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73 Proprietor: **Ripamonti, Maria**
Via E. Toti, 54
Macherio (Milan) (IT)

73 Proprietor: **Cassanmagnago, Flavia Maria**
Via G.B. Vico, 25
Lissone (Milan) (IT)

73 Proprietor: **Cassanmagnago, Maria Cecilia**
Via Frassino, 10
Lissone (Milan) (IT)

73 Proprietor: **Cassanmagnago, Franco Giuseppe**
Via Martiri della Libertà, 259
Lissone (Milan) (IT)

73 Proprietor: **Cassanmagnago, Eugenio Paolo**
Via E. Toti, 54
Macherio (Milan) (IT)

72 Inventor: **Cassanmagnago, Ugo**
deceased (IT)

74 Representative: **Dr. Ing. A. Racheli & C.**
Viale San Michele del Carso, 4
I-20144 Milano (IT)

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Description

This application relates to the field of furnishings.

Sliding door assemblies are known for closets or the like, which assemblies comprise one or more fixed guides and at least one panel or door sliding on these guides. Particularly for equipped walls forming closets, so-called "disappearing" or "hidden" door assemblies are also known, comprising sliding guides concealed within a double vertical wall and door elements sliding in these guides; each door element comprises a standard or upright having a panel hinged thereto, which panel is the actual closure door or wing; the door element is slidable between a retracted position, in which the panel is arranged coplanar with the standard or upright and both are retracted within the vertical wall, and an extended position, in which at least the panel projects from the vertical wall, so as to be able to pivot on hinges and to be moved into a position, e.g. a closure position for a space. Generally, at extended position, the door element is cantilever supported, that is supported only on the guides within the vertical wall.

These door assemblies involve some problems; they have to be guided during horizontal sliding, in order to avoid jammings; the door has to keep a vertical attitude during the sliding motion, that is to say, the upright, or a vertical side of the door element, has to be kept parallel to itself during the movement; the weight of the door element has to be supported; the door element, at extended position, has to be retained so that it cannot exit completely from its seat in the vertical wall.

The known door assemblies are of some constructive complexity and involve relevant high costs; the hitherto adopted solutions for assuring an easy and smooth movement thereof and for cantilever support generally comprise rack devices hidden within the vertical double wall.

DE—A—2847578 discloses a guide device for a sliding door, in which an elongate flexible member has its two ends fixed on a means integral with the door and coils up onto two or more pulleys arranged in a plane parallel to the plane wherein a guide body moves. The weight of the door is supported on further pulleys disposed in a further vertical plane which is side by side to the plane of the first mentioned pulleys and to the door plane, while further vertical axis roll means, engaged in suitable guides, work as guidance means. It is evident that an embodiment according to the teachings of said disclosure is too bulky when seen transversely to the movement direction of the door, and further too complicated and expensive, in that it involves the assembly of many parts.

Furthermore, due to the fact that the members which support the door, which retain the same and keep the same in vertical condition (this latter member is the flexible member) are in an offset position with respect to a vertical plane through a

center of gravity of the door, a couple is generated which tends to rotate the door about a horizontal axis; accordingly it is necessary to provide suitable guides, as mentioned above, sturdy enough to withstand such a tendency. Furthermore said couple, in the long run, causes a permanent deformation (a bend or deflection) of the door, which deformation is unaesthetic and may cause jammings.

DE—B—1143415 discloses a sliding door assembly for furnishings, wherein the ends of a cable wound around stationary pulleys are fastened to the door element, the pulleys are fixed on a stationary framework of the furnishing, on one side of the door; also in this assembly there is the shortcoming of excessively large overall dimensions, when the assembly is seen transversely with respect to the movement of the door.

FR—A—1214990 discloses a furniture door comprising two opposed guiding cables wound around pairs of pulleys which are arranged sideways on a crossbar; also this arrangement involves large overall dimensions.

It is an object of this application to provide a door assembly which is of reduced cost, but which is able to work very well.

The above object has been achieved by a sliding door assembly according to claim 1. Preferably, means are provided for adjusting the length of the elongate means.

If required, a further steel strip could be provided and arranged opposite to the first steel strip in order to prevent any longitudinal oscillation of the door. According to modified embodiments, the or each steel strip could be replaced by a metal cable, a chain or a belt, etc., or a plastic material strip.

The new assembly advantageously can be readily manufactured at reduced costs. Moreover, the sliding door of the new assembly is positively supported at any sliding position thereof and has an easy and smooth movement.

By way only of unrestrictive illustration, some exemplary embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a perspective part broken away view of a "disappearing" type door assembly according to the invention, shown with the movable element at extracted position;

Fig. 1a is a cut away view of the lower pulley and lower guide (in section), on an enlarged scale relative to Fig. 1;

Fig. 2 is a lateral part sectional view of the assembly of Fig. 1; the movable element is shown by continuous line at extended condition and by dashed lines at retracted condition;

Fig. 3 is a lateral part sectional view of a modified embodiment of the assembly; and

Fig. 3a is a view similar to Fig. 1a of the assembly of Fig. 3.

In the example shown in Fig. 1, a "disappearing" type sliding door assembly 10 comprises a vertical double wall 12 providing a recess or gap 14, for accommodating a movable door element

16. The latter comprises a vertical standard or upright 18 having a generally U shaped cross-section, and carrying through vertical axis hinges 20, a panel or door (wing) 22. The vertical standard or upright 18 has a generally U-shaped horizontal cross-section and carried engagement means in the form of a first idle upper roller or pulley 24, pivoted adjacent to the upper end thereof, and a second idle lower roller or pulley 25, pivoted adjacent to the lower end. Two fixed guides are arranged within the gap 14, namely an upper guide 26 and a lower guide 28. A steel strip or band 30 has an upper end secured at 31 to the upper guide, or to a fixed portion within the gap 14; then the strip 30 extends along said guide 26, is wound or coiled around an upper portion and a front portion (external portion) of the circumference of said pulley 24, extends between pulleys 24 and 25 is wound around a rear (internal) portion and a lower portion of pulley 25, extends along said guide 28 and has the other end secured at 32 to the outer end of the lower guide, or to other fixed location at similar position. Preferably, at least the fastening at 32 is provided by already known devices (not shown) allowing a length adjustment for the strip. The length adjustment for the strip could be also provided by already known tie rod devices (not shown) placed at intermediate position in the strip.

The movable element 16 is may be shifted between an extended position, in which at least the door 22 projects completely out from the gap 14, and a retracted position, in which the door 22 is accommodated within the gap 14. At extended position, said door 22 may be rotated on the hinges, for example, to close a space.

Each pulley 24 or 25 (Fig. 1a) has a seat or engaging surface for receiving said strip 30 and the lower pulley bears with said seat on the strip 30 and accordingly on said guide 28.

It will be seen that at the extended position of the door, shown in Fig. 1, said strip 30 has a long upper run and a short lower run. By pushing said door from an extended position to a retracted position within said gap 14 (said retracted position being drawn by dash dot lines in Fig. 2), the lower run of the strip is increasingly elongated and the upper run is increasingly shortened, the full extension of the strip remaining obviously unaltered. On the other hand, by removing or extracting the movable element, an elongation of the upper run and corresponding shortening of the lower run would occur. At the extracted position of the door, the strip subjected to traction will effectively retain the upper portion of the movable element, so that the latter can be carried in a cantilever arrangement, in which it bears only on the lower guide, while said door 22 is free of contact locations with the ground or floor.

The mutual engagement of the pulley, the band and the guide operates simultaneously to support the weight of the door element 16, to guide the element when this latter moves horizontally out or into its gap, to guide the door element so that the vertical upright will always move through

parallel positions, i.e. generally keeping an attitude at right angles to the ground; and to retain element 16, when the door is in an extended position.

The overall cross dimension of the door element is thus extremely reduced, and does not exceed the cross dimension of the door alone.

Of course, many changes could be made to the described example; the pulleys could be directly secured to the door, so that the latter would be slidable and not rotatable and cantilever carried; the steel strip could be replaced by a plastic material strip or any other flexible elongate element, such as belt, metal cable, or chain; however, in these latter cases, preferably the pulley will have a bearing area distinct from the seat for the cable or chain. The pulley could be replaced by a rotating roller, or even by a not rotating horizontal bar, or finally by any seat, possibly coated with antifriction material.

A further modified embodiment comprises an assembly 10a shown in Figs. 3 and 3a. The parts of the assembly 10a identical to those of the assembly 10 bear the same reference numerals and will not be described in detail. For an improved restraint of the movable element, the assembly 10a comprises a pair of dual seat rollers 24a and 25a; the strip 30 is accommodated in one said seats, whereas the strip 30a is accommodated in the other of the two seats, in an opposite arrangement to strip 30, that is adjustably secured adjacent to the outer end of the upper guide 26, wrapped on the inner upper portion of the pulley 24a, extended between the pulleys 24a and 25a, and secured on the inner portion of the guide 28a.

Thus, said standard or upright 18 is firmly retained in said gap 14 both at its upper end and at its lower end.

Of course, although the embodiments herein shown are those at present preferred, the arrangement of the pulleys and steel strip could also be different from that shown, without departing from the field of the present invention. For example, two or more pulleys could be provided secured to the guides, and a strip or the like could be provided, having the ends fixed to the door element and variously wound around the pulleys.

Claims

1. A sliding door assembly comprising a movable door element (16) having a sliding panel or door (22); a fixed element with at least one upper fixed guide (26) and a lower fixed guide (28) in order to guide said movable element during its movement; an upper idle pulley (24) and a lower idle pulley (25) carried on at least one of said fixed or movable elements; a flexible elongate member (30) having the ends thereof clamped to the other of said two elements and wound around said pulleys and having opposite curves on one pulley with respect to the other to form a restraint between said two elements, characterized in that the axes of said guides and elongate flexible member lie in a substantially vertical plane; the

pulleys (24, 25) are carried on the movable element (16); said elongate flexible member (30) has an end part stationary with respect to the upper guide (26) and the other end part stationary with respect to the lower guide (28) and the intermediate part thereof is arranged on an upper part of the upper pulley and on a part of the same pulley facing towards the door; said flexible member further is extended between the pulleys and is arranged on a part of the lower pulley facing away from the door and on a lower part of the lower pulley; at least said lower pulley (25) has a circumferential surface and said lower guide has a longitudinal surface which cooperates with said circumferential surface of the pulley to bear the weight of the movable element, said flexible elongate member being interposed between said surfaces of the pulley and the guide.

2. An assembly according to claim 1, characterized in that a median vertical plane through said idle pulleys (24, 25) and said flexible elongate members (30) is generally coincident with a vertical plane through the center of gravity of the movable element (16), when this latter is in a retracted condition.

3. An assembly according to claim 1, wherein said flexible elongate member (30) is a steel strip or a plastic material strip.

4. An assembly according to claim 1, characterized in that it comprises a double race upper pulley (24a) and a double race lower pulley (25a) and guides (26a, 28a) having a double longitudinal engagement surface, furthermore it comprises another flexible elongate member (30a) having an end stationary with respect to the upper guide (26a) and the other end stationary with respect to the lower guide (28a) and the intermediate part wound around an upper part of the upper pulley (24a), extended from the upper to the lower pulley (25a), wound around an exterior and lower part of the lower pulley (25a).

5. An assembly according to claim 1, characterized in that the pulleys are carried directly on to the door of the movable or slidable element.

6. An assembly according to claim 1, characterized in that said movable element comprises an upright (18) having a substantially U-shaped cross-section and a door (22) hinged to the upright and the pulleys are carried within the U-shape of the upright.

Patentansprüche

1. Anordnung für Schiebetüren mit einem beweglichen Flügelelement (16) mit einem gleitbaren Türflügel (22), einem festen Element mit wenigstens einer festen oberen Führung (26) und einer festen unteren Führung (28) zum Führen des beweglichen Elements während seiner Bewegung, einer oberen Leerlaufrolle (24) und einer unteren Leerlaufrolle (25), die von wenigstens einem der genannten festen oder beweglichen Elemente getragen sind, einem biegsamen Längselement (30), dessen Enden am anderen der

beiden Elemente blockiert sind, das sich um die genannten Rollen wickelt und entgegengesetzte Krümmungen auf einer Rolle zur anderen hat, um eine Bindung zwischen den beiden Elementen zu bilden, dadurch gekennzeichnet, daß die Achsen der Führungen und des biegsamen Längselements sich im wesentlichen auf einer senkrechten Ebene befinden, daß die Rollen (24, 25) vom beweglichen Element (16) getragen sind, daß ein Ende des biegsamen Längselements (30) an der oberen Führung (28) und das andere Ende an der unteren Führung (28) befestigt und das Zwischenstück des Längselements auf einem oberen Teil der Rolle angeordnet und auf einem Teil derselben Rolle zum Flügel gerichtet ist, daß das biegsame Element sich zwischen den Rollen erstreckt und auf einer Seite der unteren Rolle vom Flügel abgewendet auf der unteren Seite der unteren Rolle angeordnet ist, daß wenigstens die untere Rolle (25) eine Umfangsfläche aufweist und die untere Führung eine mit der Umfangsfläche der Rolle zusammenarbeitende Längsfläche zum Abstützen des Gewichts des beweglichen Elements aufweist, wobei das biegsame Längselement zwischen den Oberflächen der Rolle und der Führung liegt.

2. Anordnung nach Anspruch 1, dadurch gekennzeichnet, daß eine senkrechte Mittellinie für die Leerlaufrollen (24, 25) und die biegsamen Längsmittel (30) im wesentlichen mit einer senkrechten Schwerlinie für das bewegliche Element (16) zusammenfällt, wenn Letzteres sich in zurückgestellter Lage befindet.

3. Anordnung nach Anspruch 1, bei der das biegsame Längsmittel (30) ein Stahlband oder ein Kunststoffband ist.

4. Anordnung nach Anspruch 1, dadurch gekennzeichnet, daß sie eine obere Rolle (24a) mit Doppelrille und eine untere Rolle (25a) mit Doppelrille und Führungen (26a, 28a) mit doppelter Längseingriffsfläche, sowie ein weiteres biegsames Längselement (30a) umfaßt, wobei ein festes Ende an der oberen Führung (26a) und das andere feste Ende an der unteren Führung (28a) ist und das sich um einen oberen Teil der oberen Rolle (24a) wickelnde Zwischenstück zwischen der oberen Rolle und der unteren Rolle (25a), erstreckt und sich um einen äußeren Teil und einen unteren Teil der unteren Rolle (25a) wickelt.

5. Anordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Rollen unmittelbar vom Flügel des beweglichen oder gleitbaren Elements getragen sind.

6. Anordnung nach Anspruch 1, dadurch gekennzeichnet, daß das bewegliche Element eine Leiste (18) mit im wesentlichen U-förmigen Schnitt und einen an der Leiste angelenkten Flügel (22) umfaßt und die Rollen im U der Leiste getragen sind.

Revendications

1. Assemblage d'une porte coulissante comprenant: un élément à porte mobile (16) avec un panneau ou porte coulissante (22); un élément

fixe avec au moins une coulisse fixe supérieure (26) et une coulisse fixe inférieure (28) permettant de guider ledit élément mobile durant son mouvement; une poulie folle supérieure (24) et une poulie folle inférieure (25) portées sur au moins un desdits éléments fixe ou mobile; un élément allongé flexible (30) ayant ses extrémités bloquées à l'autre des deux éléments, entourant lesdites poulies et ayant des cintrages opposés sur une poulie par rapport à l'autre de façon à constituer un lien entre les deux éléments; caractérisé en ce que: les axes desdites coulisses et dudit élément allongé flexible se trouvent sur un plan pratiquement vertical; les poulies (24, 25) sont portées sur l'élément mobile (16); ledit élément allongé flexible (30) a une partie extrême fixe par rapport à la coulisse supérieure (26) et l'autre partie extrême fixe par rapport à la coulisse inférieure (28), et la partie intermédiaire de celui-ci est disposée sur un côté supérieure de la poulie supérieure et sur un côté de cette même poulie tourné vers la porte; ledit élément flexible s'étend en outre entre les poulies, et il est placé sur un côté de la poulie inférieure plus loin de la porte et sur le côté inférieure de la poulie inférieure; au moins ladite poulie inférieure (25) présente une surface circonférentielle et ladite coulisse inférieure présente une surface longitudinale collaborant avec ladite surface circonférentielle de la poulie pour soutenir le poids de l'élément mobile, ledit élément allongé flexible étant interposé entre lesdites surfaces de la poulie et de la coulisse.

2. Assemblage selon la revendication 1,

caractérisé en ce qu'un plan vertical médian pour lesdites poulies folles (24, 25) et lesdits moyens allongés flexibles (30) coïncide pratiquement avec un plan vertical barycentrique pour l'élément mobile (16) quand ce dernier est en condition de retrait.

3. Assemblage selon la revendication 1, où ledit moyen allongé flexible (30) est un ruban d'acier ou un ruban en matière plastique.

4. Assemblage selon la revendication 1, caractérisé en ce qu'il comprend une poulie supérieure (24a) à double cannelure et une poulie inférieure (25a) à double cannelure et des coulisses (26a, 28a) à double surface d'engagement longitudinal, il comprend en outre un autre élément allongé flexible (30a) ayant une extrémité fixe par rapport à la coulisse supérieure (26a) et l'autre extrémité fixe par rapport à la coulisse inférieure (28a) et la partie intermédiaire entourant une partie supérieure de la poulie supérieure (24a), étendue entre la poulie supérieure et la poulie inférieure (25a), entourant une partie extérieure et une partie inférieure de la poulie inférieure (25a).

5. Assemblage selon la revendication 1, caractérisé en ce que les poulies sont directement portées sur la porte de l'élément mobile ou coulissant.

6. Assemblage selon la revendication 1, caractérisé en ce que ledit élément mobile comprend un montant (18) ayant pratiquement une section en forme de U et une porte (22) sur charnières sur le montant et les poulies sont portées à l'intérieure du U du montant.



