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(54) Device for stabilising the closure of folding door wings

(57) A device for stabilising the closure of wings (1,2) of folding doors (8) comprising a rectilinear rod (34), attached to the top crosspiece (6) of the closing wing (1), able to guide a slider (35), elastically constrained to the rod (34) by elastic means (33), in such a way that, with the wings coplanar, a torque (M) is created around the axis of rotation (r) of the articuled joint (4) coupling the wings (1,2) sufficient to maintain the wings (1,2) perfectly coplanar by the restraining reaction deriving from the action of the second end of the slider (35) on the upright (7) of the jamb or on a limit stop (10) of a groove (11) guiding a pin (9), borne by said second end of the slider (35), to guide the wings (1,2) as they slide.

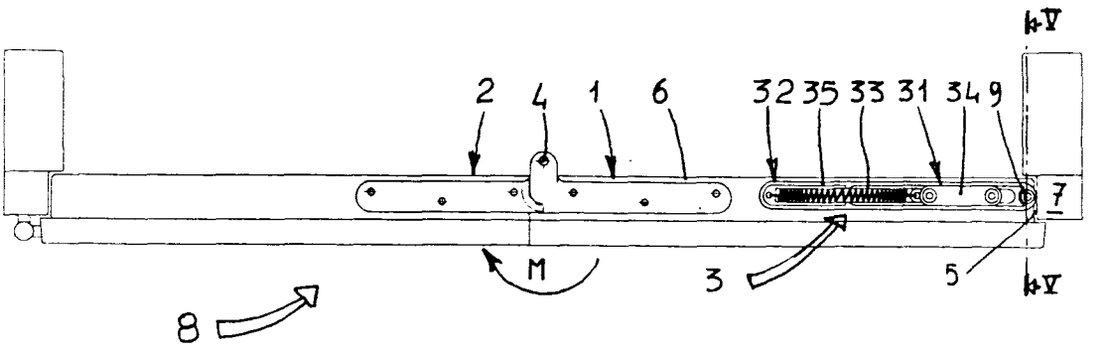

Fig.1

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Description

The present invention relates to a device for stabilising the closure of folding door wings.

As is well known, in the manufacture of folding doors, one problem it to make as inconspicuous as possible or actually to hide the hinges joining the two wings of the folding door. To do so, flat hinges have been designed, placed at the top and at the bottom ends of the wings and mutually articulated. This placement, however, since said hinges do have a certain vertical size, entails a rather large clearance under the door and, above the door, the need to keep the hinges within the height of the rabbet edge of the door.

Another problem is that of keeping the wings, when the door is closed, in a position which is stable enough yet not too rigid, since, when the door is opened, the wings must swivel on their joints requiring a moderate effort to be opened. To do so, the prior art has devised accessories for the reversible locking of the wings in a coplanar position, located over the metal rods of the hinges. These accessories comprise a flexible foil, fastened on top of one of the metal rods, whose head is shaped like an inverted V and which is meant to be coupled with a corresponding protruberance obtained on the other metal rod on the other wing. It is evident that in this case there may be and/or arise over time an annoying backlash between the metal parts that fit together which may impinge on the operation of the device even to an intolerable degree. Moreover, the vertical dimensions are not negligible, since the accessories are made integral and secured to the top surface of the rods. Therefore, to limit the aforesaid dimensions, slots have been milled in the upper and lower edge of the door, placing the aforesaid metal rods with the related coupling accessories in these slots. Thus it is evident that the cost of obtaining a sufficiently effective product is not altogether modest, since, in addition to the cost of the metal rods and of the accessories, which is actually modest, it is necessary to make at least one of these accessories integral to the related metal rod of the hinge and, above all, it is necessary to mill slots in the edge of the doors.

Moreover, these elastic accessories may be subject to frequent failures, in particular in the area where they are fastened to the metal rods, and their replacement is not immediate.

The purpose of the present invention is to eliminate the drawbacks mentioned above. The invention, as characterised in the claims, solves the problem of conceiving a device whose metal parts, elastically movable axially, are so designed as to create a torque, on the articulated joint of the wings, such as to keep the wings stably closed until a force is imparted manually to open them.

One of the advantages obtained through the present invention, which is inexpensive to manufacture and whose structure has minimum vertical size, consists of the fact that its movable metal parts are subject to extremely little wear and maintain their full effectiveness over time, without giving rise either to damaging backlash, or to a great deal of friction.

Moreover, the present invention attains its stabilised wing closure configuration smoothly and progressively, without sudden metal clicks, while the opening action of the wings is initially made easier and cushioned throughout their travel.

Additional characteristics and advantages of the invention shall be made more evident in the detailed description that follows, illustrated purely by way of non limiting example in the enclosed drawings in which:

- Figure 1 shows a plan view of the device applied to the closing wing of a folding door in coplanar wing configuration, with the jamb crosspiece removed for better viewing of some parts;
- Figure 2 shows the device as per Figure 1, in the configuration with the wings folded, immediately after they have been released from the closed or coplanar configuration and with the horizontal trace of the axis of the wing sliding guide;
- Figure 3 shows the device as per Figure 2, in the configuration with the wings folded, at an instant subsequent to the one shown in Figure 2;
- Figure 4 shows a side view of a part of the device as per Figure 3, within a portion of the folding door, with some parts removed for better viewing of other parts;
- Figure 5 shows a cross section view, along the section line V-V as per Figure 1, with some parts removed for better viewing of other parts;
- Figure 6 shows a plan view of a slider which is part of the device. With reference to the enclosed drawings, a folding door (8) is shown, with wings (1) and (2), of the type for instance which include flat hinges fitted to the top and bottom end of the folding door. Each of these hinges comprises a first and a second metal rod (18) and (19), arranged horizontally and mutually articulated, forming a cantilever joint (4), with axis of rotation (r).

The device, in general, comprises a mechanical component (3), that can be elastically deformed along its axis which passes at such a distance, from the axis of rotation (r) of the joint (4) coupling the wings (1, 2), as to originate, by restraining elastic reaction against a stop (5), a torque (M), around the axis of rotation (r), sufficient to maintain the two wings (1, 2) perfectly coplanar in the closed position, when no opening force is imparted.

The mechanical component (3) comprises a first guiding element (31) and a second element (32) associated to the first and guided by it, in order to be able to move from a first extreme position with nil restraining force, with the wings folded and parallel, to a second extreme position of maximum restraining force, with the

wings coplanar. In this latter configuration the second element (32) acts on the stop (5), in correspondence with the upright (7) of the jamb of the folding door (8). Between the first and second element (31, 32) are interposed elastic means (33) able to originate the aforesaid elastic reaction.

The mechanical component (3), theoretically, could thus simply comprise an elastic component inserted crosswise in the upright (7) of the jamb with the stop (5), opposite to it, placed in the upright of the wing (1) or vice versa, in such a way as to allow a forced contact between the elastic component and the stop (5), with no need, theoretically, to fit sliding guides for the opening or closing of the wings.

However, in the preferred and more effective embodiment the mechanical component (3) is fitted along the horizontal peripheral edge (66) of one of the crosspieces (6) of the closing wing (1), the articulated joint (4) between the two wings being cantilevered in the opposite direction to their folding angle (see Figures 1, 2 and 3).

In particular, the first element (31) of the mechanical component (3) is in this case a shaped rectilinear rod (34), attached along the edge (66), while the second element (32) is a slider (35) whose shape complements that of the rod (34) and whose length is at least such as to include both the length of the rod (34), and of the elastic means (33) in their fully extended configuration, as is clearly shown in Figures 1, 4 and 5. The elastic means (33) are interposed between the end of the slider (35) facing the joint (4) coupling the wings (1, 2) and the corresponding end of the rod (34). The second and opposite end of the slider (35) instead acts directly on the stop (5) in correspondence with the jamb, in the configuration with the wings coplanar, so that said maximum restraining reaction occurs with the elastic means (33) fully extended, as clearly shown in Figure 1.

The second end of the slider (35), very advantageously, solidly bears a vertical pin (9) to guide the wings (1, 2) as they slide along a fixed groove (11) obtained in the crosspiece (14) of the jamb of the folding door (8), as clearly shown in Figures 4 and 6, whereas Figures 2 and 3 show only the horizontal trace of the axis of the wing sliding guide. In the embodiment shown in Figures 3, 4 and 5 the stop (5) coincides with the upright (7) of the jamb of the folding door (8), whereas in the embodiment shown in Figure 4 the stop (5) is a fixed limit stop (10) of the fixed groove (11) guiding the pin (9).

These embodiments of the present invention allow to attain the configuration of stable closure of the wings smoothly and progressively, with no sudden metal clicks, during the extension of the elastic means (33), while wing opening is, at least initially, made easier and cushioned throughout the opening action, as can easily be understood from Figures 1, 2 and 3.

As soon as an opening force is imparted on the folding wing (1), the elastic means (33) unload, returning to the rest position (Figure 2), while the pin (9) (or the second end of the slider), essentially remains in its limit position, set against the stop (5). Thus the opening of the wing (1) is initially aided by the action of the elastic means as they unload. Subsequently, the opening of the wings is cushioned by the very presence of the elastic means (Figure 3).

The fact that the maximum restraining reaction is obtained with the elastic means fully extended (rather than compressed), frees the device from any requirement to contain the elastic means, which can thus be easily accessible, should their replacement be necessary, as they are the only elements subject to deformations and stresses.

The rod (34) and the slider (35) are fitted along the horizontal peripheral edge (66) of the top crosspiece (6) of the folding wing. The rod and the slider are flat elements and their maximum thickness, as well as that of the elastic means (33) is smaller than the vertical dimension of the rabbet edge (12) of the folding wing (1). More particularly, the rod (34) has a lateral shape (15) complementing that of a corresponding shape (16) within the slider (35), the latter being fitted with a centre slot (17), destined both to make room for the rod (34), introduced in it so that its thickness is included in that of the slider (35) and to contain the elastic means (35), also included in the same thickness (Figure 4).

In this way, the device is effectively hidden from view.

The joint (4), in the configuration with the wings coplanar, also fits within a concealing housing (13), obtained on the crosspiece (14) of the jamb of the folding door (8).

The invention thus conceived can be subject to numerous modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all components may be replaced with technically equivalent elements.

In practice, modifications and/or improvements may be possible without thereby departing from the scope of the following claims.

Claims

1. Device for stabilising the closure of folding door wings, characterised in that it comprises at least one mechanical component (3), which can be elastically deformed along its axis and which passes at such a distance, from the axis of rotation (r) of the articulated joint (4) coupling the wings (1, 2), as to originate, by restraining elastic reaction against a stop (5), a torque (M) around the axis of rotation (r), sufficient to maintain the two wings (1, 2) perfectly coplanar in the closed position, when no opening force is imparted.

2. Device according to claim 1, characterised in that the mechanical component (3) is fitted along the

horizontal peripheral edge (66) of one of the crosspieces (6) of the closing wing (1).

3. Device according to claim 1 or 2, characterised in that the mechanical component (3) comprises a first guiding element (31) and a second element (32) associated to the first and guided by it so as to move from a first extreme position of nil restraining reaction, with the wings folded and parallel, to a second extreme position of maximum restraining reaction, with the wings coplanar, wherein said second element (32) acts on the stop (5), in correspondence with the upright (7) of the jamb of the folding door (8).

4. Device according to claim 1, characterised in that the articulated joint (4), in the configuration with the wings coplanar, is fitted within a concealing housing (13), obtained on the crosspiece (14) of the jamb of the folding door (8).

5. Device according to claim 3, characterised in that between said first and second element (31, 32) of the mechanical component (3) are interposed elastic means (33).

6. Device according to claim 5, characterised in that the first element (31) of the mechanical component (3) is a shaped rectilinear rod (34), fastened along the horizontal edge (66) of one of the crosspieces (6) of the closing wing (1), whereas the second element (32) is a slider (35) whose shape complements that of the rod (34), and whose length is at least such as to include, within it, both the length of the rod (34), and of the elastic means (33) in their fully extended configuration, the elastic means (33) being interposed between the end of the slider (35) facing the articulated joint (4) coupling the wings (1, 2) and the corresponding end of the rod (34), the second and opposite end of the slider (35) instead acting directly on the stop (5) in correspondence with the jamb, in the configuration with the wings coplanar, so that said maximum restraining reaction occurs with the elastic means (33) in a fully extended configuration.

7. Device according to claim 6, characterised in that the rod (34) and the slider (35) are fitted along the horizontal peripheral edge (66) of the top crosspiece (6) of the closing wing, the rod and the slider being flat elements with their maximum thickness and that of the elastic means (33) being smaller than the vertical dimension of the rabbet edge (12) of the closing wing (1).

8. Device according to claim 6 or 7, characterised in that the second end of the slider (35) solidly bears a vertical pin (9) to guide the wings (1, 2) as they slide.

9. Device according to claim 6 or 7, characterised in that the stop (5) is the upright (7) of the jamb of the folding door (8).

10. Device according to claim 8, characterised in that the stop (5) is a fixed limit stop (10) of a fixed groove (11), acting as a guide for the pin (9).

11. Device according to claim 7, characterised in that the rod (34) has a lateral shape (15), complementary to that of a corresponding shape (16) within the slider (35), the latter being fitted with a centre slot (17), destined both to make room for the rod (34), introduced in it so that its thickness is included in that of the slider (35), and to contain the elastic means (35).

12. Device, according to the previous claims and as described an illustrated herein with reference to the figures of the accompanying drawings and for the purposes stated herein.

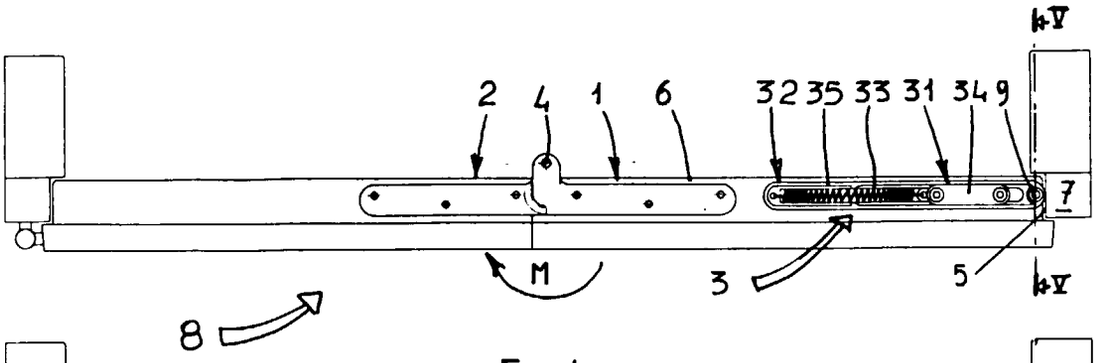

Fig.1

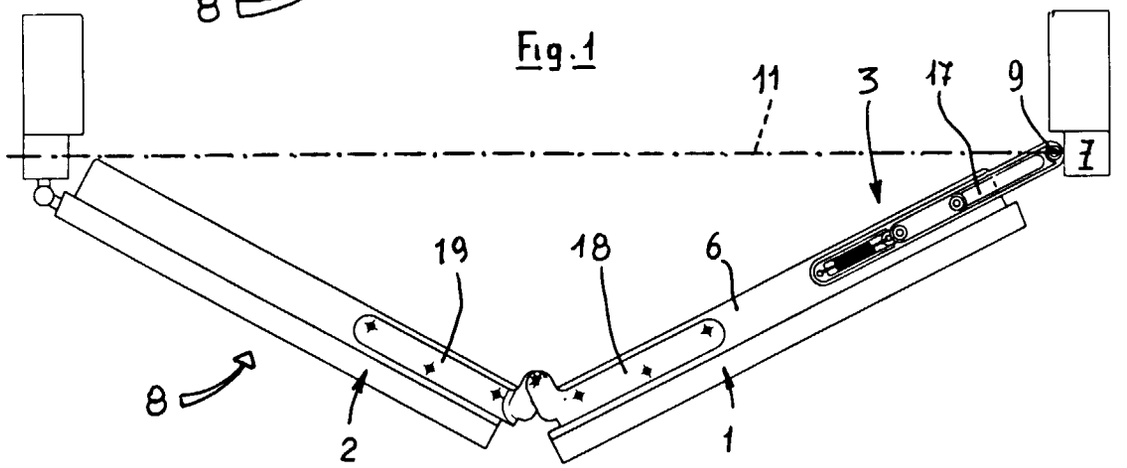

Fig.2

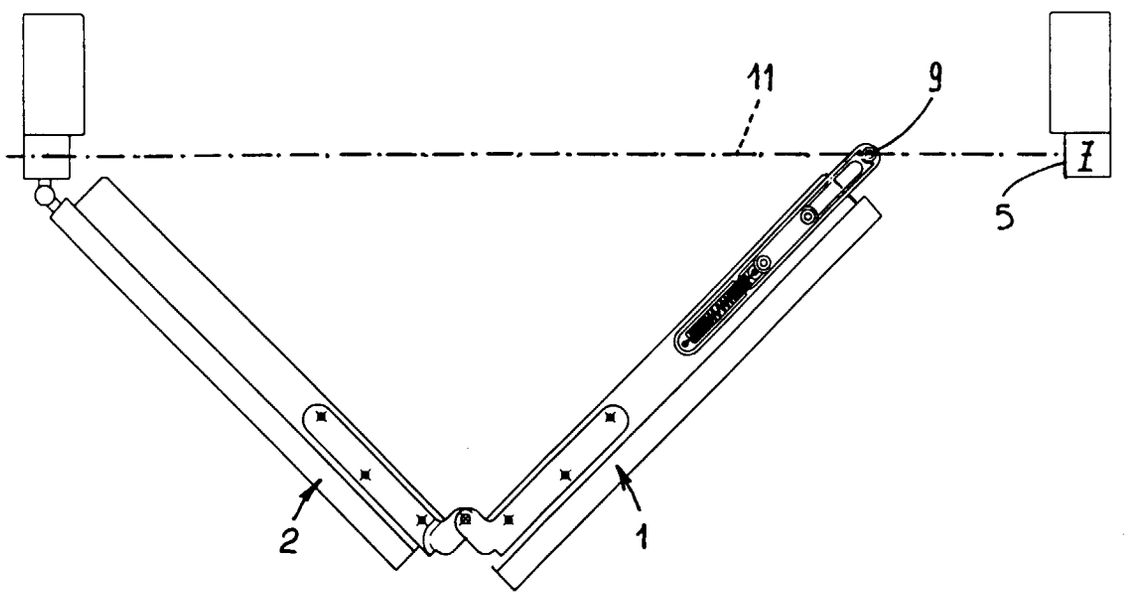

Fig.3

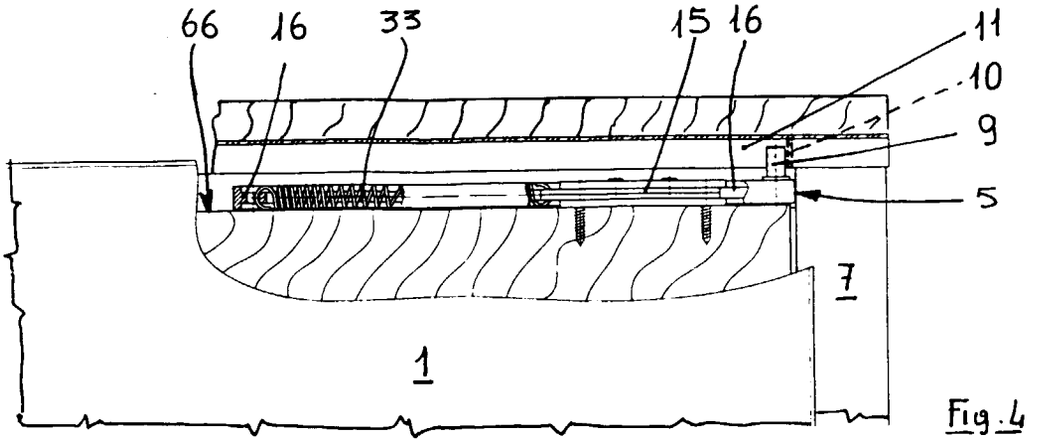

Fig.4

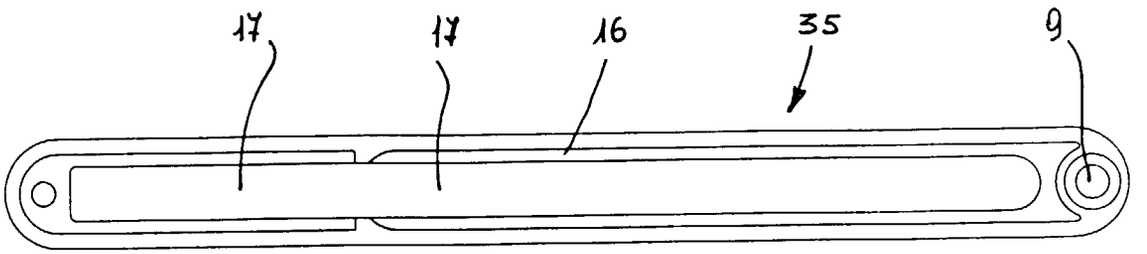

Fig.5

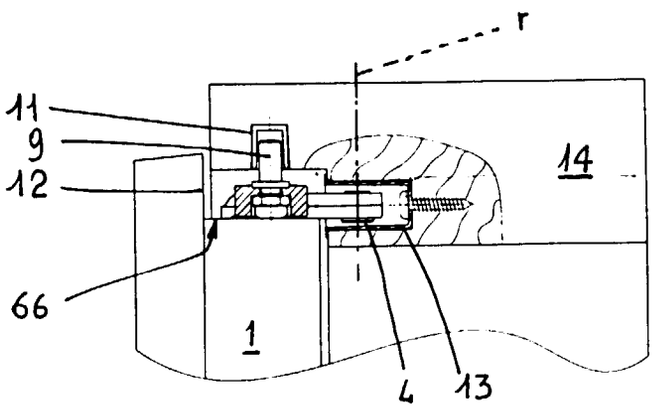

Fig.6