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(54) **Carriage**

(57) Carriage (1) for supporting a sliding wing; the carriage (1) comprising a casing (7) housing a movable equipment (2) provided with two first lateral walls (4a) and at least a roller (3) contained between the first lateral walls (4a) and carried in a rotatable fashion by a pin (9) transverse to the first lateral walls (4a); a constraining group (40) positioned between the casing (7) and the movable equipment (2) for stably retaining the movable equipment (2) inside the casing (7); characterised in that the constraining group (40) comprises an abutment device (45) and a support device (46) mutually interfaced to prevent the movable equipment (2) from slipping out of the casing (7).

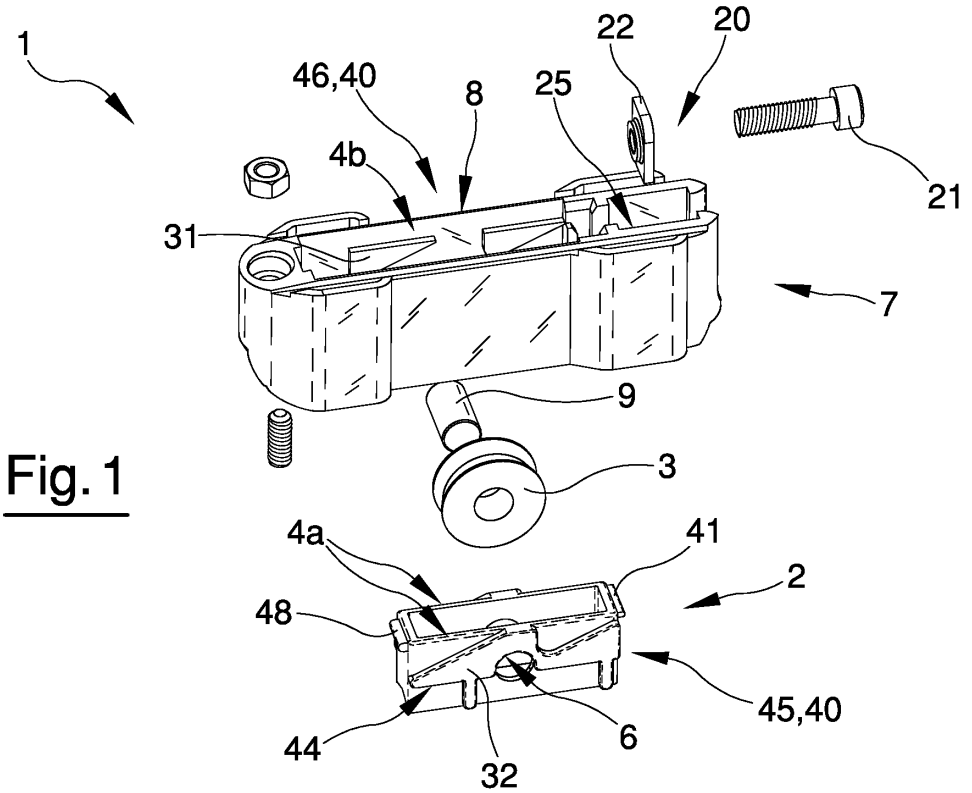

Fig. 1

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Description

[0001] The present invention relates to a carriage for supporting a wing sliding along a given direction. In particular, the present invention relates to a carriage for supporting a sliding wing, in which a constraining group able to facilitate assembly and maintenance of the carriage itself is provided. In more detail, the present invention relates to a carriage for supporting a sliding wing, in which a constraining group is provided, which can be selectively actuated and able to facilitate assembly and maintenance of the carriage itself.

BACKGROUND TO THE INVENTION

[0002] In the field of carriages for windows, doors and the like, able to support sliding wings, for example, but without limitation, sliding windows or doors, it is well known to construct such carriages in two parts, in particular, a movable equipment provided with two rotatable parts, for example, but without limitation, rollers, wheels and other similar rotatable bodies, so shaped as they can be associated with a track carried rigidly relative to the frame of the window or door; and an outer casing supporting the movable equipment. The casing is connected rigidly to the sliding wing in correspondence of a substantially prismatic seat, laterally delimited by longitudinal grooves. Usually, the movable equipment is interfaced with the casing by means of shaped element-tappet couplings in such a way as to be movable with respect to the latter along a given direction in order to allow variations of the position of each rotatable part relative to the casing, and thus to allow the adjustment for height of the sliding wing relative to the track below.

[0003] The prolonged and continuous use of the sliding wing may result in the wear and/or damage of the carriages even in a short time; therefore, it would be practical and economical to carry out the maintenance operations leaving the casing in its respective seat and extracting the movable equipment to replace only the damaged parts. It is thus necessary to have available a carriage, in which the movable equipment is maintained stably inside the casing during assembly, transport or installation, but that could be easily extracted from the side of the track to allow maintenance of the carriage itself.

[0004] A solution allowing the selective engagement and disengagement of the movable equipment in the casing is described in French patent FR 2746136 by La Croisée DS or in patent EP563015A1 by GIESSE S.p.A., in which abutment pins project laterally from the movable equipment to engage supports carried by the casing, thus preventing the movable equipment itself from slipping out downward. In order to allow the movable equipment to be inserted and to slip out, the casing presents vertical guides positioned adjacent to the supports and open from the side of the track. In this way it is possible to insert the movable equipment by making the abutment pins slide along the vertical guides and, following a vertical translation, to engage the adjacent supports. However, this type of coupling is not completely stable until the carriage is not installed on the supported window or door and therefore, during the transport or installation of the carriage, the risks remain of the movable equipment slipping out due to accidental translation of the abutment pins at the mouth of the vertical guides.

[0005] As regards adjusting the position of the movable equipment inside the casing, the above-mentioned patent EP 563015A1 by GIESSE S.p.A. describes a cam carried transversely to the walls of the casing and provided with a curved lower profile substantially J-shaped which engages two curvilinear guides obtained in the lateral walls of the movable equipment and shaped in a substantially similar manner to the cam to associate each longitudinal displacement of the movable equipment with a simultaneous transverse component. The adjusting device is completed by a longitudinal screw carried by the casing, which engages a threaded seat of the movable equipment in such a way that, by acting on the screw, it is possible to generate longitudinal displacements of the movable equipment. An adjusting device like the one just described results to be easily producible, but entails the disadvantage of concentrating the entire load of the supported wing on the small portion of the lateral walls of the casing in which the grooves are obtained, which, as a consequence, may deteriorate rather easily.

[0006] A similar problem is encountered also in the solution described in the Italian patent application RA2005A000015 by the same applicant, which provides the teachings to construct a carriage, in which the pivot pin of the wheel coupled to the track is carried by oblique slots obtained in the movable equipment and is constrained to move along vertical guides obtained in the outer casing. This type of carriage, if on the one hand it provides a better control of the vertical position of the supported element with respect to the technical solution described above, on the other hand it presents at least two disadvantages. First of all, also in this case the entire load of the supported element is concentrated ultimately on the contact point between the pin and the oblique slots, which, as time passes, may become deformed in correspondence of the contact point itself, thus compromising any subsequent adjustment operation. In addition to this, the constraining device of the movable equipment inside the casing consists of the engaging of a pair of horizontal slots obtained in the lateral walls of the movable equipment by a pair of projections carried internally by the casing. These constraining slots are snap engaged/disengaged by exploiting the elasticity of the projections which in this way tend to wear out and rapidly lose their abutment function.

[0007] In view of the above description, the problem of constructing a carriage provided with a movable equipment which remains inserted inside the respective casing even before the installation of the sliding wing in the seat, for example during transport or during the installation steps, and thus in absence of a load acting on casing /

movable equipment, is currently resolved in a dissatisfactory manner. Furthermore, also in view of the above description, it would be desirable to have available a carriage in which the methods of slidable coupling between the movable equipment and the casing are such as to permit long-term retention of the original functional characteristics. It is apparent that this represents an interesting challenge for the applicant. In consideration of the situation described above, it would be desirable to have available a carriage for sliding windows, doors and the like, which, in addition to enabling to limit and possibly to overcome the typical drawbacks of the art illustrated above, could define a new standard in the sector of carriages for sliding windows, doors and the like.

SUMMARY OF THE PRESENT INVENTION

[0008] The present invention relates to a carriage for supporting a wing sliding along a given direction. In particular, the present invention relates to a carriage for supporting a sliding wing, in which a constraining group able to facilitate assembly and maintenance of the carriage itself is provided. In more detail, the present invention relates to a carriage for supporting a sliding wing and in which a constraining group is provided which can be selectively actuated and able to facilitate assembly and maintenance of the carriage itself.

[0009] The object of the present invention is to provide a carriage for sliding windows, doors and the like that allows the disadvantages described above to be solved, and which is suitable to satisfy a plurality of requirements that to date have still not been addressed, and therefore, suitable to represent a new and original source of economic interest and capable of modifying the current market of carriages for sliding wings.

[0010] According to the present invention, a carriage for supporting a sliding wing is constructed, whose main characteristics are described in at least one of the appended claims.

[0011] A further object of the present invention is to construct a carriage, provided with a casing and a movable equipment, in which assembly and disassembly of the movable equipment may take place in a rapid and safe manner without damage to parts even following couplings and discouplings repeated several times, keeping unchanged the functionality of the carriage itself. According to the present invention, a casing and a movable equipment are further constructed, which are able to be mutually coupled in a carriage for supporting a sliding wing; the main characteristics of this casing and this movable equipment are described in at least one of the appended claims. A further object of the present invention is to provide a method for assembling a carriage for supporting a sliding wing, this method being suitable to satisfy a requirement that to date has still not been addressed and, in particular, to stably couple a respective casing and the corresponding movable equipment by means of a succession of steps of simple execution and therefore, suitable to represent a new and original source of economic interest and capable of modifying the current market of carriages for sliding wings.

[0012] According to the present invention, a method that is validly usable for assembling a carriage for supporting a sliding wing is also provided, whose main characteristics are described in at least one of the appended claims.

BRIEF DESCRIPTION OF THE FIGURES

[0013] Further characteristics and advantages of the carriage, the casing, the movable equipment and of the assembly method according to the present invention will be more apparent from the description below, set forth with reference to the accompanying drawings, which illustrate a non-limiting example of embodiment. In particular:

- figure 1 is a schematic perspective exploded view of a carriage according to the present invention;
- figure 2 is a plan view of figure 1 in enlarged scale;
- figure 3 is a schematic perspective view, partially in view and partially cut-way of figure 2, in enlarged scale;
- figure 4 is a side elevation view of figure 3 in a first assembly phase;
- figure 5 is a side elevation view of figure 3 in a second assembly phase; and
- figure 6 is a side elevation view of figure 3 in a third assembly phase.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0014] In figure 1, number 1 indicates, in its entirety, a preferred embodiment of a carriage for supporting a sliding wing, for example the leaf of a window or door or the movable part of a sliding railing. As shown in figure 1, the carriage 1 comprises an outer casing 7 and a movable equipment 2 housing at least a roller 3, typically, but without limitation, a wheel or a caster, suitably shaped to engage a track, known and therefore not shown, and to give to the carriage 1, and thus to the wing supported thereby, translation freedom along a first longitudinal reference direction D, which henceforth shall be referred to as first longitudinal direction. In particular, the carriage 1 comprises a constraining group 40 to fasten the movable equipment 2 inside the casing 7 and to facilitate the use of the carriage 1 itself during assembly, transport, installation or maintenance. Furthermore, the carriage 1 comprises an adjusting device 20 and a balancing device 70 for regulating the position of the movable equipment 2 relative to the casing 7, and a guiding device 30 that, in use, is suitable to constrain the relative motion of the movable equipment 2 with respect to the casing 7 along a given trajectory, as will be better described below.

[0015] The movable equipment 2 presents substan-

tially parallelepipedal shape with two first lateral walls 4a positioned according to the longitudinal direction D and parallel to each roller 3, supported by them by means of a transverse pin 9 carried in a freely rotatable manner by the same first lateral walls 4a. In the preferred embodiment of the present invention shown in the accompanying drawings, the movable equipment 2 comprises only a roller 3 carried by the respective pin 9. For this purpose, the movable equipment 2 presents a pair of holes 6 able to support the pin 9 transversely to the first lateral walls 4a. Furthermore, it should be noted that the length of the pin 9 is modulated in such a way that the pin is completely housed inside the movable equipment 2 and does not engage, in use, the casing 7.

[0016] To house the movable equipment 2, the casing 7, which is destined to be fixed to the sliding wing, known and therefore not shown, presents a inner first space 8 which has substantially parallelepipedal shape and is delimited by two second lateral walls 4b facing each other and positioned according to the first longitudinal direction D. In view of the above description, it necessarily follows that each second wall 4b of the outer casing 7 faces a respective first wall 4a of the movable equipment 2.

[0017] According to the present invention, the guiding device 30, the balancing device 70 and the constraining group 40 of the movable equipment 2 are positioned inside the first space 8 in the interspace between the movable equipment 2 and the casing 7. In this way, such a guiding device 30, such a balancing device 70 and the constraining group 40 are not easily accessible from outside of the carriage 1 and, in use, are well protected from external agents which might damage them.

[0018] In particular, the guiding device 30 comprises at least a guide 31 coupled to at least an abutment 32. More in particular, each guide 31 comprises a first shaped element 31 carried by the second lateral walls 4b inside the first space 8 and each abutment 32 comprises a second shaped element 32 projecting externally to the movable equipment 2 from the first walls 4a. According to the present invention, the guiding device 30 is constructed in such a way that, maintaining the dimensions of the movable equipment constant, the load of the supported guiding device, which can reach considerable values, is distributed in a uniform manner on a wide interface between the guide/s 31 and the abutment/s 32 to minimise the pressure which the same guiding device is subjected to. This characteristic ensures lesser wear and tear of the guiding device 30 in the long term and gives greater durability to the carriage 1. For this purpose, each first and each second shaped element are preferably, but without limitation, shaped like an inclined plane and comprise respectively a first and a second surfaces 33 and 34, each of which is inclined by a given angle α of inclination relative to the first longitudinal direction D; each first surface 33 being shaped in such a way as to be able to slide freely relative to a corresponding second surface 34. With particular reference to figure 5, each first shaped element 31 engages only a second shaped element 32 and the casing 7 supports the movable equipment 2 by means of a pair of first shaped elements 31 facing each other and positioned symmetrically with respect to a longitudinal median plane M of the carriage 1 containing the first longitudinal direction D, as shown in figure 2, in which it is represented for the sake of convenience through the same line of the first direction D itself. In this way, it is possible to support the movable equipment 2 on both side and to distribute in a uniform manner the load of the wing on both the first/second lateral walls 4a/4b. It should be specified that, when the carriage 1 is ready for installation, this median plane M is longitudinally positioned in centreline both for the casing 7 and for the movable equipment 2. Furthermore, using more than a pair comprising a first shaped element 31 and a second shaped element 32, it will be possible to increase, the bulk of the movable equipment 2 being equal, the overall extension of the surfaces in mutual contact of the casing 7 and of the movable equipment 2, with consequent reduction of the pressure exchanged at the interface between each first shaped element 31 and the respective second shaped element 32. It is easily understood that reduction of the specific loads/of the pressure allows for choosing materials distinguished by mechanical characteristics of lesser importance, all to the benefit of a decrease in the costs of the carriage 1 in its entirety. Furthermore, it should be noted that, with reference to figure 3, the two pairs of first shaped elements 31/second shaped elements 32 are positioned at opposite site each from the other with respect to the pin 9 so as to balance, in use, the position of the movable equipment 2 inside the casing 7 and to prevent any oscillation of the movable equipment 2 about the pin 9.

[0019] In view of the above description, it follows that the guiding device 30 ensures that with each longitudinal motion of the movable equipment 2 inside the casing 7 is associated a simultaneous movement along a second direction Q transverse to the first longitudinal direction D and shown in figure 4 only. By means of the guiding device 30 is therefore possible indirectly to adjust the position of the roller 3 and of the wing supported along the transverse direction Q, longitudinally translating the movable equipment 2.

[0020] These longitudinal translations can be generated by means of the adjusting device 20 housed inside the casing 7 in a second space 25 positioned longitudinally adjacent to the first space 8, as shown with particular reference to figures 1 and 2. In more detail, the adjusting device 20 comprises a regulating member 21, able to act as abutment for the movable equipment 2 along the first longitudinal direction D, and a blocking member 22 for blocking the position of the regulating member 21, able to maintain the regulating member 21, and thus also the movable equipment 2, fixed in a given position relative to the casing 7. Furthermore, the adjusting device 20 is accessible from the outside of the casing 7 in such a way that it is possible to adjust the supported wing at any moment, even following the installation of the carriage.

It should also be noted that the blocking member 22 is housed in a selectively releasable manner inside the second space 25 in such a way that the adjusting device 20 can be extracted from the carriage 1 during the maintenance operations, and replaced, if necessary. For practical and economical reasons, it may be advantageous to construct the adjusting device 20 by means of a threaded coupling comprising a screw 21 engaging a nut 22. For this reason, in the description below the terms regulating member 21 and screw 21 shall be used indifferently based upon the context. The carriage 1 further comprises a constraining group 40 positioned between the movable equipment 2 and the casing 7 to maintain the movable equipment 2 stable inside the casing 7 preventing the movable equipment 2 from accidentally slipping out of the casing 7 itself; this characteristic is particularly useful in absence of load, for example, but without limitation, during the steps of assembly, transport, installation and maintenance of the carriage 1. In particular, the constraining group 40 comprises an abutment device 45 carried by the movable equipment 2 and a support device 46 carried by the casing 7; these latter two devices are mutually interfaced so as to prevent the movable equipment 2 from slipping out of the casing 7 itself. In more detail, the abutment device 45 comprises at least a first abutment member 41 and at least a second abutment member 44 positioned at opposite sides with respect to the pin 9, and the support device 46 comprises at least a first support member 42 and at least a second support member 47 positioned remotely one from the other, facing each second abutment member 44 and each first abutment member 41 respectively, and able to cooperate to hold the movable equipment 2 stably inside the first space 8 in the casing 7. These first and second abutment members 41 and 44 project externally to the movable equipment 2 and may preferably, but without limitation, have the form of a tongue or tooth projecting from the respective support walls. More in particular, without limiting the present invention, the first abutment member 41 projects from a wall transverse to the first lateral walls 4a from the same side of the adjusting device 20/regulating member 21. Furthermore, with particular reference to figure 2, it should be noted that the movable equipment 2 comprises a pair of second abutment members 44 projecting from the first lateral walls 4a symmetrically with respect to the median plane M and suitable to engage a pair of respective support members 42 projecting internally to the first space 8 from the second lateral walls 4b. As shown in figure 3, each abutment member 44 is usually, but without limitation, positioned below a second shaped element 32 close to the lower edge of the movable equipment 2. This feature has the advantage of being able to use a single lateral projection 71 to embody at the same time both a second shaped element 32 associated with the guiding device 30 and an abutment member 44 associated with the constraining group 40; naturally, this choice entails simplification of the production process of the carriage 1. Lastly, the second support member 47 is carried inside the first space 8 by the casing 7 at the same side of the adjusting device 20/second space 25 to couple, in use, to the first abutment member 41. More in particular, the end of the regulating member 21 able to engage the movable equipment 2 comprises the second support member 47, in such a way that, by using only a mechanical element, for instance a screw, it is possible to provide both the regulating member 21 and the second support member 47. This choice also entails a number of advantages of the functional and economic type such as, for instance, reduction of the components required and simplification of the design and the production of the carriage 1. In view of the above description it is apparent that it is possible to vary the position of the second support member 47 between two different operating positions P and P' and, as it will be better described below, this operation allows the constraining group 40 to be selectively actuated. In particular, with reference to figure 4, in the first operating position P the second support member 47 is entirely housed inside the second space 25 and, without engaging the first space 8, it is separated from the first abutment member 41; in this condition the constraining group 40 is non-operative because the movable equipment 2 is supported only at opposite side from the second space 25 so it may spill out of the casing 7 by rotating it about the first support members 42. Vice-versa, the second support member 47 is in the operating position P' when it engages the first space 8 and projects inside the first space 8 in portion sufficient to maintain the movable equipment 2 far from the second space 25 so as the second abutment members 44 are facing the first support members 42. In this particular configuration the movable equipment 2 is supported at two opposite sides respectively by the coupling of the first abutment member 41 to the second support member 47 and by the coupling of the second abutment members 44 to the respective support members 42, and is therefore held stably inside the first space 8.

[0021] It follows that, when the second support member 47 is in the second operating position P', the constraining group 40 is operative. In view of the above description, with the terms "second operating position P' " it shall mean, here and below, each position in which the second support member 47 maintains the movable equipment 2 with its second abutment members 44 facing the first support members 42.

[0022] Lastly, the constraining device 40 can comprise a contrast member 43 carried by the casing 7 inside the first space 8 at opposite side from the adjusting device 20/second space 25. This contrast member 43 is suitable to exercise on the movable equipment 2 a thrust along the first longitudinal direction D constantly in the direction of the adjusting device 20, to maintain the movable equipment 2 in contact with the regulating member 21. For this purpose, the contrast member 43 usually comprises an elastic foil 43 which is clearly visible in figure 3 and in the following ones. Furthermore, the contrast member 43 comprises preferably, but without limitation, a third sup-

port member 49 suitable to be engaged by a third abutment member 48 carried by the movable equipment 2 to cooperate for maintaining the movable equipment 2 inside the casing 7. For this purpose, the third abutment member 48 projects externally to the movable equipment 2 at opposite side from the first abutment member 41 and projects from a wall transverse to the first lateral walls 4a.

[0023] The movable equipment 2 further presents at least a stiffening rib 72 carried by a respective first lateral walls 4a to give stiffness to the first lateral walls 4a. More in particular, as it is clearly shown in figure 3, all the elements projecting from a first lateral walls 4a, in particular each second abutment member 44, each second shaped element 32 and each stiffening rib 72, are delimited laterally by a planar surface 4c parallel to the first wall 4a and can be produced by means of a single lateral projection 71. For greater clarity, the lateral surfaces 4c are indicate only in figure 2 with dotted lines, and are mutually separated by a first length L that approximates in defect the distance between the second lateral walls 4b of the casing 7 to allow the movable equipment 2 to be freely inserted inside the first space 8 and to maintain the first lateral walls 4a substantially parallel to the second lateral walls 4b. In view of the above description, the balancing device 70 of the movable equipment 2 comprises a pair of lateral projections 71 carried by the first lateral walls 4a and delimited by respective lateral surfaces 4c and, in use, it maintains the first lateral walls 4a of the movable equipment 2 constantly parallel to the second lateral walls 4b of the casing 7, preventing any oscillations of the movable equipment 2 about any longitudinal axis. Lastly, in view of the above description, it follows that the pin 9 presents a length which approximates in defect the first length L so as to be completely housed inside the movable equipment 2.

[0024] The use of the carriage 1 and of its principal components, i.e. the movable equipment 2 and the casing 7, is easily understood from the description above and requires no further explanations. However, it would be opportune to illustrate a method that is validly usable for assembling the carriage 1 described above.

[0025] First of all, this assembly method comprises the step of housing the pin 9 and the roller 3 inside the movable equipment 2 and the step of housing the adjusting device 20 inside the second space 25 of the casing 7. At this point, it is possible to proceed with the step of inserting the movable equipment 2 inside the first space 8 inside the casing 7, as shown in a sequential manner in figures 4, 5 and 6. First of all, it is necessary to ensure that the second support member 47 is in the first operating position P, meaning it is completely housed inside the second space 25, as the movable equipment 2 can be correctly inserted and slipped out only when the second support member 47 is in the first operating position P and therefore the constraining group 40 is non-operative. It is then possible to proceed, as shown in figure 4, with the step of displacing the movable equipment 2 under the first space 8 and parallel to the casing 7 so as the first abutment member 41 faces towards the regulating member 21/the second support member 47. At this point, it is possible to proceed with the step of inserting the movable equipment 2 inside the casing 7 until each second shaped element 32 engages the respective first shaped element 31, as shown in figure 5. The assembly procedure is therefore completed by the step of changing the position of the second support member 47 from the first operating position P to the second operating position P' to make operative the constraining group 40 and engage the movable equipment inside the first space 8.

[0026] It should be noted that the method described above allows a large number of practical advantages during transport, installation and maintenance of the carriage 1 thanks to the possibility of selectively actuating the constraining group 40 following the change in the position of the second support member 47 from a first operating position P to a second operating position P'. In fact, the installer, once he has actuated the constraining device 40, can freely handle the carriage 1 without holding the movable equipment 2 inside the casing 7 by hand. However, in view of the above description, this last step of changing the position of the second support member 47 between two different operating positions is perfectly reversible and therefore the constraining group 40 can be selectively actuated. For instance, varying the position of the second support member 47 from the second operating position P' to the first operating position P is necessary whenever the movable equipment 2 must be extracted from the casing 7, for example during maintenance operation of the carriage 1 or replacing of worn components.

[0027] Finally, it should be reminded that the carriage 1 according to the present invention presents further advantages in addition to those already described. In particular, the lack of slots and/or guides obtained in the first lateral walls 4a or 4b allows to construct the movable equipment 2 and the casing 7 directly by moulding, without further mechanical works, thus reducing costs and times for producing the carriage 1.

Claims

1. A carriage (1) for supporting a wing sliding along a first longitudinal direction (D); said carriage (1) comprising a casing (7) housing a movable equipment (2) provided with two first lateral walls (4a) and with at least a roller (3) contained between said first lateral walls (4a) and carried in a rotatable fashion by a pin (9) transverse to said first lateral walls (4a); a constraining group (40) positioned between said casing (7) and said movable equipment (2) to stably hold said movable equipment (2) inside said casing (7); **characterised in that** said constraining group (40) comprises an abutment device (45) and a support device (46) mutually interfaced to prevent said movable equipment (2) from slipping out of said casing

(7).

2. A carriage according to claim 1, **characterised by** comprising guiding means (30) for guiding the displacements of said movable equipment (2) relative to said casing (7); said guiding means (30) comprising at least a guide (31) and at least an abutment (32) mutually interfaced and positioned between said movable equipment (2) and said casing (7) to condition, in use, relative displacements of said movable equipment (2) with respect to said casing (7) along a given trajectory.

3. A carriage according to claim 2, **characterised by** comprising balancing means (70) for balancing the position of said movable equipment (2) inside said casing (7); said balancing means (70) being positioned between said casing (7) and said movable equipment (2) to prevent any oscillations of said movable equipment (2) about any longitudinal axis.

4. A carriage according to claim 1, **characterised by** comprising balancing means (70) for balancing the position of said movable equipment (2) inside said casing (7); said balancing means (70) being positioned between said casing (7) and said movable equipment (2) to prevent any oscillations of said movable equipment (2) about any longitudinal axis.

5. A carriage according to claim 4, **characterised by** comprising guiding means (30) for guiding displacements of said movable equipment (2) relative to said casing (7); said guiding means (30) comprising at least a guide (31) and at least an abutment (32) mutually interfaced and positioned between said movable equipment (2) and said casing (7) to condition, in use, relative displacements of said movable equipment (2) with respect to said casing (7) along a given trajectory.

6. A carriage according to claim 3 or 5, **characterised by** comprising adjusting means (20) for adjusting the position of said movable equipment (2) relative to said casing (7); said adjusting means (20) being positioned inside said casing (7) and comprising a regulating member (21), able to act as abutment for said movable equipment (2) along said first longitudinal direction (D), and a blocking member (22) for blocking the position of the regulating member (21) fixed in a given position.

7. A carriage according to claim 6, **characterised in that** said regulating member (21) comprises a screw (21) and **in that** said blocking member (22) comprises a nut (22) suitably threaded to couple to said screw (21).

8. A carriage according to claim 6 or 7, **characterised in that** said casing (7) presents a first space (8) housing said movable equipment (2) and a second space (25), longitudinally adjacent to said first space (8), which houses said adjusting means (20); said first space (8) being delimited by two second lateral walls (4b) positioned in a substantially symmetrical manner relative to a longitudinal median plane (M) of the carriage (1) and each of said second walls (4b) facing said first lateral wall (4a) of said movable equipment (2).

9. A carriage according to claim 8, **characterised in that** said abutment device (45) comprises at least a first abutment member (41) and at least a second abutment member (44) positioned at opposite sides relative to said pin (9) and **in that** said support device (46) comprises at least a first support member (42) and at least a second support member (47) positioned far from each other so as to face, in use, said first and second abutment members (41, 44); each said first and second abutment members (41, 44) being able to engage respectively a said second and first support members (47, 42) to stably hold said movable equipment (2) inside said first space (8) in said casing (7).

10. A carriage according to claim 9, **characterised in that** said abutment device (45) comprises a single said first abutment member (41) projecting externally to said movable equipment (2) from a wall transverse to said first lateral walls (4a); said first abutment member (41) being positioned at the same side as the adjusting means (20) to engage, in use, said second support member (47) carried by the casing (7) inside the first space (8).

11. A carriage according to claim 10, **characterised in that** the end of said regulating member (21) facing said first space (8) and suitable to engage the movable equipment (2) comprises said second support member (47).

12. A carriage according to claim 10 or 11, **characterised in that** said abutment device (45) comprises a pair of said second abutment members (44) positioned externally to said movable equipment (2) at opposite side from said first abutment member (41) and projecting from said first lateral walls (4a) in a symmetrical manner relative to said longitudinal median plane (M), and **in that** said support device (46) comprises a pair of first support members (42) carried by said casing (7) inside the first space (8) and projecting from said second lateral walls (4b) symmetrically with respect to said longitudinal median plane (M).

13. A carriage according to claim 11, **characterised in that** the position of said second support member (47)

can be varied, in use, between a first operating position (P), in which it is entirely housed inside said second space (25), and a second operating position (P'), in which said second support member (47) engages said first space in a position facing said first abutment member (41).

14. A carriage according to claim 13, **characterised in that**, in said second operating position (P'), said second member (47) engages said first space (8) in a portion sufficient to maintain said movable equipment remote from said second space (25) so that said second abutment members (44) are facing said first support members (42).

15. A carriage according to any one of claims 8-14, **characterised in that** said constraining group (40) comprises at least a contrast member (43) positioned at opposite side from said adjusting means (20); said contrast member (43) being suitable to exercise on the movable equipment 2 a thrust along said first longitudinal direction D constantly in the direction of said adjusting means (20), to maintain said movable equipment (2) in contact with said regulating member (21).

16. A carriage according to claim 15, **characterised in that** said contrast member (43) is carried by said casing (7) inside said first space (8) and comprises at least an elastic element (43).

17. A carriage according to claim 10 and 16, **characterised in that** said contrast member (43) comprises a third support member (49) and **in that** said abutment device (45) comprises a third abutment member (48) projecting from the movable equipment (2) at opposite side from said first abutment member (41); said third abutment member (48) and said third support member (49) being suitable to cooperate with each other and with said first abutment member (41) and said second support member (47) to maintain stably said movable equipment (2) inside said casing (7).

18. A carriage according to any one of claims 8-17, **characterised in that** each said guide (31) and each said respective abutment (32) are shaped and mutually interfaced in such a way as to minimise the local pressure due to the supported wing.

19. A carriage according to claim 18, **characterised in that** each said guide (31) comprises a first shaped element (31) carried inside said first space (8) by said second lateral walls (4b) and **in that** each abutment (32) comprises a respective second shaped element (32) carried externally by said first lateral walls (4a) of said movable equipment (2); each said first shaped element (31) being able to couple to at least a respective second shaped element (32) to conditionate, in use, relative displacements of said movable equipment (2) inside said space (8) along a trajectory determined by the shape of said first and second shaped elements (31, 32).

20. A carriage according to claim 19, **characterised in that** each said first/second shaped element is shaped like an inclined plane and presents respective first/second surface (33), (34) inclined by a given angle (α) of inclination relative to said first longitudinal direction (D); each said first surface (33) being shaped in such a way as to freely slide relative to a corresponding second surface (34).

21. A carriage according to claim 19 or 20, **characterised in that** to each first shaped element (31) always corresponds only one said second shaped element (32), and vice-versa.

22. A carriage according to claim 21, **characterised in that** said guiding means (30) comprise two pairs of said first shaped elements (31) positioned symmetrically relative to said longitudinal median plane (M) and mutually facing two by two; said two pairs of first shaped elements (31) being positioned at opposite side each from the other relative to a pin (9) to balance, in use, the movable equipment (2) inside said first space (8) and to prevent any oscillations about said pin (9).

23. A carriage according to claims 21 or 22, **characterised in that** said guiding means (30) comprise at least two pairs of said first shaped elements (31) positioned symmetrically to said longitudinal median plane (M) and mutually facing two by two in such a way as, the bulk and conformation of said movable equipment (2) being equal, the overall extension of the surfaces into reciprocal contact of said casing (7) and said movable equipment (2) is greater to decrease the pressure exchanged at the interface between each first shaped element 31 and the respective second shaped element 32.

24. A carriage according to any one of the preceding claims, **characterised in that** said movable equipment (2) presents holes (6) obtained along said first lateral walls (4a) to house said pin (9).

25. A carriage according to any one of the preceding claims, **characterised in that** each said first lateral wall (4a) carried externally at least a projecting stiffening rib (72) to give stiffness to said first lateral walls (4a).

26. A carriage according to claims 12, 19 and 25, **characterised in that** each said second abutment member (44), each said second shaped element (32) and each said stiffening rib (72) project from said first

lateral walls (4a) and are delimited laterally by planar surfaces (4c) that are mutually separated by a first length (L) which approximates in defect the distance between said second lateral walls (4b) of said casing (7) to allow to freely insert of said movable equipment (2) inside said first space (8) and to maintain said first lateral walls (4a) substantially parallel to said second lateral walls (4b).

27. A carriage according to claim 26, **characterised in that** said movable equipment presents externally exclusively a pair of lateral projections (71) carried by said first lateral walls (4a) and delimited laterally by said planar surfaces (4c); each of said lateral projections (71) comprising each said respective shaped element (32), each said respective second abutment member (44) and each respective said stiffening rib (72) carried by said respective first lateral wall (4a).

28. A carriage according to claim 27, **characterised in that** said balancing means (70) comprise said pair of lateral projections (71) to maintain said first lateral walls (4a) always parallel to said second lateral walls (4b) preventing any oscillations of said movable equipment (2) about any longitudinal axis.

29. A carriage according to any one of claims 26-28, **characterised in that** said pin (9) presents a length which approximates in defect said first length (L) in such a way that said pin (9) is completely housed inside said movable equipment (2) and, in use, does not engage said second lateral walls (4b).

30. A carriage according to any one of claims 8-29, **characterised in that** said blocking member (22), in use, is fastened inside said second space (25) in a selectively releasable fashion, so that during maintenance operations, said adjusting means (20) can be extracted from said carriage (1) and replaced, if necessary.

31. A carriage according to any one of the preceding claims, **characterised in that** said movable equipment (2) and said casing (7) can be directly produced by moulding in order to minimise production costs and time.

32. A carriage according to claim 8, **characterised in that** said movable equipment (2) presents externally only a pair of lateral projections (71) delimited laterally by respective planar surfaces (4c) parallel to said first lateral walls (4a); said planar surfaces (4c) being mutually separated by a first length (L) which approximates in defect the distance between said second lateral walls (4b) of said casing (7) to allow to freely insert said movable equipment (2) inside said first space (8) and to maintain said first lateral walls (4a) substantially parallel to said second lateral walls (4b).

33. A carriage according to claim 32, **characterised in that** said lateral projections (71) are so shaped as to comprise at least a shaped element (32) associated with said guiding means (30), at least an abutment member (44) associated with said constraining group (40) and at least a stiffening rib (72) to give stiffness to said movable equipment (2).

34. A carriage according to claim 32 or 33, **characterised in that** said balancing means (70) comprise said pair of lateral projections (71) which, in use, maintains said first lateral walls (4a) of said movable equipment (2) parallel to said second lateral walls (4b) of said casing (7) preventing any oscillations of said movable equipment (2) about any longitudinal axis.

35. A method for assembly of a carriage (1) as described with reference to any one of claims 1-34; said carriage (1) comprising a casing (7) housing inside a first space (8) a movable equipment (2) provided with at least a roller (3) carried in a rotatable fashion by a pin (9); adjusting means (20) housed inside a second space (25), longitudinally adjacent to said first space (8) and suitable to adjust the position of said movable equipment (2) relative to said casing (7) and comprising a regulating member (21) which, in turn, comprises a second support member (47); a constraining group (40) positioned between said casing (7) and said movable equipment (2) to hold stably said movable equipment (2) inside said casing (7), said constraining group (40) comprising a first abutment member (41) projecting from said movable equipment (2) and positioned at the same side as said adjusting means (20); **characterised by** comprising a step of inserting said movable equipment (2) inside said first space (8), followed by a step of varying the position of said second support member (47) from a given first operating position (P) to a given second operating position (P') to actuate said constraining group (40).

36. A method according to claim 35, **characterised in that** in said first operating position (P) said second support member (47) in entirely housed inside said second space (25), whilst, in said second operating position (P') said second support member (47) engages said first space so as to cooperate with said first abutment member (41) to hold stably said movable equipment (2) inside said first space (8) .

37. A method according to claim 35 or 36, **characterised in that** said step of varying the position of said second support member (47) from said first operating position (P) to said second operating position (P')

is reversible and allows to selectively actuate said constraining group (40).

38. A method according to claim 36 or 37, **characterised in that** said step of inserting said movable equipment (2) inside said first space (8) is carried out with said second support member (47) being in said first operating position (P) and is followed by a step of engaging at least a guide (31) carried by said casing (7) inside said first space (8) with at least an abutment projecting from said movable equipment (2).

39. A method according to any one of claims 35-38, **characterised in that** said step of inserting said movable equipment (2) inside said first space (8) follows a step of displacing said movable equipment (2) under said first space (8) and parallel to said casing (7) so that said first abutment member (41) faces said regulating member (21).

40. A method according to any one of claims 35-39, **characterised in that** said step of inserting said movable equipment (2) inside said first space (8) follows both the step of housing at least one said roller (3) and said pin (9) inside said movable equipment (2), and the step of housing said adjusting means (20) inside said second space (25) of said casing (7).

41. A casing (7) for a carriage (1) as described with reference to any one of claims 1-34; said casing (7) being suitable to engage in a mechanically releasable fashion a wing sliding along a first longitudinal direction (D) and to house inside a first space (8) delimited by the lateral walls (4b) a movable equipment (2) provided with at least a roller (3); **characterised by** comprising a support device (46) associated with a constraining group (40) of the carriage (1) and suitable to cooperate with an abutment device (45) carried by said movable equipment (2) to hold stably said movable equipment (2) inside said casing (7).

42. A casing according to claim 41, **characterised in that** said support device (46) comprises at least a first support member (42) and at least a second support member (47) suitable to be engaged by respective first and second abutment members (44, 41) associated with said abutment device (45) and carried by said movable equipment (2).

43. A casing according to claim 42, **characterised by** comprising a pair of said first support members (42) mutually facing and projecting from said lateral walls (4b) symmetrically to a longitudinal median plane (M) of the carriage (1) to couple, in use, to a pair of said second abutment members (44) carried by said movable equipment (2) symmetrically to said median plane (M).

44. A casing according to any one of claims 41-43, **characterised by** housing inside a second space (25), longitudinally adjacent to said first space (8), adjusting means (20) to adjust the position of said movable equipment (2) relative to said casing (7) ; said adjusting means (20) comprising a regulating member (21) able to act as abutment for said movable equipment (2) along said first longitudinal direction (D), and a blocking member (22) for blocking the position of the regulating member (21) suitable to maintain said regulating member (21) fixed in a given position.

45. A casing according to claims 43 and 44, **characterised in that** said regulating member (21) comprises said second support member (47).

46. A casing according to claim 44 or 45, **characterised in that** said regulating member (21) comprises a screw (21) and **in that** said blocking member (22) comprises a nut (22) suitably threaded to couple to said screw (21).

47. A casing according to any one of claims 44-46, **characterised by** comprising at least an abutment member (43) carried inside said first space (8) at opposite side from said second space (25) and suitable to exercise on said movable equipment (2) a one-directional thrust always in the direction of said second space (25).

48. A casing according to claim 47, **characterised in that** said contrast member (43) comprises a third support member (49) suitable to be engaged by a third abutment member (48) carried by said movable equipment (2) to cooperate to maintain said movable equipment (2) inside said casing (7).

49. A casing according to any one of claims 41-48, **characterised by** comprising at least a guide (31) carried inside said first space (8) by said lateral walls (4b) of said casing (7) and suitable to couple to at least an abutment (32) carried by said movable equipment (2) to condition its relative displacements inside said first space (8).

50. A casing according to claim 49, **characterised in that** each guide (31) comprises a first shaped element (31) substantially shaped as an inclined plane and suitable to freely slide relative to a second shaped element (32) associated with said abutment 832).

51. A casing according to claim 50, **characterised by** comprising at least a pair of said first shaped elements (31) carried inside said first space (8) by said walls (4b) to couple by both longitudinal sides to said

movable equipment (2); said first shaped elements (31) being mutually facing and positioned symmetrically relative to a longitudinal median plane (M) positioned between said lateral walls (4b).

52. A casing according to claim 51, **characterised by** comprising two pairs of said shaped elements (31) positioned symmetrically to said longitudinal median plane (M) and mutually facing two by two; said two pairs of said first shaped elements (31) being positioned, in use, at the opposite side from each other relative to a pin (9) supporting said roller (3) to balance the movable equipment (2) inside said first space (8) and to prevent any oscillations about said pin (9).

53. A casing according any one of claims 46-52, **characterised in that** said blocking member (22), in use, is housed inside said second space (25) in a selectively releasable fashion, so that, during maintenance operations, said adjusting means (20) can be extracted from said carriage (1).

54. A casing according to any one of claims 41-53, **characterised in that** it can be constructed by moulding in order to minimise production costs and time.

55. A movable equipment (2) for a carriage (1) as described with reference to any one of claims 1-34; said movable equipment (2) being suitable to be housed inside a casing (7) and comprising a roller (3) carried in a rotatable fashion by a pin (9) between two lateral walls (4a) mutually facing and parallel to a first longitudinal direction (D); **characterised by** comprising an abutment device (45) associated with a constraining group (40) of the carriage (1) and suitable to cooperate with a support device (46) carried by said casing (7) to hold stably said movable equipment (2) inside said casing (7).

56. A movable equipment according to claim 55, **characterised in that** said abutment device (45) comprises at least a first abutment member (41) and at least a second abutment member (44) suitable to engage respectively a second and a first support members (47, 42) carried by said casing (7) to prevent said movable equipment (2) from slipping out of said casing (7).

57. A movable equipment according to claim 56, **characterised in that** said abutment member (41) is carried by said movable equipment (2) projecting from a wall transverse to said lateral walls (4a).

58. A movable equipment according to claim 56 or 57, **characterised in that** said abutment device (45) comprises a pair of second abutment members (44) carried externally to said movable equipment (2) at opposite side from said first member (41) relative to said pin (9); said second abutment members (44) projecting from said lateral walls (4a) and being positioned symmetrically relative to a median plane (M) positioned between said lateral walls (4a) to couple, in use, to a pair of said first support members (42) associated with said support device (46).

59. A movable equipment according to any one of claims 55-58, **characterised in that** said abutment device (45) comprises a third abutment ember (48) externally projecting at opposite side from said first abutment member (41) and suitable to engage a third support member (49) carried by said casing (7).

60. A movable equipment according to any one of claims 55-59, **characterised by** comprising at least an abutment (32) associated with guiding means (30) of the carriage (1) and suitable to couple to a guide (31) carried by said casing (7) to condition, in use, relative displacements of said movable equipment (2) with respect to said casing (7) along a given trajectory.

61. A movable equipment according to claim 60, **characterised in that** said abutment (32) comprises a second shaped element (32) projecting from lateral walls (4a); said second shaped element (32) being shaped substantially like an inclined plane so as to freely slide relative to a first shaped element (31) associated with said guide (31).

62. A movable equipment according to claim 60 or 61, **characterised by** comprising at least a pair of said second shaped elements (32) externally projecting from said lateral walls (4a); said second shaped elements (32) being positioned symmetrically relative to a median plane (M) positioned between said lateral walls (4a).

63. A movable equipment according to claim 62, **characterised by** comprising two pairs of said second shaped elements (32) positioned symmetrically to said median plane (M) and suitable to couple to two corresponding pairs of said first shaped elements (31) carried by said casing (7); said two pairs of said second shaped elements (32) being positioned at opposite side from each other relative to said pin (9) to balance the movable equipment (2) inside said casing (7) and prevent any oscillations about said pin (9).

64. A movable equipment according to any one of claims 55-63, **characterised by** comprising at least a stiffening rib (72) for each lateral wall (4a); each said stiffening rib (72) projecting from said lateral walls (4a) to give stiffness to said lateral walls (4a).

65. A movable equipment according to claims 58, 60 and 64, **characterised in that** said movable equipment (2) presents externally only a pair of lateral projections (71) projecting from said lateral walls (4a) ; each of said lateral projections (71) being delimited laterally by a planar surface (4c) and comprising each respective said second shape element (32), each respective said second abutment member (44) and each respective said stiffening rib (72) associated with the lateral walls (4a) from which it projects.

66. A movable equipment according to claim 65, **characterised in that** said pair of said projections (71) determines balancing means (70) for balancing the position of said movable equipment (2) inside said casing (7) to prevent any oscillations of the movable equipment (2) about any own longitudinal axis.

67. A movable equipment according to any one of claims 55-66, **characterised in that** said lateral walls (4a) present holes (6) suitable to support said pin (9) transverse to said lateral walls (4a); said pin (9) presenting a length substantially equal to the distance between said walls (4a) so that it is entirely housed inside said movable equipment (2) and does not engage, in use, said casing (7).

68. A movable equipment according to any one of claims 55-67, **characterised in that** said pin (9) and said roller (3) can be selectively disassembled from said movable equipment (2) so as they can be easily replaced in case of wear or damage.

69. A movable equipment according to any one of claims 55-68, **characterised in that** it can be handled inside said casing (7) by means of adjusting means (20) carried by said casing (7).

70. A movable equipment according to any one of claims 55-69, **characterised in that** it can be directly produced by moulding to minimise the production costs and time thereof.

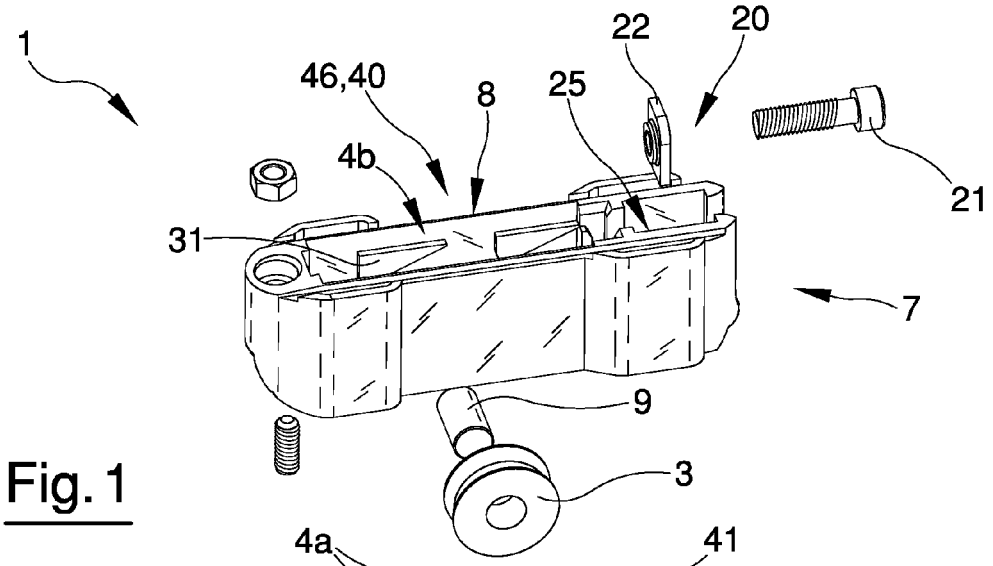
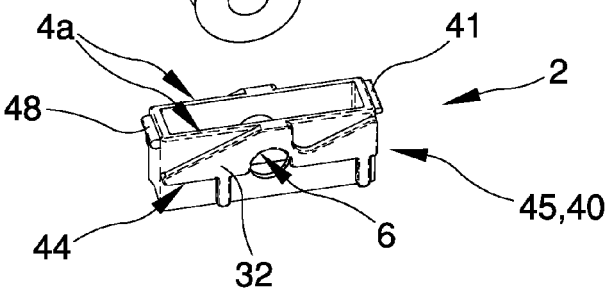


Fig. 1



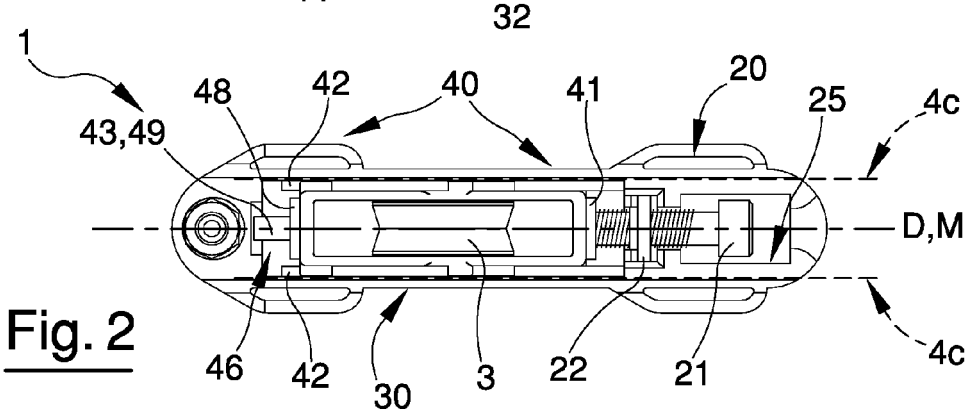


Fig. 2

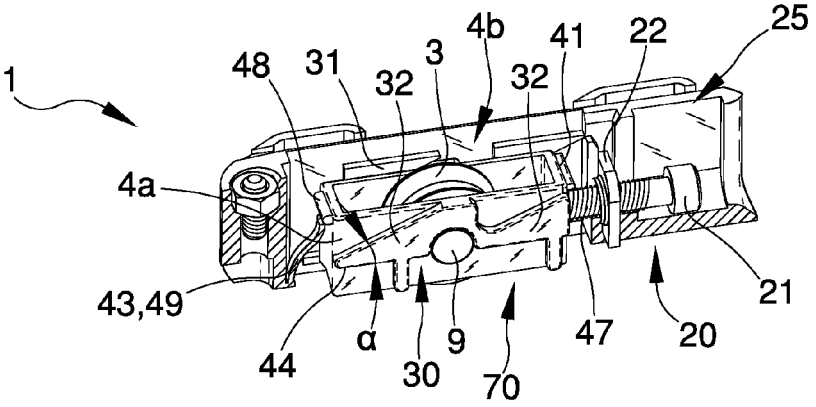


Fig. 3

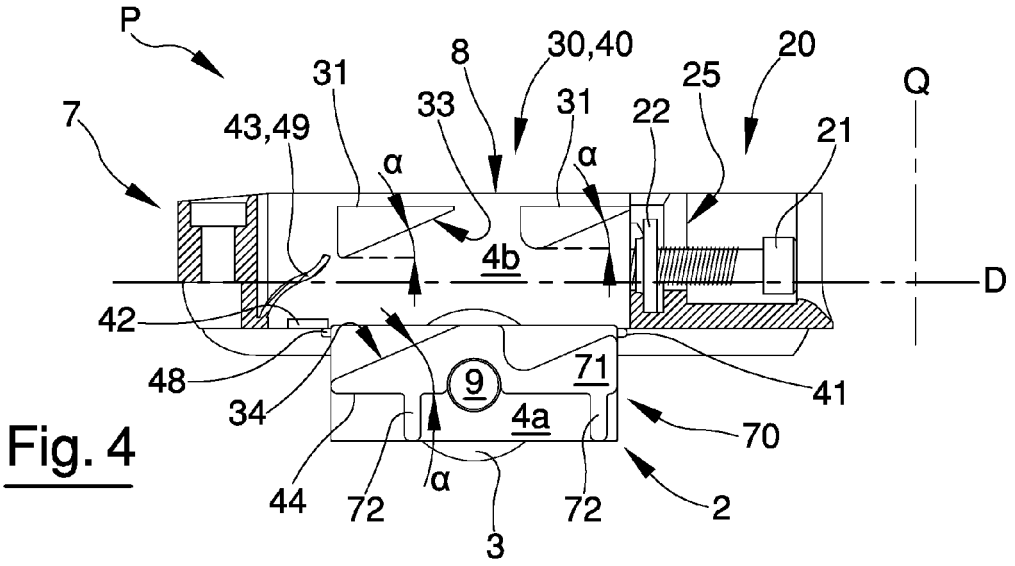


Fig. 4

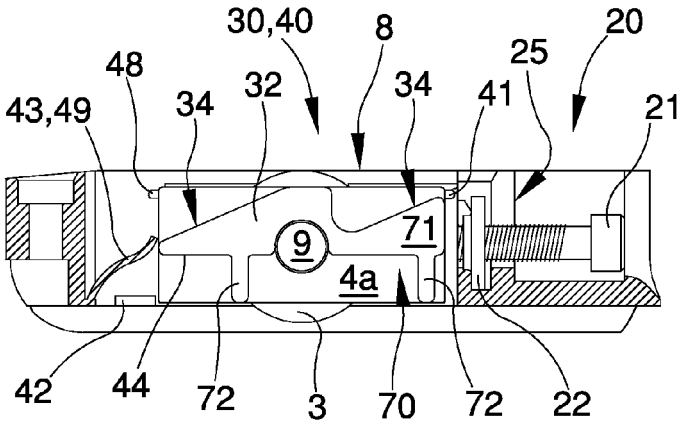


Fig. 5

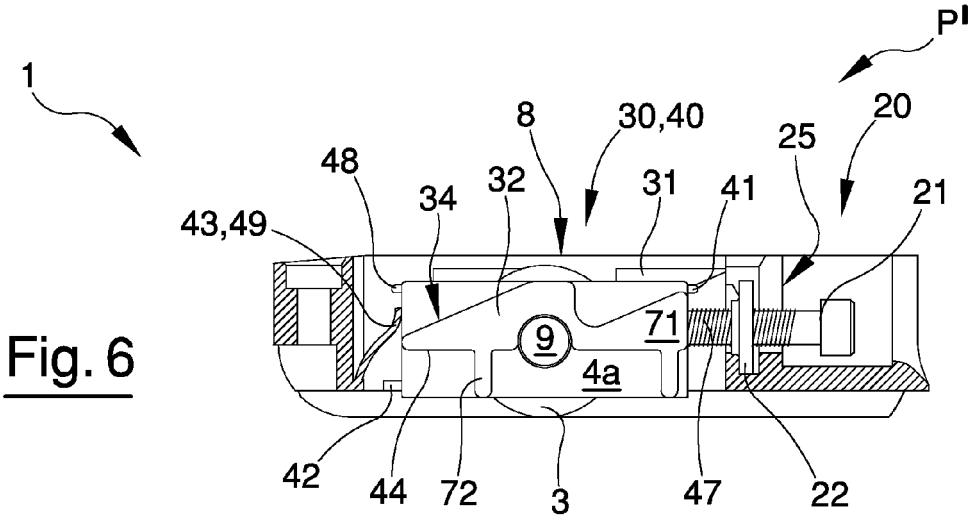


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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