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(54) **Support and actuation device for coplanar sliding doors, in particular for floor and hanging wardrobes, also of reduced sizes**

(57) Support and actuation device for coplanar sliding doors, in particular for floor and hanging wardrobes, also of reduced sizes.

Device adapted to allow the displacement of the doors (6) from a closed position thereof to an opened position thereof, and vice-versa, and to allow the sliding of the opened doors onto the closed doors.

Device comprising a first group of upper component parts (13), and a second group of lower component parts (14), of which the upper component parts (13) need for supporting the doors (6) allowing their sliding both in the longitudinal direction and in the transversal direction, namely in the wardrobe depth, whereas the lower component parts (14) need for guiding the sliding of the doors (6) in the same sliding directions of the upper component parts (13) and in synchronism with the same.

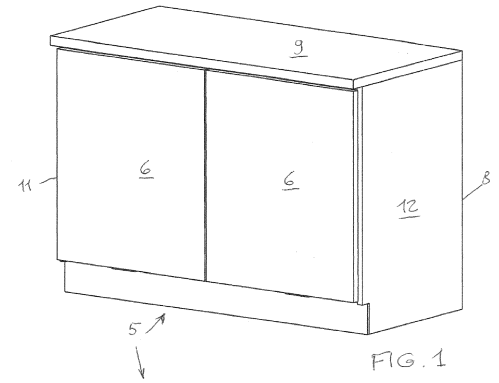

FIG. 1

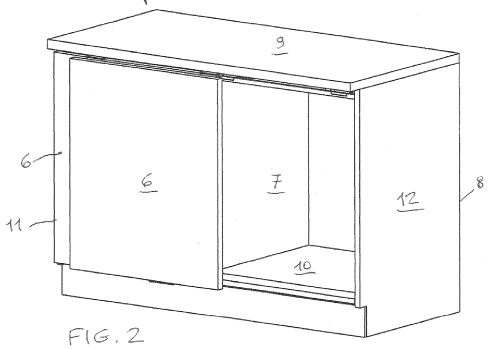

FIG. 2

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Description

[0001] The invention relates to a support and actuation device for coplanar sliding doors, in particular for floor and hanging wardrobes, the doors of which are made of a type slidable in an alternate longitudinal direction along upper and lower rectilinear guide members, that are applied respectively in the ceiling and the bottom of the related wardrobe, and such doors are actuated in alternate longitudinal sliding directions, in position which are coplanar to each other, from the opened position to the closed position thereof, and vice-versa.

[0002] There are known support and actuation devices for sliding doors for wardrobes of reduced sizes, normally used for example in the kitchens, the doors of which opened like a "book".

[0003] Into the wardrobes of this kind that are placed onto the floor, it is requested a particular attention to the arrangement of the wardrobes and to the encumbrance of their doors, for allowing to have available space for opening and closing the doors for accessing into the internal compartments of the wardrobes.

[0004] Furthermore, in the case of wardrobes of reduced sizes used as hanging wardrobes, their doors are arranged at the person heads height, so that it is required to be very careful during to opening and the closing of the doors, for preventing that the same come in contact with the same persons, and therefore may produce damages.

[0005] There also known support and actuation device for sling doors for floor wardrobes or of the hanging type, the doors of which are sliding in the alternate directions, into positions coplanar to each other, in a manner that a flat and uniform front wall is obtained in the door closing position.

[0006] In these systems for opening and closing the doors for wardrobes, the doors are at first displaced from a closed position to an opened position thereof, in which they are at first displaced forward with a limited stroke and then are let to slide laterally in the desired position thereof, parallel to the plane of the wardrobe front face, along guide members which are rectilinear and parallel to each other and are applied on to the bottom and into the ceiling of the wardrobes, thereby for accessing into the internal compartments of the wardrobes, and then such doors are displaced laterally to the closed position thereof with a reverse movement.

[0007] The object of the present invention is to provide for a support and actuation device for sliding coplanar doors, in particular for floor and hanging wardrobes, realized with a simplified mechanical structure which can be assembled easily and quickly, for determining the actuation of the doors in a simple manner.

[0008] This support and actuation device is realized with the constructive characteristics substantially described, with particular reference to the attached patent claims.

[0009] The invention will be better understood from the following description, that is given by way of nonlimiting example and with reference to the accompanying drawings, in which:

- Figure 1 shows a perspective front view of a wardrobe to be displaced onto the ground, provided with two doors and incorporating the support and actuation device according to the present invention, in which both the doors are displaced in the closed position thereof, in the position aligned to each other ;
- Figure 2 shows a perspective front view of the wardrobe of the Fig. 1, with one door displaced in the opened position thereof, in which this latter is overlapped to the other door ;
- Figure 3 shows a perspective front view of the wardrobe into the same position of the Fig. 2, with the two doors overlapped to each other and with the relative upper and lower component parts of the wardrobe ;
- Figure 4 shows a perspective front view of a first and a second group of upper and lower component parts assembled into the wardrobe, to be applied to the back wall of a relative wardrobe door;
- Figure 5 shows a perspective front exploded view of all the upper component parts of the Fig. 4, disassembled to each other ;
- Figure 6 shows a front exploded view of all the lower component parts of the Figure 4, disassembled to each other ;
- Figure 7 shows a perspective rear view of one wardrobe door, wherein the upper and lower component parts are assembled ;
- Figure 8 shows a perspective front view of some component parts assembled to each other of the group of upper components parts of the Fig. 4 ;
- Figure 9 shows a perspective front exploded view of some upper component parts of the Fig. 8, disassembled to each other ;
- Figure 10 shows a cutaway view in the wardrobe transversal direction, and illustrating the component parts of the first upper group and the second lower group of the Fig. 4, applied into a hanging wardrobe of reduced seizes, with the door displaced in the closed position thereof;
- Figure 11 shows a cutaway view in the wardrobe transversal direction, and illustrating the hanging wardrobe of the Fig. 10 in which there are applied the same component parts and with the door displaced in the opened position thereof;
- Figure 12 shows a view from below of the wardrobe according to the present invention, with the lower component parts thereof applied into the relative doors ;
- Figure 13 shows a partially cutaway plan view of the wardrobe according to the present invention, with the upper component parts applied into the same ;
- Figure 14 shows a perspective front view of the wardrobe of the Fig. 1, with both the doors partially displaced in the opened position thereof, in a manner

to make visible the internal compartment which is partially opened centrally ;

- Figure 15 shows a partially cutaway plan view of the wardrobe according to the present invention, with the upper component parts thereof displaced toward the middle of the relative door, for allowing the movement of the doors in the position shown in the Fig. 14.

[0010] In the above-mentioned figures, it is represented a support and actuation device for coplanar sliding doors, in particular for floor and hanging wardrobes, which is realized and operates in the manner which will be described, and adapted to determine the support and actuation and sliding of the doors in alternate longitudinal directions into positions coplanar to each other, wherein the doors are actuated for being displaced from a closed position thereof, in which the doors are approached and aligned to each other and with respect to the wardrobe front plane, to an opened position thereof in which such doors are at first displaced forward with a limited stroke and then are let to slide laterally into the desired position, parallel to the plane of the wardrobe front face.

[0011] In particular, the fig. 1 and 2 show a floor wardrobe 5 provided with two front flat doors 6 identical to each other, each provided with the present support and actuation device for doors, which are actuated individually by the user who exerts a slight force onto the same for letting them to slide laterally in alternate longitudinal direction as it will be described, and of which in the present case in the Fig. 1 both the doors 6 are moved in the closed position thereof, whereas in the Fig. 2 the right door 6 is moved to the left in the opening position thereof, and results partially overlapped to the left door, which is closed, and slightly spaced away from it in the depth direction of the wardrobe, in a manner to make visible the internal compartment 7 of the wardrobe provided in the correspondence of the right door. Furthermore, each wardrobe 5 is delimited by a rear wall 8, parallel to the door 6, by an upper flat ceiling 9, by a lower flat bottom 10 and by two side walls 11 and 12.

[0012] Now, it is described in detail the support and actuation device for doors of the present wardrobe, which is assembled in each doors 6 and is visible both in the Fig. 3, wherein the wardrobe is shown without the upper ceiling 9 and the right door 6 is moved in the opening position thereof as in the Fig. 2, and in the Fig. 4 wherein such assembled device is spaced away from the relative door 6, and in the Fig. 5 and 6 wherein the different component parts of the device referred to are shown.

[0013] As visible particularly in the Fig. 4-6, the support and actuation device for doors 6 of the present wardrobe is substantially constituted by a first group of upper component parts 13 (see Fig. 3, 4 and 5) applied onto the flat ceiling 9 of the wardrobe and fixed in the upper part of the rear wall of the relative door 6, and by a second group of lower component parts 14 (see Fig. 3, 4 and 6), applied onto the flat bottom 10 of the wardrobe and fixed on the lower part of the rear wall of the relative door 6.

[0014] The first group of upper component parts 13 is substantially constituted by a thin rectilinear load-bearing section bar 15, preferably made of metallic material, having a length slightly smaller than the width of the doors adjacent to each other, in this case of the two doors 6 of the wardrobe, which section bar is fixed under the wardrobe flat ceiling 9, and is shaped like a "U" in the depth direction of the wardrobe, in a manner to define a central flat portion 16, with a width smaller than the wardrobe depth, and two short flat portions, respectively a front 17 and a back one 18, which are joined orthogonally to the end portions of the central flat portion 16, of which the rear flat portion 18 is higher than the front flat portion 17, whereas this latter is provided with two side notches 19 and 20, identical and spaced away to each other along the same portion in correspondence of the relative front door 6, in order to apply the correspondent support elements of the door, which will be described later on. Along the central flat portion 16 there are fixed, in correspondence of each door 6, a respective side wall 21 and a respective central wall 22, which are all identical and shaped as it will be described, and particularly while the side walls 21 are fixed to the free end portions of the central flat portion 16, the central walls 22 are fixed in an approached and parallel position to each other into the area comprised between the side notches 19 and 20 adjacent to each other, and under this condition between each pair of walls 21 and 22 it is defined a flat path for the sliding of the relative door 6 in the longitudinal and transversal directions, with the component parts and in the manners that will be soon described. Into each mentioned sliding path there are housed respectively an horizontal torsion bar 23 and two side sliding trucks 24 and 25, identical to each other and co-operating with the relative end portions of the torsion bar 23, as well as supporting the correspondent support elements of a relative door 6, and these component parts are made in the manner and for performing the function that will be described later on.

[0015] In turn, the second group of lower component parts 14 is substantially constituted by a thin rectilinear section bar 26, preferably made of metallic material, having a length slightly smaller than the width of the doors adjacent to each other, in this case of the two doors 6 of the wardrobe, which section bar is fixed below the lower flat bottom 10 of the wardrobe, and is shaped with two short vertical wings 27 and 28 parallel and slightly spaced away to each other in the depth direction of the wardrobe, and with an horizontal wing 29 provided integrally above said two vertical wings and that is extended slightly beyond the rear vertical wing 28 in the depth direction of the wardrobe. Such second group 14 is also constituted by a set of guide element for each door 6, adapted to allow the alternate sliding of the door in the longitudinal and transversal directions of the same wardrobe. These guide elements are formed by at least two stationary elements 30 and 31, identical to each other and secured both below said lower flat bottom 10, in the wardrobe

depth direction, and along the guide rectilinear section bar 26, into positions spaced away to each other, and are also formed by at least two movable elements 32 and 33 co-operating with the correspondent stationary elements 30 and 21, and such stationary and movable elements are realized in the manner and for the functions that will be described later on.

[0016] The Fig. 3 and 4 show respectively the first group of upper component parts 13 and the second group of lower component parts 14, which are assembled into the wardrobe and ready for being applied against the rear wall of the door 6, whereas the Fig. 5 and 6 show respectively the first group of upper component parts 13 and the second group of lower component parts 14, which are disassembled from the wardrobe and separated to each other, and finally the Fig. 7 shows the component parts assembled onto the upper and the lower parts against the rear vertical surface of each door 6, for supporting the same into the wardrobe and allowing the sliding thereof in the longitudinal and transversal directions.

[0017] Referring now to Fig. 5, 8 and 9, there are shown the different component parts separated to each other of the first group of upper component parts 13, that comprises for each door 6 the load-bearing section bar 15, the side wall 21 and the central wall 22, the torsion bar 23, and the two side sliding trucks 24 and 25 earlier specified.

[0018] In particular, each one of the side wall 21 and central wall 22 is constituted by a relative metallic or plastic piece 34 and 35, having a limited thickness, and such a length as to adapt itself between the front flat portion 17 and rear flat portion 18 of the load-bearing section bar 15, and a height identical to the height of the rear portion 18 of said load-bearing section bar, in a manner do not project itself beyond this latter, and these pieces are opportunely fixed to said load-bearing section bar. Each one of the pieces 34 and 35 is shaped with a correspondent flat longitudinal edge 36 and 37, that is depressed with respect to the higher edge 38 and 39 of the relative piece, and onto each one of said flat edges it is secured a respective end-of-stroke block 40 and 41, adapted to limit the sliding stroke of the correspondent side sliding truck, and shaped with a square shape, as well as dimensioned with such a height as to arrange itself with its upper surface at the level of the upper surface of the correspondent higher edge 38 and 39, and to arrange itself with its relative external side flat edge 42 and 43 at the same level of the external vertical surface of the side wall onto which such block is secured.

[0019] As visible particularly from the Fig. 3-5, each couple of end-of-stroke blocks 40 and 41 is associated with a door 6, and each one of the end-of-stroke blocks 40 and 41 is larger than the thickness of the respective flat edge 36 and 37 of the wall piece onto which it is fixed, in a manner to be projected slightly inward of the load-bearing section bar 15, thereby acting as end-of-stroke bearing surface of the correspondent sliding truck of such door 6. The two end-of-stroke blocks 40 and 41 delimiting the longitudinal sliding stroke of the trucks 24 and 25 of each door are fixed onto the relative wall piece in positions offset to each other, and in particular in the present example the end-of-stroke blocks 40 and 41 of the left door 6 are fixed the one onto the flat edge 36 of its wall piece, in the position in which it is arranged into contact with the higher edge 38 of the same wall piece, and the other one is fixed onto the flat edge 37 of its wall piece, in the central position of the same edge. In turn, the end-of-stroke blocks 40 and 41 of the right door 6 are fixed into positions which are inverse with respect to the previous blocks, that is that the block 40 is fixed onto the flat edge 36 of the its wall piece, in the central position of the same edge, whereas the block 41 is fixed onto the flat edge 37 of the its wall piece, in the position in which it is arranged into contact with the higher edge 38 of the same wall piece.

[0020] With this arrangement of the different end-of-stroke blocks, therefore, the blocks 40 and 41 fixed to the wall pieces 34 and 35 applied to the end portions of the load-bearing section bar 15 are arranged in the same position, whereas the blocks 40 and 41 fixed to the wall pieces 34 and 35 applied in the central position of the load-bearing section bar 15 are also arranged in the same position, which however is offset with respect to the position of application of the previous blocks.

[0021] In this manner, into the free area defined between the inner flat edges 44 and 45 of the blocks 40 and 41, fixed in the central position of the load-bearing section bar 15, and the opposed front flat portion 17 of the same load-bearing section bar, the sliding trucks 24 and 25 of each door 6 may slide in alternate longitudinal directions, when such trucks do not interfere with these central blocks, in the extracted position of the same door, and under this condition it is possible to displace singularly each one of the two doors 6 of the wardrobe from the closed position thereof, in which it is re-entering into the wardrobe and its trucks 24 and 25 are abutting the relative blocks, to the opened position thereof, in which the door is displaced in the extracted position thereof, and its trucks do not interfere with the same blocks. In particular, when one of the doors, for example the left door 6, is displaced in the opened position thereof, it is at first displaced in its extracted position, together with the relative trucks 24 and 25, and in this position such door is moved away in front of the other door, that is displaced in the closed position thereof, and then this door is let to slide in the longitudinal direction of the wardrobe, in a position parallel to the closed door, up to be partially or completely overlapped to the closed door, thereby making accessible the internal compartment of the wardrobe associated with this opened door. In turn, the torsion bar 23 of each door 6 is supported at its end portions by the sliding trucks 24 and 25 of the same door and provides for sliding these trucks in the manners that will be soon described, and under this condition the wardrobe torsion bars 23 may be displaced, together with the relative trucks, during the displacement of each door from the one to the other one

of its opened and closed positions, and in particular when both the doors 6 are closed their torsion bars 23 are displaced in the position re-entering into the load-bearing section bar 15 of the wardrobe, together with the relative trucks 24 and 25, in the position in which the left door is displaced, as visible in the Fig. 3-5, while when one of the doors 6 is opened its torsion bar 23 is displaced in a position displaced forward in front of the load-bearing section bar 15, together with the relative e trucks 24 and 25, in the position in which the right door visible in the Fig. 3-5 is displaced. With particular reference to Fig. 5, 8 and 9, now it is described in detail the conformation of each one of the sliding trucks 24 and 25, of the torsion bar 23 and of the support elements for a relative door 6. In particular, each one of these sliding trucks is substantially constituted by a thin plate 46, preferably made of metallic material, shaped with almost quadrangular shape, with a length smaller than the width of the central flat portion 16 of the load-bearing section bar 15, and with a width smaller than the length of the same plate, in a manner that such plate 46 may be adaptable by sliding into said flat central portion 16, both in the longitudinal direction and the transversal direction of the same. This plate 46 is shaped in its front part with a short raised flat front edge 47, and in its rear part with a "C"-shaped fork 48, defining two horizontal wings 49 and 50 joined to each other by a vertical flat stem 51, and turned toward the rear flat portion 18 of the load-bearing section bar 15. The raised flat front edge 47 of the plate 46 is joined with the vertical stem 51 of this latter, in succession with an enlarged cylindrical zone 52, into which a cylindrical through hole 53 is provided for all the width of the plate 46, with a thin horizontal flat portion 54 and with an additional enlarged cylindrical zone 55, int5o which a threaded cylindrical through hole 56 is provided for all the width of the plate 46, which hole has a diameter smaller than the diameter of the previous cylindrical through hole 53. Through the horizontal wings 49 and 50 of the plate 46 it is vertically provided a central through hole 57, for inserting a correspondent cylindrical stem 58 of a thin flat pulley 59, in a manner that such stem may be inserted into the through hole 57, for the function that will be described later on.

[0022] The cylindrical through hole 53 of each plate 46 acts for supporting a correspondent end portion of the torsion bar 23, as it will be described, whereas the cylindrical hole 57 of such plate needs for inserting the correspondent cylindrical stem 60 of a short horizontal cylindrical pivot 61, performing the function of guiding the plate 46, during the lateral sliding of the same in the transversal direction of said central flat portion 16.

[0023] Into the sliding path of each door 6 there are arranged two plates 46 in side position, for supporting the relative torsion bar 23 as it will be described, and each plate 46 is positioned with its raised front sliding edge 47 turned toward the front portion 17 of the load-bearing section bar 15 and with its rear fork 48 turned toward the rear portion 18 of said load-bearing section bar, as previously described, and such plate 46 has an height smaller than the height of said rear portion 18, in a manner that onto the same plate it may then fixed the relative support element for the door 6, the thickness of which is such that under this assembled condition it isn't projected with its upper surface beyond the height of this rear portion 18.

[0024] Furthermore, under this arrangement condition of the plates 46, each one of said pivot 61 is inserted into the relative plate in a manner to be projected laterally outward, so as to guide the transversal sliding of the same plates into the load-bearing section bar 15 as will be described.

[0025] Fig. 5, 8 and 9 shown now a torsion bar 23, that is substantially constituted by a lengthened rectilinear cylindrical bar 62 having a length almost identical to the width of each door 6, and a diameter slightly smaller than the diameter of the cylindrical through hole 53, and the end portions of this bar are each shaped with a short restricted portion 63, defined by two flat side millings 64 parallel to each other, and with a short terminal cylindrical portion 65, having a diameter smaller than the diameter of the lengthened bar 62. The torsion bar 23 is also constituted by two sprocket wheels 66, 67, identical to each other, adapted to be inserted into and made integral in rotation with the end portions of the same bar. On to the end portion of the lenghtened bar where the sprocket wheel 66 is fixed, there are inserted in succession a regulating handle 68, externally knurled for facilitating the handgrip of the operator, an elastic friction ring 69 and a torsion spring 70, the tension of which is regulated by acting onto the regulating handle 68. This end portion of the lenghtned bar is then completely inserted through the through hole 53, in a manner that the restricted portion 63 and the terminal cylindrical portion 65 are projected beyond the left edge of the plate 46, for inserting onto such end portion the sprocket wheel 66, and that the torsion spring 70, the elastic friction ring 69 and the regulating handle 68 are placed beyond the opposite edge of the same plate. Thereafter, the sprocket wheel 66 is inserted onto the end portion of the lenghtened bar, that for this aim is provided with an internal through hole 71 in which two side flat notches 72 are provided parallel to each other, and dimensioned for being adapted onto the corrispondent flat millings 64 of said restricted portion 63, in a manner that the sprocket wheel 66 be supported in this position and be then opportunely torsionally fixed onto such end portion, and under this condition said terminal cylindrical portion 65 be slightly projected beyond the sprocket wheel 66, for acting as guide during the sliding of the plate 46 in the alternate transversal direction through the load-bearing section bar 15. In turn, the elastic friction ring 69 is introduced under elastic pressure onto a cylindrical projection 73 of the regulating handle 68 and has a peripheral cut 74 for inserting the correspondent end portion 75 of the torsion spring 70, which is also inserted through a peripheral cut 76 of the regulatin handle 68. The other end portion 77 of the torsion spring

70 is laid onto the horizontal flat portion 54 of the plate 46, thereby determining the torsion of the torsion spring 70 on to itself, in the manner that will be descibed, during the alternate transversal sliding of the plate 46 end the torsion bar 23 through the load-bearing section bar 15.

[0026] Indeed, this transversal sliding of the plate 46, and therefore of the torsion bar 23, that is produced by acting manually onto the door in a manner to push it with a short stroke for opening and pushing it inward the wardrobe for the entire stroke for closing it again, is allowed and driven by the engagement of the sprocket wheels 66 with the correspondent toothing 78 of a rectilinear rack 79 (see Fig. 10 and 11), that is fixed in the transversal direction onto the central flat portion 16 of the load - bearing section bar 15, solely for the front middle part of the same central portion, in a manner that during the displacement of the plate 46 in the alternate transversal direction through the load -bearing section bar 15, the sprocket wheel 66 rotates in the same displacement direction, by engaging with the rectilinear rack 79, and determining a consequent rotation also of the torsion bar 23 in the same rotation direction thereof Then, under this condition, the rotation of the torsion bar 23 provides for the torsion of the torsion spring 70 onto itself in either one direction, thanks to the fact that while the end portion 75 of the spring being constrained with the torsion bar 23 rotates together with this latter, the other end portion 77 of such spring remains stationary in that it is constrained with the plate 46.

[0027] In this manner, the torsion spring 70 is completely wound onto itself, and therefore is pre-loaded with the maximum force, when the door 6 is displaced in the closed position thereof, and under this condition the plate 46 of said sliding trucks 24 is displaced in the direction of the depth of said load -bearing section bar 15, in a manner that the back fork 48 of the plate 46 is abutting on to the stem 58 of the flat pulley 59, and therefore is arranged close to the rear flat portion 18 of the same load-bearing section bar (se Fig. 10), and under this position the sprocket wheel 66 of the torsion bar 23 is displaced in the termini rear position of the toothing 78 of the rectilinear rack 79.

[0028] Besides, in this closing position of the door 6, the door is kept in this position by the control mechanism that will be described later on, that acts against the torsion bar 23 in a manner to prevent the accidental return in the opened position thereof, and that allows such return only after having exerted a slight pressure against the door 6, under the condition in which said mechanism disengages the door as it will be described, and the torsion spring 70 discharges the tension loaded during the torsion onto itself and, by unwinding itself in the direction reverse than the previous one, it exerts such a force as to push in the reverse direction the truck 24 and the sprocket wheels 66, together with the torsion bar 23, so that such force brings back the truck 24 in the opening position thereof (see Fig. 11), wherein the sprocket wheel 66 by rotating in the same direction on to the toothing 78 of the rectilinear rack 79 brings it back in the front position of the same rectilinear rack, and consequently also the door 6 is displaced in the extracted opened position thereof For displacing the door 6 again into its closed position, previously described, it is necessary to exert a greater pressure against the door 6, by pushing it inward the wardrobe, so as to wind the torsion spring 70 onto itself again.

[0029] As already specified, the tension of the torsion spring 70 may be changed into established limits, by actuating in rotation the regulating handle 68, that determines the consequently rotation of the end portion 75 of the spring 70 and hence a torsion of the same spring. As particularly visible in Fig. 8, the other end portion of the lenghtened bar 62 of the torsion bar 23 is also inserted through the correspondent through hole 53 of the other shaped plate 46, and onto such end portion it is at first fixed the relative sprocket wheel 67 in the same manner, moreover by letting the terminal cylindrical portion 65 to be projected outward, which portion performs the same function of the above-described one. Also in this case, the sprocket wheel 67 engages a correspondent rack (not indicated) secured on to the load-bearing section bar 15 in the same manner and performing the same function of the previously described rack 79. Now, it is described the control mechanism that allows to hook and unhook the torsion bar 23, when this latter is displaced into the closed position of the door 6. This mechanism is substantially constituted (see Figs. 5 and 8) by a short cylindrical sleeve 80, assembled on and secured to the lengthened bar 62 near the edge of the plate 46 opposite to that where the sprocket wheel 67 is assembled, which sleeve is integral with a rectilinear cylindrical bar 81, projected orthogonally and in the horizontal direction from the sleeve 80, and which is supported and slides in the alternate direction through a correspondent through hole 82 of a relative support bracket 83 provided with flat side wings 84, that are fixed onto said central flat portion 16 of the load- bearing section bar 15, and the flat end part 85 of such bar 81 is co-operating with a correspondent elastic element 86 which is fixed against the rear flat portion 18 of the load-bearing section bar 15. In particular, such elastic element 86 is a traditional element of the so-called type push and open, push and close, namely it can be actuated by a push into two different positions, extracted and re-entering, and when it is pushed from its extracted position to its re-entering position, it remains in this latter position, and when it is pushed again it is brought back in its extracted position and remains in this latter position. In this manner, when the door 6 is displaced from its opened to its closed position, the transversal sliding of said torsion bar 23 provides for also the sliding of the bar 81 through the bracket 83, until the end part 85 of the bar is arranged into contact with the elastic element 86, and displaces it in the re-entering position, and under this condition the bar 81 remains hooked to the elastic element in this position, together with the torsion bar 23. On the contrary, when the door 6 is slightly

pushed, also the end part 85 of the bar 81 is pushed against the elastic element 86, so that this latter displaces itself in the extracted position thereof and provides for unhooking the bar 81 which, by sliding through the bracket 83, is therefore brought back, together with the torsion bar 23, in the door opened position, thanks to the action of the torsion spring 70 as previously described.

[0030] The alternate transversal sliding through the load- bearing section bar 15 of the two plates 46, associated with each door 6, is also guided by the relative pivots 61 projected from the correspondent plates 46, which are inserted by sliding through a relative horizontal guide through slot 87 and 88, provided into the correspondent side wall 21 and the central wall 22, as well as it is guided by the relative end portions 65 projected from the correspondent plates 46, which are inserted by sliding through another horizontal guide through slot 89 and 90, always provided into the correspondent side wall 21 and central wall 22, however into different positions which do not interfere with the previous through slot.

[0031] Now, there are described the two support elements for each wardrobe door 6, which are applied into the door 6 in a position coincident with the position of the relative plate 46 and the relative side notches 19 and 20 of the front flat portion 17, and each one of them is constituted by a thin support bracket 91, visible in the Figs. 3-5 displaced into the wardrobe and in the Fig. 7 applied against the rear wall of a door 6, which bracket is provided with an upper stepped shaped portion 92, in a manner do not interfere with the underlying door during the side transfer, and with a front flat plate 93 integral with this latter and bent orthogonally with respect thereto, wherein the upper portion 92 has a set of steps having an horizontal arrangement, which is raising from the front part towards the back part of the same portion, and with such a size as to adapt itself and to be opportunely fixed onto the upper surface of the relative plate 46, and such upper portion 92 is joined, in correspondence of the beginning and the end of the first step 94 of the set of steps, with a respective short lower edge 95 and 96 directed downward and spaced away to each other.

[0032] In turn, the front flat plate 93 is shaped with quadrangular form and is adapted to be fixed against the rear surface of the door 6, in the upper zone thereof, in a manner that each support bracket 91 is fixed to and supported at its one end portion by the door 6 and fixed with its other end portion to the correspondent plate 46. For securing the vertical plate 93 to the door, it is provided with a set of horizontal through holes 97 for the passage of screws, bolts or other suitable fastening means (not indicated), while in turn the other end portion of the same brackets is shaped with a tapered end part 98, adapted to engage itself by sliding into the correspondent groove 99 of the relative flat pulley 59, when the door 6 is displaced in the closed position thereof (see Fig. 10), therefore by keeping the door always orthogonal to the floor.

[0033] After the application of the two brackets 91 as described, the displacement of the door 6 outwards or inwards the furniture determines a consequently sliding of the brackets 91, the plates 46 and the torsion bar 23 in the same direction and in particular, when the door 6 is displaced in the closed position thereof, the upper portion 92 of the brackets 91, the plates 46 and the torsion bar 23 are completely introduced into the load-bearing section bar 15, while the front plates 93 are inserted and housed into correspondent side notches 19 and 20 of the same load-bearing section bar. Vice-versa when the door 6 is displaced in the opened position thereof, said brackets 91, plates 46 and torsion bar 23 are displaced in the extracted position thereof, wherein the raised edges 47 of the plates 46 are aligned to each other, while the front plates 93 are extracted and moved away forward with respect to the correspondent above mentioned notches 19 and 20.

[0034] For determining the longitudinal sliding into the wardrobe of each door 6 being displaced in the above extracted position, in a manner to displace it in the position overlapped to the other door 6, which is closed, into each bracket 91 there are provided at least two sliding wheels 100 identical to each other and having an adequate diameter (see Figs. 5, 7, 10 and 11), which are supported by the lower edge 96 of the relative bracket 91, in positions aligned and spaced away to each other in the transversal direction of the same edge, and are shaped with a central groove 101, and with a central through hole 102, and these wheels 100 are fixed in position by means of a relative short pivot 103, inserted through said through hole 102 and a correspondent hole 104 of such lower edge 96, in a manner that the wheels are idle in rotation. With this arrangement of said sliding wheels 100, moreover, the same are supported onto the raised front edge 47 of the relative plates 46 and, therefore, when a door 6 has been displaced in its extracted position, in which the plates 46 and their raised edges 47 have been displaced in front of the correspondent components of the other closed door, this extracted door may be let to slide laterally thanks to the sliding of the relative wheels 100 onto said raised edges 47, up to the position in which said wheels 100 are moved away laterally from the same raised edges, and however are always aligned with the same, and during this sliding the brackets 91 of such extracted door do not interfere with the brackets 91 of the closed door, and under this condition the extracted door is overlapped to the closed door, thereby making accessible the relative internal compartment of the wardrobe. Thereafter, for bringing back this so opened door to its closed position, there are repeated the operations in the inverse direction.

[0035] Now, it is described the second group of lower component parts 14 that, as already described, are applied onto the flat bottom 10 of the wardrobe and fixed at the lower part to the rear wall of the relative door 6, and are constituted by at least two stationary elements 30, 31 and by at least two movable elements 32, 33, as previously described, and these lower component parts 14 are now described in detail with reference to the Figs.

4 and 6, wherein they are shown during the assembly phase into the wardrobe and to the Fig. 7, wherein they are shown applied to the rear wall of a door 6, in the middle lower part of the same.

[0036] The stationary elements 30 and 31, which are preferably realized in plastic material, are arranged and applied into the wardrobe in correspondence of the bottom 10 of the same wardrobe, into the middle position of the relative door 6, and each one of these stationary elements is constituted by a portion of flat rectilinear section bar 105 with a limited width, arranged and applied in a position correspondent to that of the overlying rack 79 and having at least the same length of this latter, and this section bar portion 105 is shaped with two side rectilinear hollows 106 for almost the entire length thereof, by defining two sliding guide members for the correspondent movable elements 32 and 33, as it will be described later on. Such section bar portion 105, furthermore, is joined with an enlarged end part 107 which is opportunely secured below the horizontal wing 29 of said rectilinear guide section bar 26. In turn, the movable elements 32 and 33 are realized with plastic or metallic material and are shaped each one with a square form, defined respectively by an horizontal flat portion 108 and 109 having almost the same length of the portion of section bar 105, for co-operating with it as it will be described, and by a vertical flat portion 109' and 110 bent orthogonally upward from its own horizontal portion and with a size smaller than the size of said horizontal portion, and these vertical portions are bored for allowing the passage of screws, bolts or the like for fixing the same vertical portions, and therefore also the movable elements, to the vertical rear wall of the door 6, in the lower middle position of the same, as visible in the Fig. 7, in a manner that the horizontal portion of each movable element is projected towards the wardrobe, in a position correspondent to that of the relative portion of section bar 105.

[0037] Onto the upper surface of each of said horizontal flat portions 108 and 109 there are fixed two pairs of short supports, spaced away to each other in the longitudinal direction of the relative horizontal portion, the first pair of which is formed by the two supports of cylindrical shape 110 and 111 arranged in the front and transversal direction of the relative horizontal portion 108 and 109, which are fixed onto a short vertical edge 112 obtained by bending upward the material of the same horizontal portion, and are aligned and slightly spaced away from each other, thereby defining a short free space, and in the opposite walls of such cylindrical supports 110 and 111 it is pivoted a relative idle wheel 113 and 114, which are identical to each other and have a reduced diameter and a horizontal rotation axis, and these wheels are spaced away to each other of such extent as to be able to engage by sliding into the correspondent side sliding guide member 106 of the relative portion of section bar 105.

[0038] Furthermore, the second pair of supports is formed by the two cylindrical supports 115 and 116, identical to each other and to the previous supports 110 and 111, which are arranged and fixed in the transversal direction and almost in the central zone of the relative horizontal portion 108 and 109, with the same arrangement and size of said two previous supports, and onto the opposite walls of said cylindrical supports 115 and 116 it is also pivoted a relative idle wheel 117 and 118, which are identical to the previous ones and also spaced away to each other of the same extent, in order to be able to engage by sliding the correspondent side sliding guide member 106.

[0039] Finally, into the two cylindrical supports 115 and 116 there are pivoted laterally a first and a second sliding wheel 119 and 120 with a vertical rotation axis, in positions opposite to each other and turned outwards the horizontal portion, and these wheels are spaced away to each other of such extent as to be able to be arranged on to the flat vertical wing 28 of the rectilinear guide section bar 26, and to be able to slide along the same, when the door 6 is let to slide in the alternate longitudinal direction of the wardrobe. In this manner, the presence of the above-described stationary and movable elements allows the sliding of each door 6 both in the depth direction of the wardrobe and in the longitudinal direction of the wardrobe, for being displaced from the one to the other one of its opened and closed positions.

[0040] Then, in the first case the sliding of the pairs of the idle wheels 113 and 114 and 117 and 118 along the rectilinear guide members 106, forces the door 6 to stay always perfect vertically and perpendicular to the wardrobe, while in the second case the sliding of the pair of the idle wheels 119 and 120 along the rectilinear guide section bar 26 is allowed only when the door is opened (see Fig. 11), under the condition in which the idle wheels 119 and 120 are arranged sliding on to the flat vertical wing 28 of said guide section bar.

[0041] Referring now to the Figs. 10, 11 and 12, shown therein is the arrangement of the vertical legs for supporting the wardrobe onto the floor, which are opportunely offset to each other to prevent interferences with the horizontal portions 108 and 109 during the sliding of the doors 6 in the wardrobe longitudinal direction. To the aim, from such Figures it is noted that the rear support legs 121, 122, 123 and 124 of the wardrobe are all arranged aligned and opportunely spaced away to each other, whereas the relative front leg 125 and 126 of the wardrobe is arranged in the side position of the same wardrobe, and that the relative intermediate leg 127 and 128 of the wardrobe is arranged in a position misaligned with such front legs 125 and 126, and does not interfere with the longitudinal sliding of the stationary elements 30 and 31 and the movable elements 32 and 33 of each door 6, when this latter is displaced into the opened position thereof. From Fig. 12 it is noted also that the lower stationary and movable elements of the lower component parts 14 of each door 6 are fixed to the relative door in misaligned positions symmetrical to each other, in a manner that when the two doors are overlapped to each other

such stationary and movable elements aren't overlapped to each other and, therefore, being not interfering to each other, allow the sliding of the doors without obstacles.

[0042] In the Fig. 13 it is noted the arrangement of the different components of the first group of upper component parts.

[0043] Finally, in the Figs. 14 and 15 it is noted a wardrobe with two sliding doors with the upper sliding trucks 24 and 25 which are displaced towards the middle of the relative door 6, under the condition in which it is also possible to let to slide the doors outwards, by allowing the access of the wardrobe central part with a smaller displacement of the door.

Claims

1. Support and actuation device for coplanar sliding doors, in particular for floor and hanging wardrobes, also of reduced sizes, adapted to determine the support and the actuation and sliding of the doors (6) in alternate longitudinal directions in positions coplanar to each other, wherein the doors (6) are actuated from a closed position thereof, in which they are aligned with respect to the wardrobe (5) front face, to an opened position thereof in which they are at first displaced forward and then are let to slide laterally in the desired position thereof, parallel to the plane of the wardrobe front face, and vice versa, the wardrobe (5) comprising at least two flat front doors (6), a rear wall (8), an upper flat ceiling (9), a flat lower bottom (10) and two side walls (11, 12), the support and actuation device being substantially constituted by a first group of upper component parts (13) applied on to the flat ceiling (9) and secured with their upper part to the rear wall of the relative door (6), and by a second group of lower component parts (14), applied on to the flat bottom (10) of the wardrobe and fixed with their lower part to the rear wall of the relative door (6), said first group (13) comprising a load-bearing rectilinear section bar (15) fixed below the flat ceiling (9), and said second group (14) comprising a rectilinear guide section bar (26) secured below the flat bottom (10), **characterized in that** said load-bearing section bar (15) is shaped with a U-shape in the direction of the depth of the wardrobe, in such a way to define a central flat portion (16), with a width smaller than the depth of the wardrobe, and two short flat portions, respectively front (17) and rear (18) portions, which are joined orthogonally to the end portions of the central flat portion (16), of which the front flat portion (17) is provided with two side notches (19, 20), identical and spaced away to each other along the same portion in correspondence of the relative front door (6), and along the central flat portion (16) there are fixed, in correspondence of each door (6), a respective side wall (21) and a respective central side wall (22), which are all identical to each other, of which the side walls (21) are secured to the free end portions of the central flat portion (16), whereas the central side walls (22) are secured in an approached and parallel position to each other into the area comprised between the side notches (19, 20) adjacent to each other, under the condition in which between each pair of side walls (21, 22) a flat path is defined for the sliding of the relative door (6) in the longitudinal and transversal directions, said load bearing section bar (15) co-operating with movable means (23,24,25) adapted to support a relative door (6) and to displace the same in the longitudinal and transversal directions of the same load bearing section bar, from a closing to the opening position of the same door, and vice versa ; and **characterized in that** said guide section bar (26) is shaped as a horizontal sliding guide member, formed preferably by at least an horizontal wing (29), and co-operating with stationary guide members (30, 31) and movable guide members (32 ,33), adapted to drive the sliding of the relative door (6) in the longitudinal direction of said guide section bar (26) and transversal direction in the direction of the wardrobe depth.

2. Device according to claim 1, **characterized in that** each of said side (21) and central (22) walls is constituted by a relative piece (34, 35), shaped with a correspondent longitudinal flat edge (36, 37), which is depressed with respect to the upper side (38, 39) of the relative piece, and a respective end-of-stroke block (40, 41) of said movable means (23, 24, 25) is fixed on to each one of said flat edges, wherein each pair of end-of stroke blocks (40, 41) is associated with a door (6), and each one of the end-of-stroke blocks (40, 41) is larger than the thickness of the respective flat edge (36, 37) of the side wall part to which it is fixed, in a manner to be protruded slightly inward of said load bearing section bar (15), and to act so as an end-of-stroke abutment surface of the correspondent said movable means (23,24,25), wherein the two end-of-stroke blocks (40, 41) delimiting the longitudinal sliding stroke of said movable means of each door (6) are fixed on to the relative side wall part in positions offset to each other, and with this arrangement of the different end-of-stroke blocks, therefore, into the free space defined between the respective internal flat edges (44,45) of the blocks (40, 41), fixed in the central position of said load bearing section bar (15), and the opposite front flat portion (17) of the same load bearing section bar, there may slide in the alternate longitudinal direction said movable means (24, 25) of each door (6), when these latter do not interfere with these central blocks, in the extracted position of the same door, and under this condition it is possible to displace singularly each door (6) of the wardrobe from its closing position, in which it is re-entered inward the wardrobe

and its movable means (24, 25) are abutting to the relative blocks, to its opening position in which it is displaced in the extracted position, and its movable means do not interfere with the same blocks.

3. Device according to claim 2, **characterized in that** said movable means (23, 24, 25) are constituted by a torsion bar (23) and by at least two sliding lateral trucks (24, 25), identical to each other and co-operating with the relative end portion of said torsion bar (23) as well as supporting the correspondent support elements of a relative door (6), said torsion bar (23) of each door (6) being supported by its end portions by said sliding trucks (24, 25) of the same door for determining the transversal sliding of the same trucks, from the one to the other one of the closed and opened position of the relative door (6).

4. Device according to claim 3, **characterized in that** each of said sliding trucks (24, 25) is substantially constituted by a thin plate preferably of metallic material (46), shaped of almost quadrangular form, with a length smaller than the width of the central flat portion (16) of said load bearing section bar (15), and with a width smaller than the length of the same plate, in such a way that such plate (46) may be slidably adapted into the above central flat portion (16) both in the longitudinal direction and the transversal direction of the same, said plate (46) being shaped at its front part with a short raised front flat edge (47), and at its back part with a C-shaped fork (48), by defining two horizontal wings (49, 50) joined to each other by a vertical flat stem (51), and turned toward the rear flat portion (18) of the load- bearing section bar (15), said short raised front flat edge (47) being joined with said vertical stem (51), in succession with an enlarged cylindrical zone (52), into which a cylindrical through hole (53) is provided for all the width of the plate (46), with a thin horizontal flat portion (54) and another enlarged cylindrical zone (55), into which a cylindrical threaded through hole (56) is provided for the width of the plate (56), which hole has a diameter smaller than the diameter of the previous cylindrical through hole (53), and through said horizontal wings (49, 50) being provided vertically a central through hole (57), for inserting of a correspondent cylindrical stem (58) of a thin flat pulley (59), in such a way that said stem may be inserted into said through hole (57), the cylindrical through hole (53) of every plate (46) being adapted to support a correspondent end portion of said torsion bar (23), while said cylindrical hole (57) is adapted to insert the correspondent cylindrical stem (60) of a short horizontal cylindrical pivot (61), performing the function of guide of the plate (46), during the side sliding of the same in the transversal direction of said central flat portion (16).

5. Device according to claim 4, **characterized in that** into the sliding path of each door (6) two plates (46) are arranged in a side position, for supporting the relative torsion bar (23), and each plate (46) is arranged with its raised front edge (47) turned toward the front portion (17) of said load bearing section bar (15) and with its back fork (48) turned toward the rear portion (18) of the same load- bearing section bar, and such plate (46) has a height smaller than the height of said rear portion (18), in a manner that the relative support element of the door (6) may be then fixed on to the same plate, in which the thickness of the support element is such that in this assembled condition it doesn't protrude with its upper surface beyond the height of said rear portion (18), and under this arrangement condition of the plates (46), each one of said pivots (61) is inserted into the relative plate in a manner to protrude laterally outward, for co-operating with the correspondent said side and central walls (21, 22) and thereby to guide the transversal sliding of the same plates into the load- bearing section bar (15).

6. Device according to claim 5, **characterized in that** each torsion bar (23) is substantially constituted by a lengthened rectilinear cylindrical bar (62) having a length almost identical to the width of each door (6), and a diameter slightly smaller than the diameter of the said cylindrical through hole (53), and the end portions of said bar are each shaped with a short restricted portion (63), defined by two flat side millings (64) parallel to each other, and with a short terminal cylindrical portion (65), having a diameter smaller than the diameter of the lengthened bar (62), said torsion bar (23) being also constituted by at least two transmission members (sprocket wheels 66, 67) identical to each other, adapted to be inserted into and made integral in rotation with the end portions of the same bar, wherein the restricted portion (63) of each end portion of the bar (13) is at first inserted through the correspondent said through hole (53) of the relative plate (46) and thereafter into a correspondent through hole (71) of the relative transmission member (66, 67), in a manner that said terminal portions (65) are slightly projected therefrom and are co-operating with said side and central walls (21, 22), for acting as guide during the sliding of said plates (46) in the alternate transversal direction through said load- bearing section bar (15), and on to the end portion of the bar where one of said transmission members (sprocket wheel 66) is fixed, there are inserted in succession a regulating handle (68), an elastic friction ring (69) and a torsion spring (70), the tension of which is regulated by acting on to said regulating handle (68), and an end portion (75) of said torsion spring (70) being inserted both through a side cut (74) of said elastic friction ring (69), which is introduced with elastic pressure onto a cylindrical

projection (73) of said regulating handle (68), and also through a side cut (76) of the same regulating handle, and the other end portion (77) of said torsion spring (70) being laid onto the horizontal flat portion (54) of the plate (46), so as to provide for the torsion of the torsion spring (70) onto itself during the alternate transversal sliding of the plate (46) and the torsion bar (23) through the load- bearing section bar (15), which is generated by acting manually onto the door in a manner to push it for a short stroke for opening and pushing it inwardly the wardrobe for the entire stroke for re-closing it, such sliding being allowed and driven by the engagement of said transmission members (sprocket wheels 66, 67) into the correspondent toothing (78) of a rectilinear rack (79) fixed in the transversal direction onto the central flat portion (16) of said load - bearing section bar (15), only for the front medium part of the same central portion, in a manner that during the displacement of the plates (46) in the alternate transversal direction through the load -bearing section bar (15) it is determined a consequent rotation also of said torsion bar (23) in the same rotation direction, under the condition **in that** the rotation of said torsion bar (23) determines the torsion of said torsion spring (70) onto itself in either one direction, and said torsion spring (70) is completely wound onto itself, and so is preloaded with the maximum force when the door (6) is displaced in the closed position thereof, and the plates (46) of said sliding trucks (24, 25) are displaced in the direction of the depth of said load -bearing section bar (15), in a manner that said back forks (48) are abutting on the stems (58) of the relative flat pulleys (59), under the condition in which said transmission members (sprocket wheels 66, 67) are displaced in the back terminal position of said toothing (78).

7. Device according to claim 6, **characterized by** a control mechanism co-operating with said torsion bar (23), in a manner to keep the door (6) in the closed position thereof, together with the torsion bar (23), by preventing the accidental return in the opened position of the door, and by allowing such return only after having applied a slight pressure against the same door, under the condition in which the torsion spring (70) discharges the tension loaded during the torsion onto itself and, by unwinding itself in the direction reverse than the previous one, it exerts such a force as to push in the reverse direction said trucks (24, 25) and said transmission members (sprocket wheels 66, 67), together with the torsion bar (23), so that such force brings back said trucks (24, 25) in the opened position thereof, by bringing back also said transmission members (66, 67) in the front position of the relative rack (79), and consequently by displacing the door (6) too in its extracted opened position, said door (6) being again displaced in the closed position thereof by applying a greater pressure against the same, and by pushing it inwardly the wardrobe, so as to wound said torsion spring (70) onto itself again.

8. Device according to claim 7, **characterized in that** said control mechanism is substantially constituted by a short cylindrical sleeve (80), assembled on and secured to said lengthened bar (62), near one of said plates (46), and integral with a rectilinear cylindrical bar (81) projected orthogonally from and in the horizontal direction of the sleeve (80), and which is supported by and sliding in alternate direction through a correspondent through hole (82) of a relative support bracket (83) provided with side flat wings (84), which are fixed onto said load- bearing section bar (15), the end flat part (85) of said bar (81) co-operating with a correspondent elastic element (86) which is fixed against said rear flat portion (18) and is constituted by a traditional element of the so-called type push and open, push and close, namely it can be actuated by means of a push in two different positions, extracted and re-entering, and when it is pushed from its extracted position to its re-entering position, it remains in this latter position, and when it is pushed again it is brought back in the extracted position thereof, and remains in this latter position, and under this condition when the door (6) is displaced from the opened to the closed position thereof, the transversal sliding of said torsion bar (23) provides for also the sliding of the bar (81) until the end part (85) of this latter is arranged into contact with said elastic element (86), and displaces it in the re-entering position, and under this condition the bar (81) remains hooked to the elastic element in this position, together with the torsion bar (23), while when the door (6) is slightly pushed, also the end part (85) is pushed against the elastic element (86), so that this latter displaces itself in the extracted position thereof and provides for unhooking the bar (81) which is therefore brought back, together with said torsion bar (23), in the opened position of the door, thanks of the action of said torsion spring (70).

9. Device according to claims 5 and 6, **characterized in that** the alternate transversal sliding through the load- bearing section bar (15) of the two plates (46), associated with each door (6), is driven by the relative pivots (61) which are inserting themselves by sliding through a relative horizontal guide through slot (87, 88), provided into the correspondent side and central walls (21, 22), as well as is driven by the relative said projected end portions (65) which are inserted by sliding through another correspondent horizontal guide through slot (89, 90), always provided into the correspondent side and central walls (21, 22), but into different positions and not interfering with the previous through slot.

10. Device according to claims 8 and 9, **characterized in that** the support elements of each door (6) are applied in this latter in a position coincident with that of the relative plate (46) and the relative side notch (19,20) of said front flat portion (17), and each one of them is constituted by a thin support bracket (91) provided both with an upper stepped shaped portion (92), for not interfering with the underlying door during the side translation, and a flat front plate (93) integral with said upper portion (92) and bent orthogonally with respect thereto, wherein said upper portion (92) has a set of horizontally directed steps, which are raising from the front part towards the back part of the same portion, and with such a size as to adapt itself and to be fixed opportunely onto the upper surface of the relative plate (46), and said upper portion (92) is joined, in correspondence of the beginning and the end of the first step (94) of the set of steps, with a respective lower short edge (95, 96) direct downward and spaced away to each other, while said front flat plate (93) is shaped with quadrangular form and is adapted to be fixed to the back surface of the door (6), in the upper zone thereof, in a manner that each support bracket (91) is fixed to and supported at its one end portion by the door (6) and fixed with the other end portion thereof to the correspondent plate (46), the free end portion of the same brackets being shaped with a tapered end part (98), adapted to engage itself by sliding into the correspondent groove (99) of the relative said flat pulley (59), when the door (6) is displaced in the closed position thereof, by keeping so the door always orthogonal to the floor, and under this condition the displacement of the door (6) externally or internally the wardrobe cabinet determines a consequent sliding of said brackets (91), plates (46) and torsion bar (23) in the same direction, and in particular, when the door (6) is displaced in the closed position thereof, the upper portions of the brackets (92), the plates (46) and the torsion bar (23) are completely inserted into the load- bearing section bar (15), while the front plates (93) are inserted and housed into the correspondent said side notches (19, 20), and on the contrary when the door (6) is displaced in the opened position thereof, said brackets (91), plates (46) and torsion bar (23) are displaced in the extracted position thereof, wherein said raised sides (47) are aligned to each other, while the front plates (93) are extracted and moved away in front of the correspondent said notches (19, 20).

11. Device according to claim 10, **characterized in that** for determining the longitudinal sliding of each door (6) into the wardrobe, which door is displaced in the extracted position thereof, in a manner to displace it in the position overlapped to the other door (6), which is closed, into each bracket (91) there are provided at least with two sliding wheels (100) identical to each other and with a suitable diameter, which are supported by the lower edge (96) of the relative bracket (91), in positions aligned and spaced away to each other in the transversal direction of the same edge, and are shaped with a central groove (101), and with a central through hole (102), and said wheels (100) are fixed in position by means of a relative short pivot (103), inserted through said through hole (102) and a correspondent hole (104) of such lower edge (96), in a manner that the wheels are idle in rotation, and, with this arrangement of said sliding wheels (100), the same are supported onto the raised front edge (47) of the relative plates (46) and, therefore, when a door (6) has been displaced in its extracted position, in which the plates (46) and their raised edges (47) have been displaced in front of the correspondent components of the other closed door, this extracted door may be slid laterally thanks to the sliding of the relative wheels (100) onto said raised edges (47), up to the position in which said wheels (100) are moved away laterally from the same raised edges, and however are always aligned with the same, and during this sliding the brackets (91) of such extracted door don't interfere with the brackets (91) of the closed door, and under this condition the extracted door is overlapped to the closed door, thereby making accessible the relative internal compartment of the wardrobe, and for bringing back this open door to the closed position thereof, these operations are repeated in the reverse direction.

12. Device according to previous claims, **characterized in that** the lower component parts of said second group (14) are constituted by at least two stationary elements (30, 31) and at least two movable elements (32, 33), every one of said stationary elements (30, 31) being constituted by a portion of rectilinear flat section bar (105) with a limited width, arranged and applied in a position correspondent to that of the overlying said rack (79) and having at least the same length of this latter, which section bar portion (105) is shaped with two side rectilinear hollows (106) for almost the entire length thereof, defining two sliding guide members for the correspondent said movable elements (32, 33), said section bar portion (105) being joined also with an enlarged end part (107) which is opportunely secured below the horizontal wing (29) of said rectilinear guide section bar (26), and **characterized in that** said movable elements (32, 33) are shaped each with a square form, defined respectively by an horizontal flat portion (108, 109) having almost the same length of the portion of section bar (105), for co-operating with it, and by a vertical flat portion (109', 110) bent orthogonally upward from its own horizontal portion and with a size smaller than the size of said horizontal portion, and these vertical portions are bored for allowing the passage of means for fixing the same vertical portions, and

therefore also the movable elements, to the vertical rear wall of the door (6), in the lower position of the same, in a manner that the horizontal portion of each movable element (32, 33) is projected towards the wardrobe, in a position correspondent to that of the relative portion of section bar (105).

13. Device according to claim 12, **characterized in that** onto the upper surface of each of said horizontal flat portions (108, 109) there are fixed two pairs of short supports, spaced away to each other in the longitudinal direction of the relative horizontal portion, the first pair of which is formed by two supports of cylindrical shape (110, 111) arranged in the front and transversal direction of the relative horizontal portion (108, 109) and which are fixed onto a short vertical edge (112) obtained by bending upward the material of the same horizontal portion, and which are aligned and slightly spaced away to each other, thereby defining a short free space, and a relative idle wheel (113, 114) is pivoted onto the walls opposed to each other of said cylindrical supports (110, 111), which wheels are identical to each other and have a reduced diameter and a horizontal rotation axis, and these wheels are spaced away to each other of such extent as to be able to engage slidably the correspondent side sliding guide member (106) of the relative portion of section bar (105), the second pair of said supports being formed by two cylindrical supports (115, 116), identical to each other and to the previous supports (110, 111), which are arranged and fixed in the transversal direction and almost in the central area of the relative said horizontal portion (108, 109), with the same arrangement and size of said two previous supports, and onto the opposed walls of said cylindrical supports (115, 116) being also pivoted a relative idle wheel (117, 118), which are identical to the previous ones and also spaced away to each other of the same extent, in order to be able to engage slidably the correspondent side sliding guide member (106), into said cylindrical supports (115, 116) being pivoted laterally a first and a second sliding wheel (119, 120) with a vertical rotation axis, in positions opposite to each other and turned outwards the horizontal portion, and these wheels being spaced away to each other of such extent as to be able to be arranged on to the vertical flat wing (28) of said rectilinear guide section bar (26), and to be able to slide along the same, when the door (6) is let to slide in the alternate longitudinal direction of the wardrobe, the sliding of the pairs of said idle wheels (113, 114) and (117, 118) along the rectilinear guide members (106) being adapted to force the door (6) to stay always perfect vertically and perpendicular to the wardrobe, while the sliding of the pair of said idle wheels (119, 120) along said rectilinear guide section bar (26) being allowed only when the door is opened, under the condition in which said idle wheels (119, 120) are arranged sliding against the flat vertical wing (28) of said guide section bar.

14. Device according to previous claims, **characterized in that** the wardrobe is provided with vertical legs for support on the floor (121, 122, 123, 124, 125, 126, 127, 128), which are opportunely offset to each other to prevent interferences with said horizontal portions (108, 109) during the sliding of the doors (6) in the longitudinal direction of the wardrobe, and **characterized in that** said lower stationary (30, 31) and movable (32, 33) elements of each door (6) are secured to the relative door in misaligned positions symmetrical to each other, in a manner that when the two doors are overlapped to each other such stationary and movable elements aren't overlapped to each other and, therefore, being not interfering to each other, allow the sliding of the doors without obstacles.

15. Device according to previous claims, **characterized in that** said side sliding trucks (24, 25) of each door (6) are displaced towards the middle of the same door, under the condition in which it is also possible to let to slide the doors outwards, allowing the access of the wardrobe central part with a smaller displacement of the door.

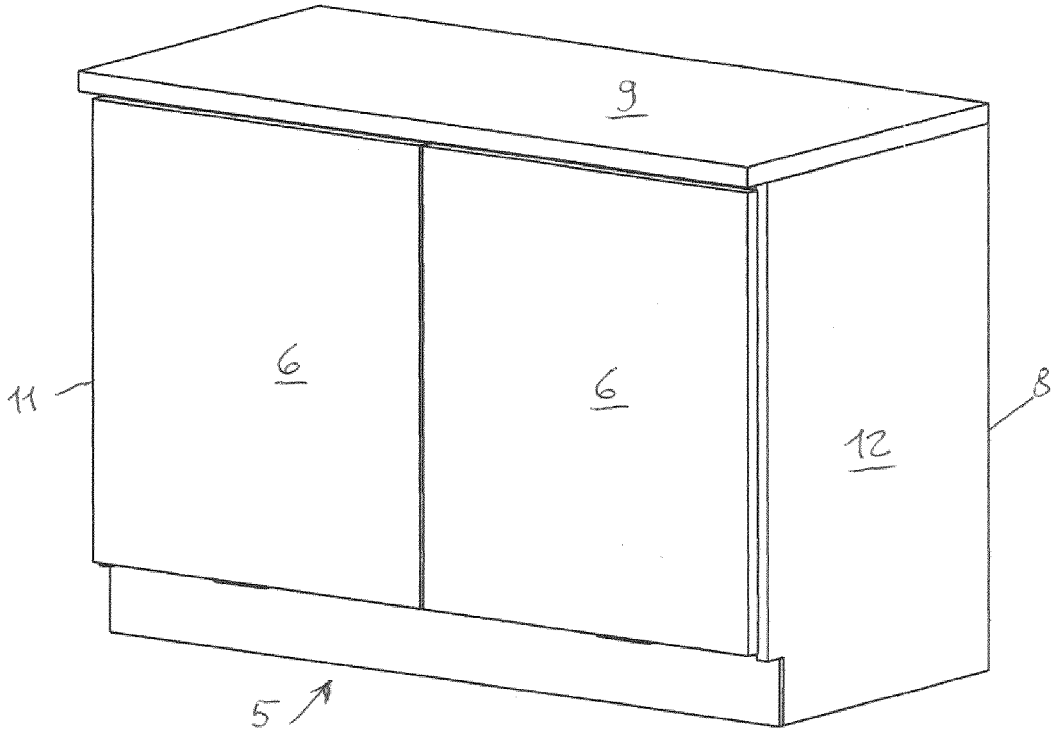


FIG. 1

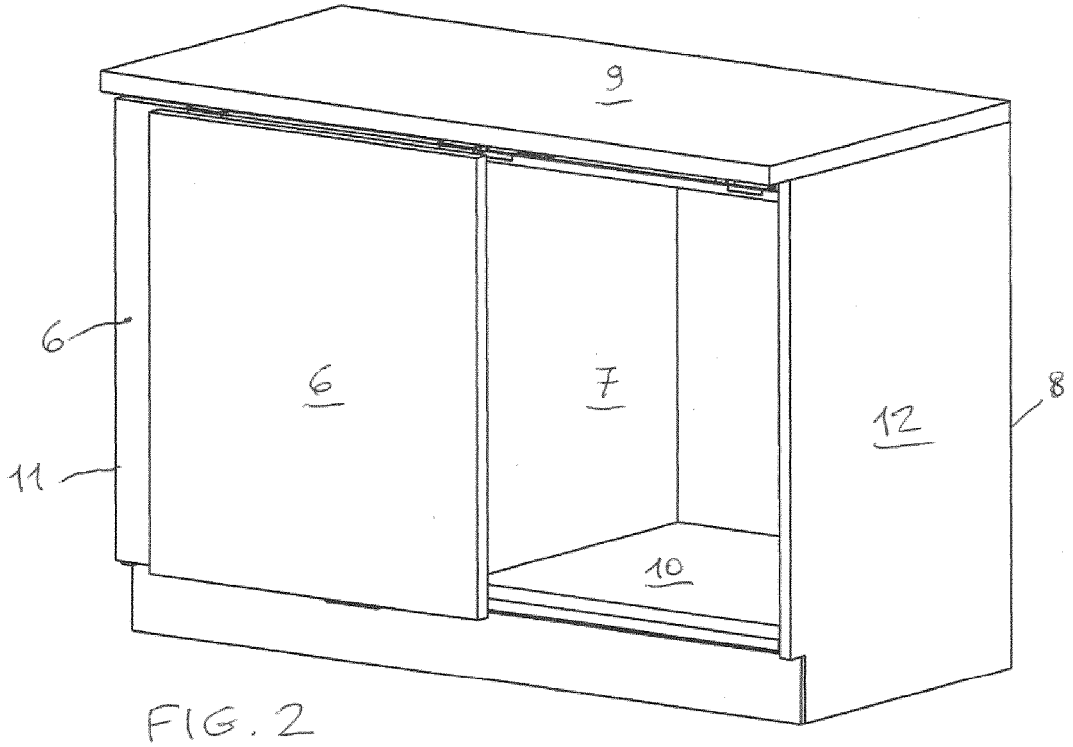
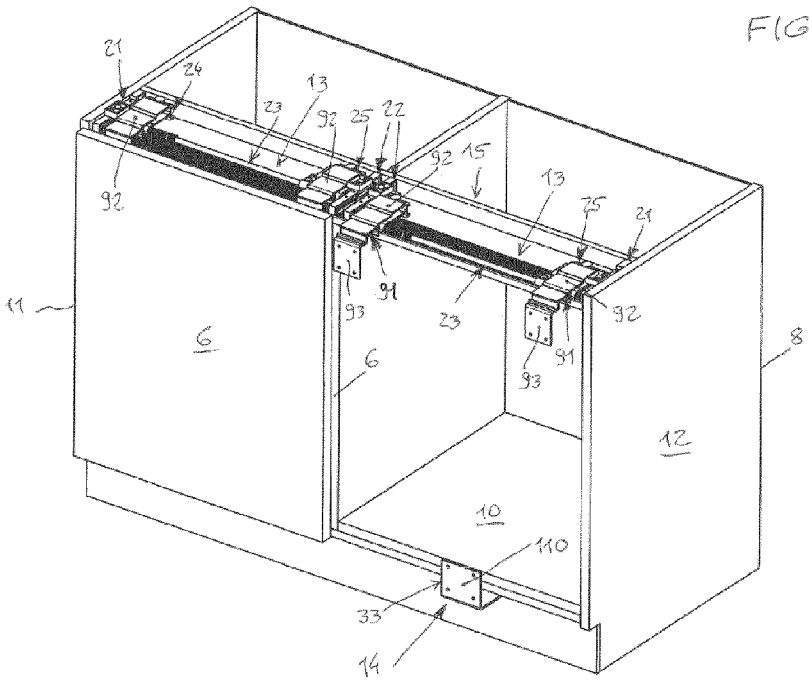


FIG. 2

FIG, 3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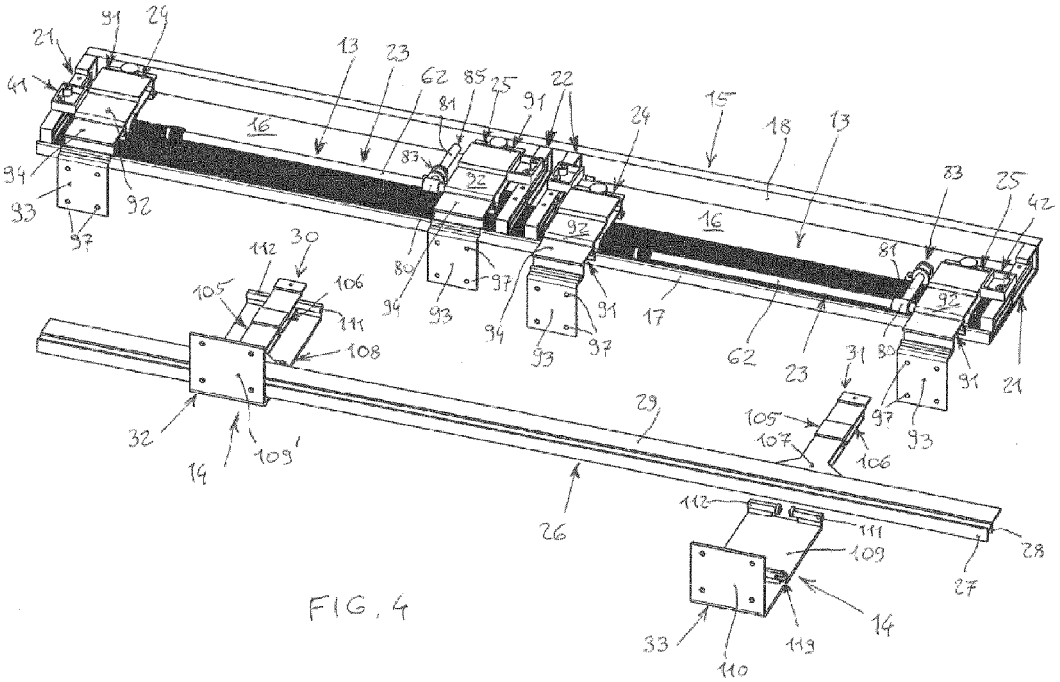
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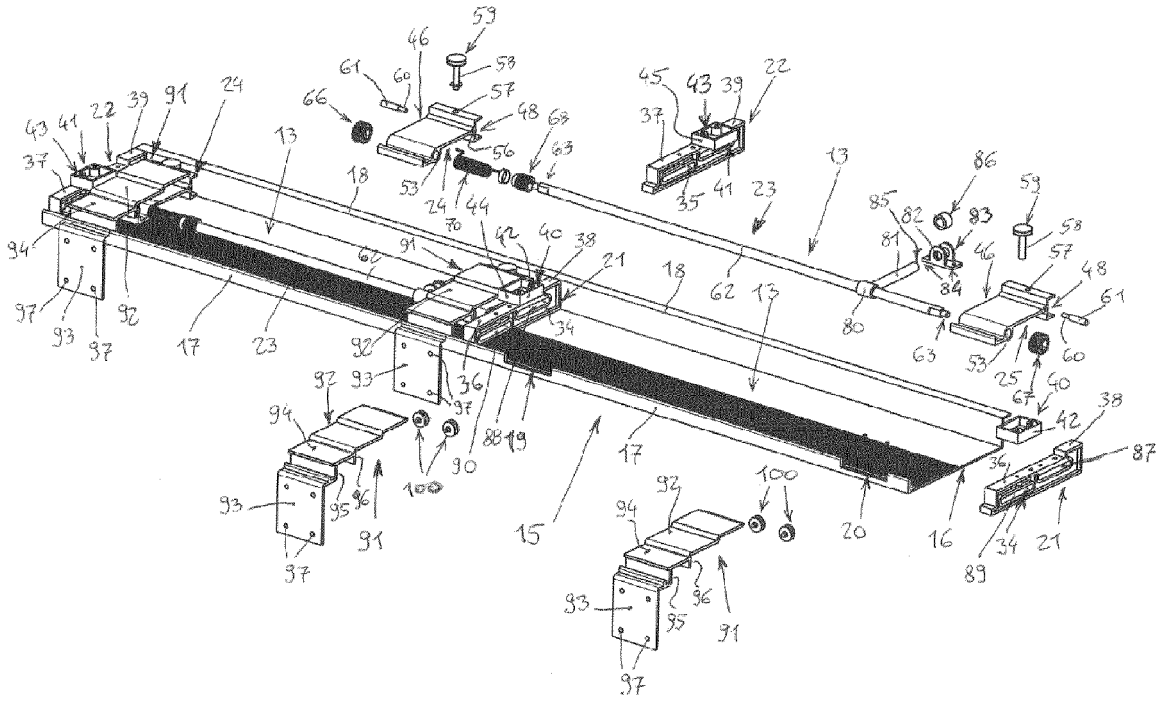
FIG, 4

FIG. 5



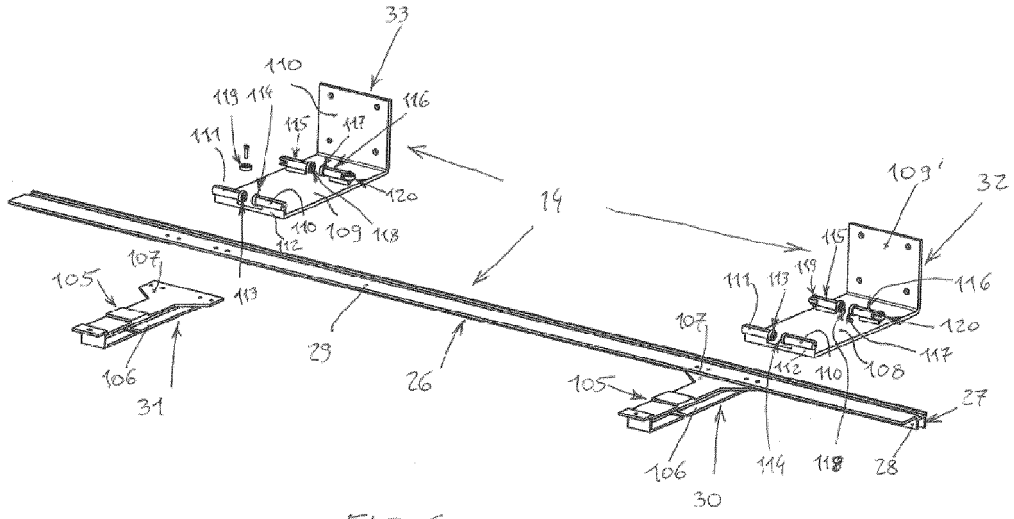


FIG. 6

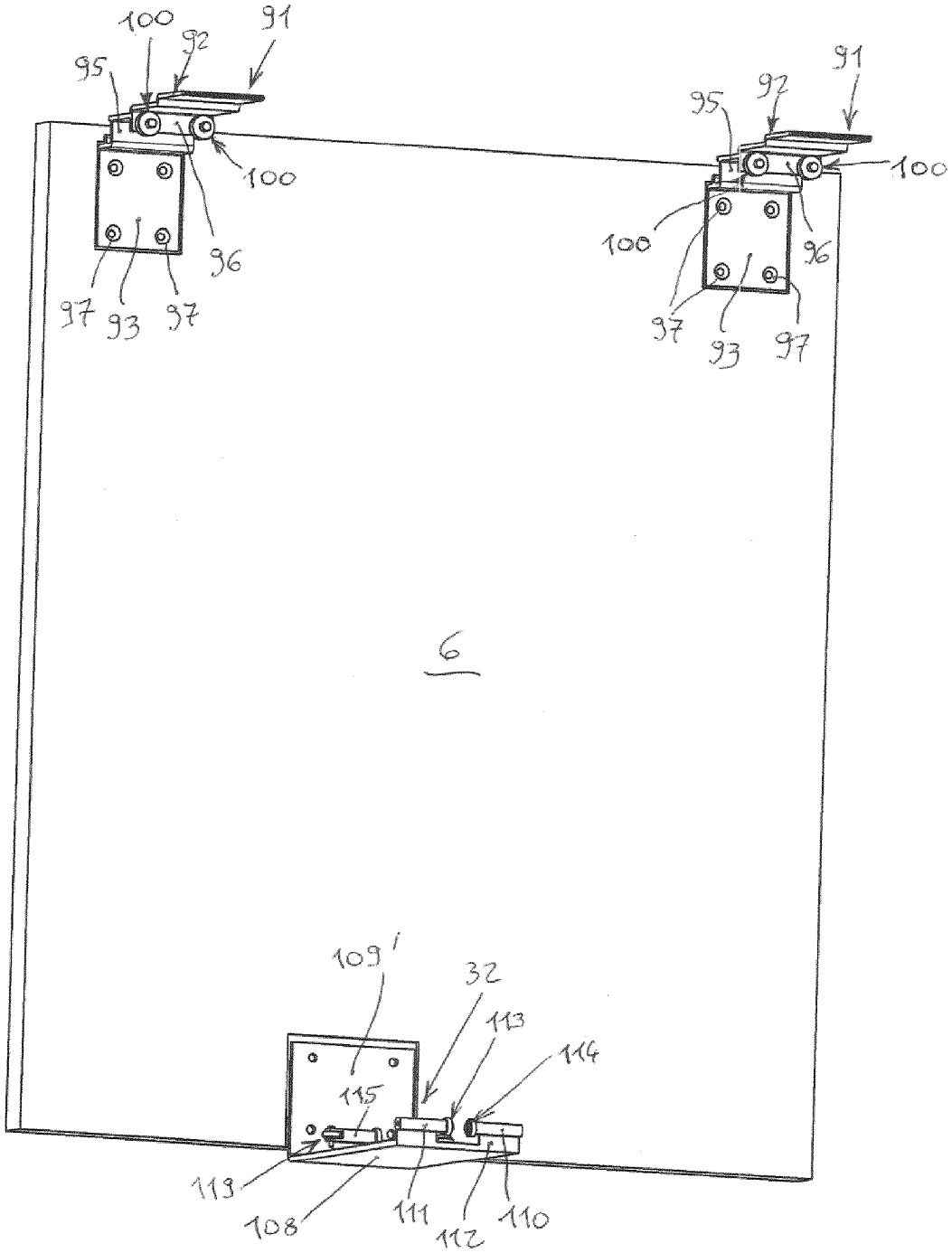

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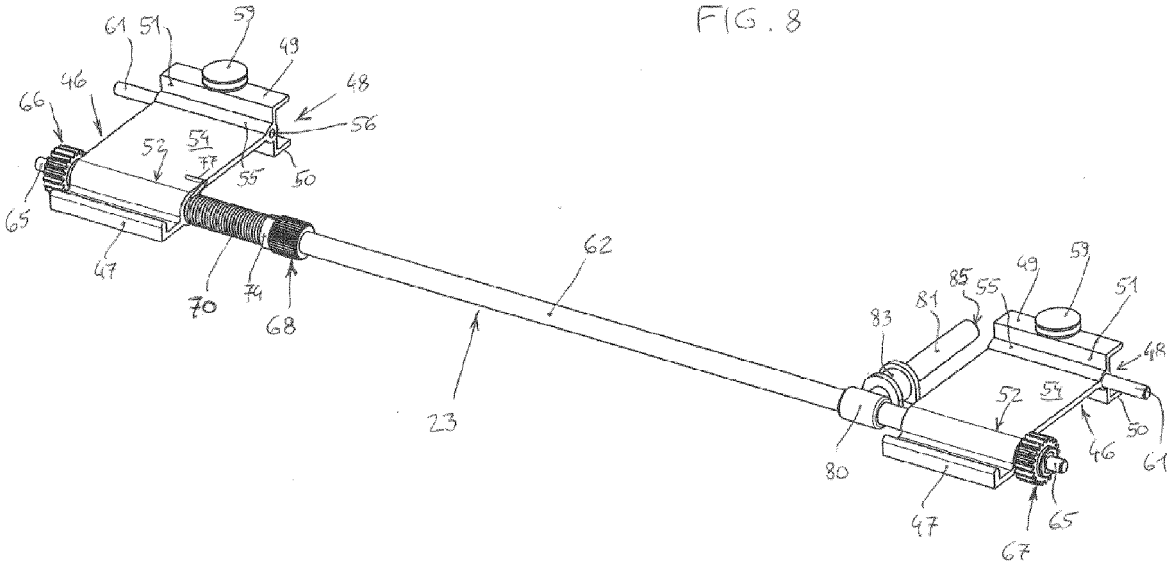
FIG. 7

FIG. 8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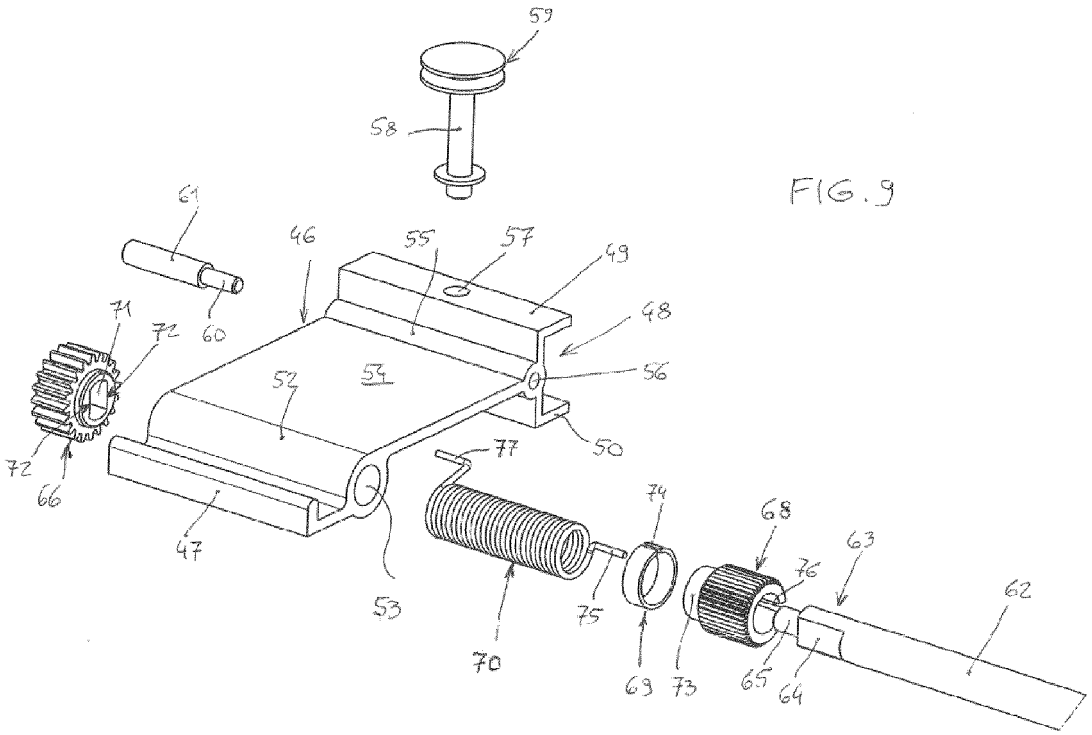
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FIG. 9

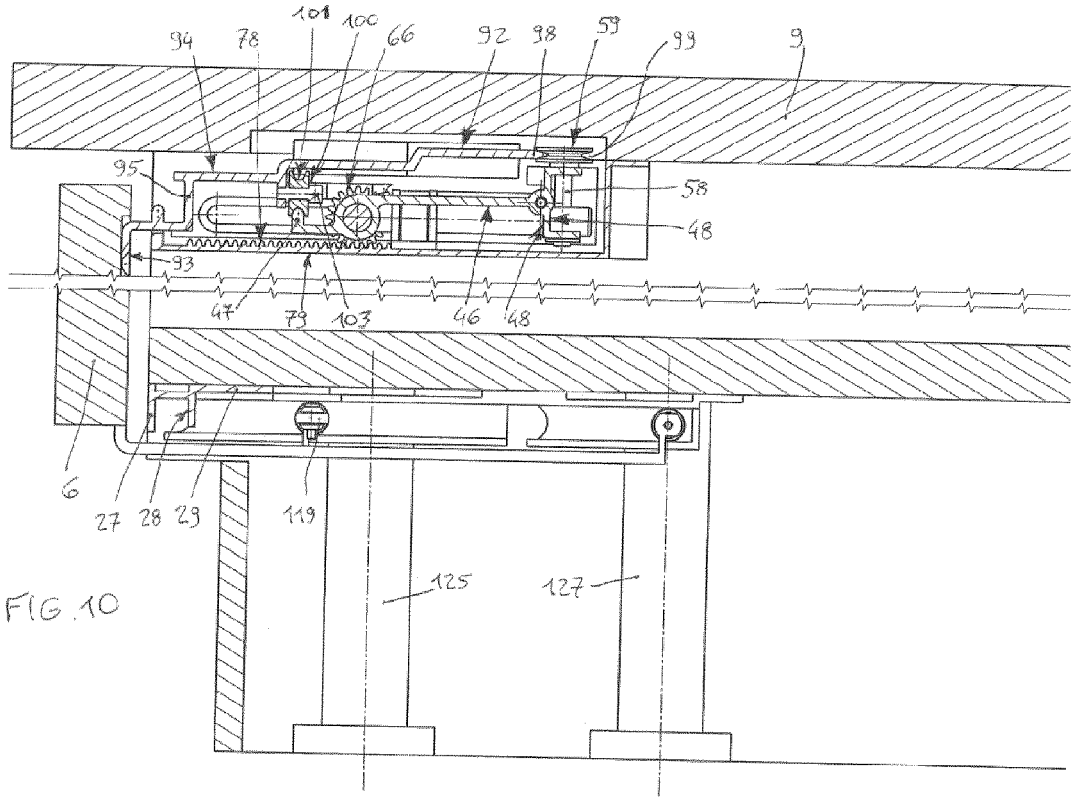
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FIG.10

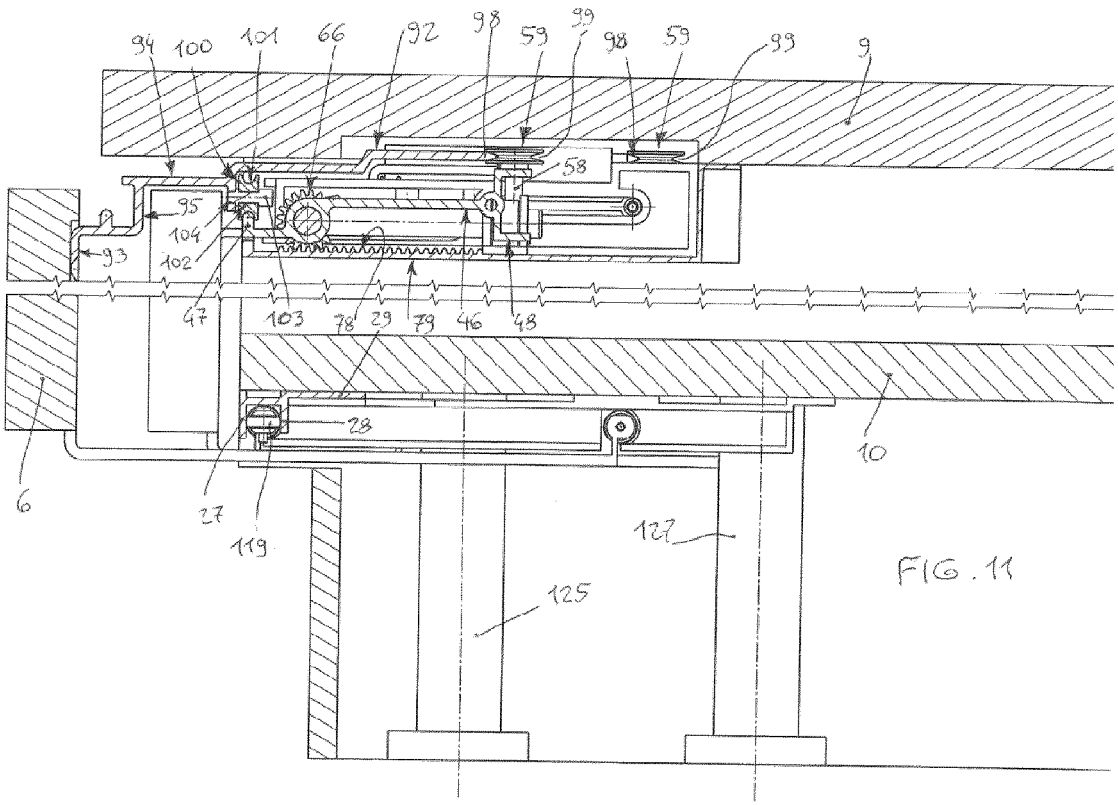
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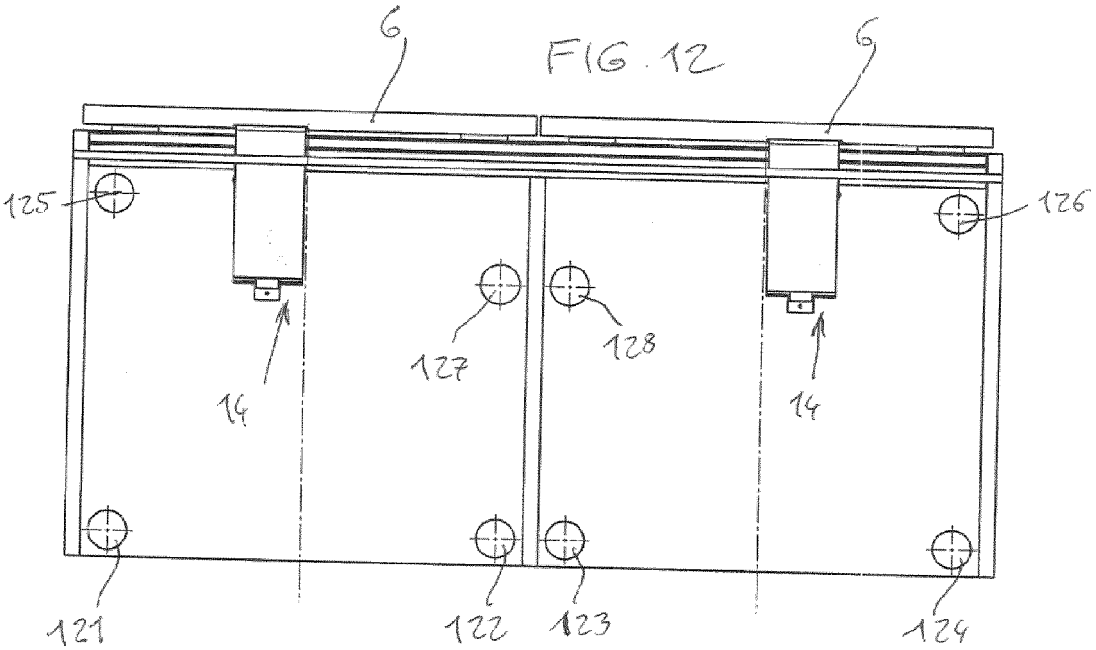
FIG.11

FIG. 12



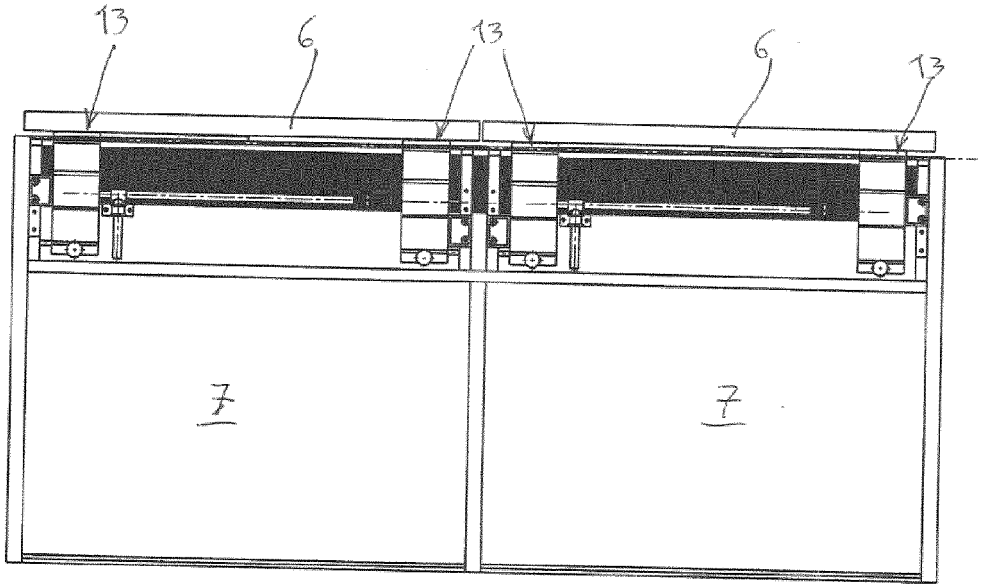


FIG. 13

FIG. 14

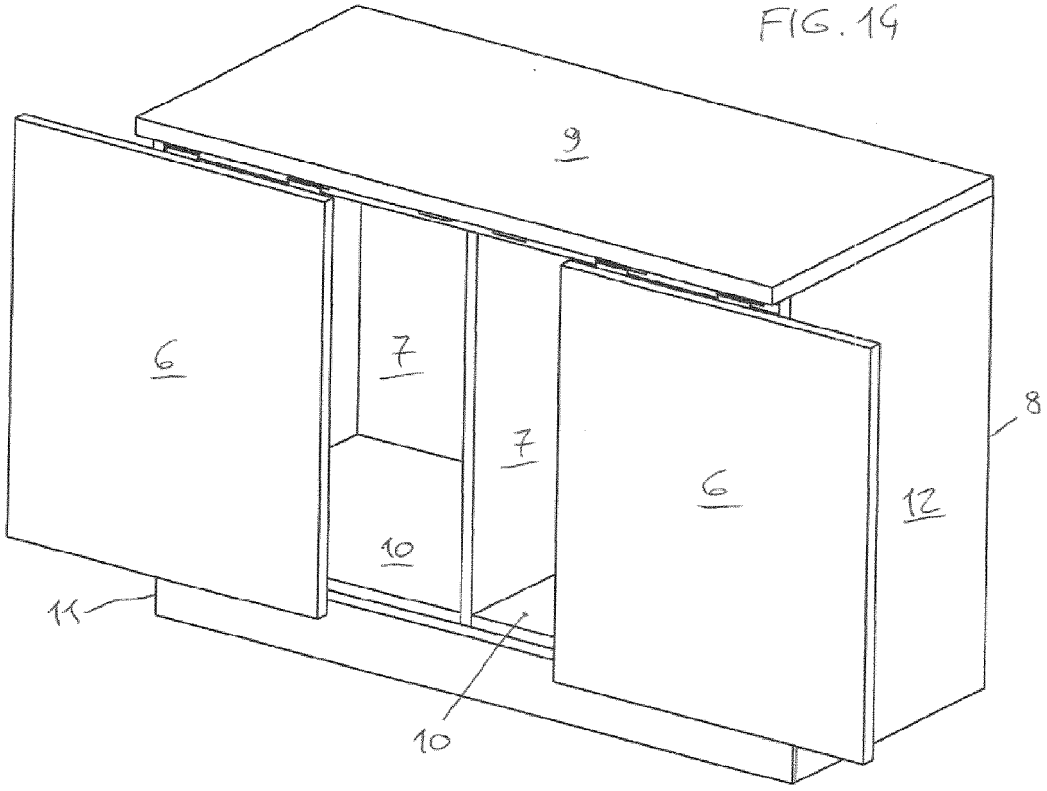
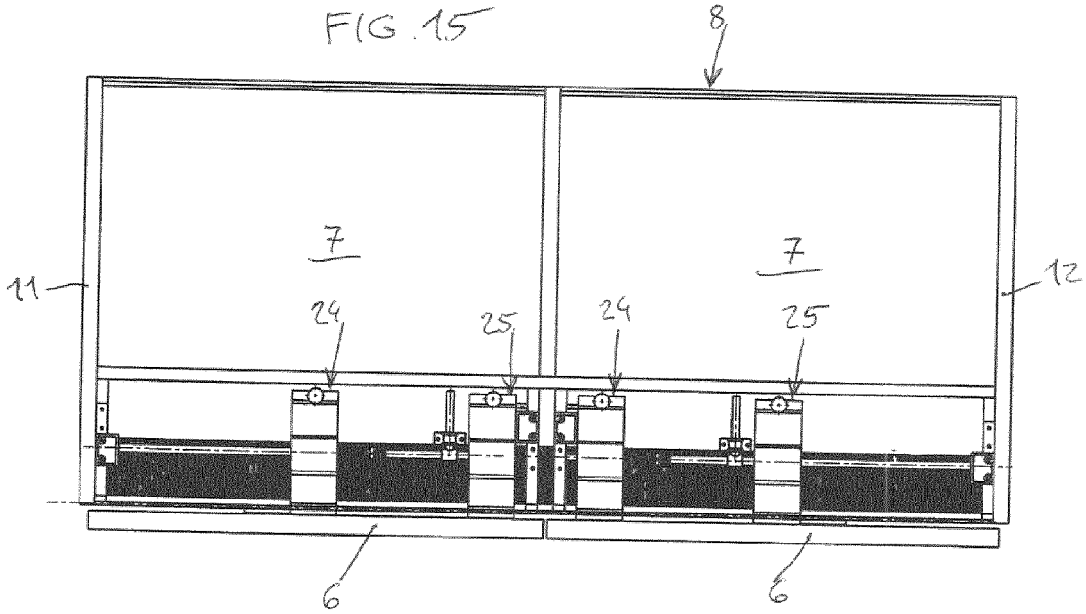


FIG. 15



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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 1436

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 36 19 775 A1 (HANEWINKEL HEINZ [DE]) 17 December 1987 (1987-12-17)	1	INV. E05D15/10
A	* abstract; figures *	2-15	
A	WO 2009/095755 A1 (FORNASARI PAOLO [IT]) 6 August 2009 (2009-08-06) * abstract; figure 12 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 July 2014	Witasse-Moreau, C

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15-07-2014

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		WO 2009095755 A1	06-08-2009

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