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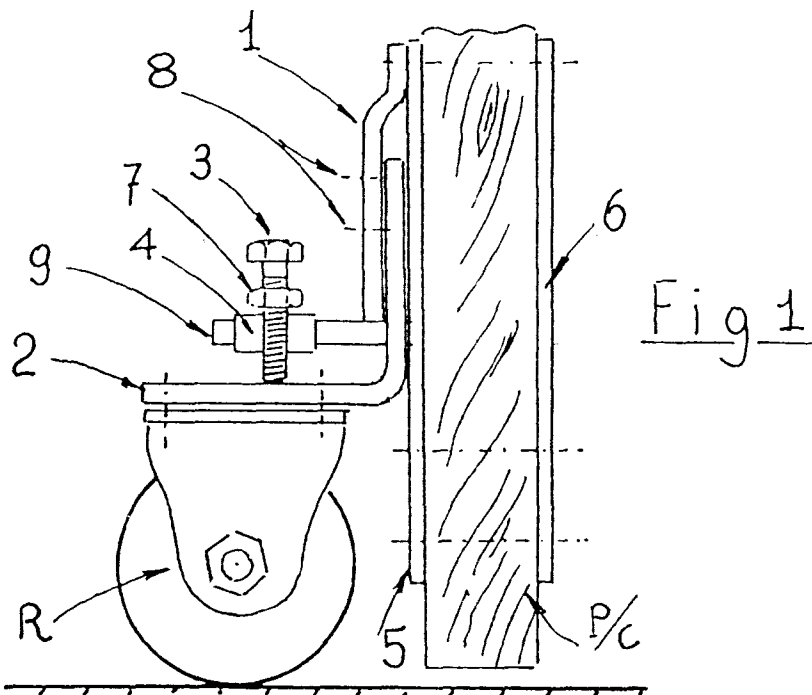
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10123 Torino (IT)(30) Priority: **21.04.1997 IT TO970335**(54) **Compensator for play due to wear in the hinges and vertical structural give in doors and gates**

(57) The aim of the invention is to provide a mechanism for easily, rapidly and accurately vertically repositioning a dropped leaf of a door or gate and which acts as a stable fixing for a wheel assembly (R) which is fitted to provide support and reduce friction.

The mechanism is constituted by an upper part (1) to be fixed to the projecting edge of the dropped leaf,

with a lower part (2) coupled for vertical sliding, once mounted for operation, relative to the upper part (1), and carrying beneath it a plate suitable for fixing the wheel assembly (R); the sliding which determines the adjustment of the leaf is achieved by means of a screw (3) which, once engaged in a threaded female element (4) fixed to one part (1, 2) presses on the other, moving it apart.

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Description

The present invention relates to a minimum-force, high-precision mechanism for compensating for play due to wear and vertical give in the structure of doors and gates, anomalies which are encountered in particular when the leaves are large, heavy and of considerable width.

The invention was designed to be stably fitted between the tree edge of the door or gate (P/C) and the roller unit R (roller and associated bracket with pin and plate) selected from the many on sale for fixing to the bottom edge of the leaf in order to reduce the operating load on the pivots in use (Figure 1). The advantages of the invention, in comparison with the prior art, are clear with regard to ease of assembly, calibration and accuracy of the compensator, and thereby also in respect of cost and improved quality.

currently, when the bottom of a door or gate scrapes along the ground owing to increased play at the hinges and/or vertical structural give in the structure with misalignment of the lock striker, in order to avoid the strenuous operation involved in inserting thickening washers at the hinges, a guide wheel (R) is fitted to the edge opposite the hinge.

However, in order to achieve this and the ideal fitting position, it is necessary to lift the gate leaf which requires various means and the assistance of several people.

Once the wheel assembly has been fixed to the projecting edge of the door or gate, it is not possible to make any subsequent correction or adjustment, to allow for an error or unexpected settling, since the position of the wheel assembly is immovable and fixed in relation to the leaf.

The compensator of the invention, on the other hand, has the advantage of compensating for vertical play in doors and gates in a gradual and repeatable manner which can be corrected at any time and with minimum effort, even in the case of very heavy doors. This is made possible by the fact that the vertical position of the wheel assembly relative to the door or gate is not unchangeable, thanks to the fitting of the intermediate compensator mechanism of the invention, whilst being defined and fixed once adjustment has been effected.

The micrometric compensator of the invention is therefore constituted by an upper metal portion 1, a lower metal portion 2, slidably coupled to the portion 1 and being fixable at its lower region to the wheel assembly by means of screws or welding, by a female element or threaded nut 4 securely fixed to the metal portion 1 with its axis parallel to the sliding direction of the portion 2 relative to the portion 1, this direction will be vertical once the assembly is mounted for operation, and by a robust pressure screw 3 engaged in the female element 4 (Figure 1).

Once the said screw 3, which has a threaded por-

tion longer than that of the female element 4, has been tightened by hand, by means of an appropriate key, until it fully engages the female element, the flat end thereof, opposite its head, encounters a surface or plate forming part of the metal portion 2, pressing against it and thereby moving the said portion 2 away from the portion 1 and thereby making it easy to raise the door or gate by pressing the wheel on to the ground.

It is thus very simple to mount the compensator mechanism of the invention, along with the wheel assembly, since this is done on the settled leaf of the door or gate, with no need to lift the said leaf; the operation to adjust the height of the leaf will be carried out by manipulating the screw (3) and is even simpler.

The final operation consists in securely locking the screw 3 by means of a lock-nut 7 and in slidably coupling the portions 1 and 2 by means of specially provided play-compensation and locking screws 8.

Obviously, modifications may be made to the practical embodiment of the invention without thereby departing from the scope thereof: the dimensions and thickness of the components may vary, parts may be welded or moulded in one piece, the sliding coupling between the portions 1 and 2 may be achieved differently, with different ranges of adjustment of the coupling between the screw 3 and the female element 4.

Such embodiments will ensure that the device of the invention is adapted to the requirements of the market, to different loads according to the frontal dimensions of doors or gates to which it is to be fitted, to the projection of the wheel unit with respect to the flat fixing plate (5) of the door or gate, and to the more or less advanced position of the female element 4 relative to the plate 5. In addition, the said female element 4 may be integral to, or formed in the upper metal portion 1, or in the lower portion 2, with the screw 3 acting accordingly downwards on the portion 2 or upwards on the portion 1; these arrangements being provided purely by way of non-limitative examples within the scope of the invention.

Claims

1. A micrometric, minimum-force compensator for hinge wear or vertical settling of doors and gates which, when securely fixed by its lower portion (2) to the wheel assembly (R) fitted to reduce friction and to support the projecting lower corner of the said door or gate, and by its upper portion (1) to the lowered projecting edge thereof, enables the distance between the lower portion (2) and the upper portion (1), which are slidably coupled, to be continuously adjusted mechanically.
The said mechanism thus enables the dropped free edge of a leaf of a door or gate to which it is fitted to be lifted to the best adjustment height with minimum effort and held in this position.

2. A mechanism according to Claim 1, constituted by the following parts:

- an upper metal portion (1) constituted by a fixing plate (5) for fixing to the door or gate, a metal unit rigidly and centrally fixed to the plate (5) and operable to form a slidable coupling with the underlying part (2) in such a way that, once the mechanism is assembled for operation, the sliding path of the said coupling will be vertical, with no other degree of freedom of movement, a robust plate (9) centrally fixed to the plate (5), perpendicular to this and to the sliding path of the part (2) relative to the portion (1) and bearing a robust threaded female element (4) positioned with its axis parallel to the sliding path and centred relative to the sliding assembly, slightly spaced and projecting from the plate (5) in such a way as to enable the insertion and adjustment, by means of an appropriate key, of the screw (3) which engages the threaded female element (4) so as to press against the underlying part (2).
- Also claimed in the invention is the alternative equivalently functional arrangement in which the threaded female element (4), instead of being fixed to the upper portion (1), once again with its axis parallel to the path along which the part (2) slides relative to the portion (1) is fixed to the lower part (2) centrally, still with its axis parallel to the sliding of (2) with respect to (1); in this case the conditions of manoeuvrability and size of the screw (3) are different, it will be inserted into the female element (4) and manipulated from below, in operation, and will press against the corresponding abutment fixed to the upper portion (1). Also claimed is the alternative equivalently functional embodiment with the female element (4) which, without needing the plate (9), is fixed directly to the plate (5), again in a central position, slightly projecting so that it can be manipulated by a key for adjusting the screw (3) and with its axis parallel to the sliding path.
- a metal lower part (2) centrally mounted beneath the assembly (1), operable and arranged to couple with the upper part and slidably only along a vertical direction, once the mechanism is assembled for operation, with no other degree of freedom of movement, sliding on the plate (5) and fixable to the underlying wheel assembly.

The lower metal part is thus fundamentally and conceptually constituted by a robust assembly with an L-shape or square section, where the vertical element serves slidably to couple the upper part (1) with the plate (5) and the lower horizontal element

is represented by a plate which serves to resist the screw (3), when the arrangement with threaded female element fixed to the upper part of the mechanism of the invention is chosen and, again, as a fixing plate for the wheel unit.

The part of the lower element (2) which serves to resist the screw (3), when the arrangement in which the female element is fixed to the upper part is chosen, or which acts as a fixing or as a seat for the threaded female element (4), if the arrangement with the female element fixed to the lower portion is chosen, must be perpendicular to the axis of the said screw and threaded female element, and thus to the sliding path of (2) relative to (1).

The plate part of the lower, L-shaped portion (2), in furtherance of the now described, acts instead for fixing the wheel unit, will have to be horizontal, therefore in the plane of the first portion of the plate (Figure 1), or, in order to save vertical space, slightly inclined, obtained by means of a fold parallel to the first 90° bend existing at the base of the L.

- a robust metal screw (3) with a thread acting and arranged to engage the female element (4) and having a threaded part longer than that of the female element and a hexagonal head, or in any case a head which can be engaged and turned by a key
- a metal counter plate (6) which mounted in a mirror-image coupling configuration to the plate (5) on the other "face" of the door or gate (P/C) serves to largely ensure that, if the leaf is made of wood, the plate stays fixed in place for longer, if through-bolts and nuts are used.
- a locking nut (7) preventing the screw (3) from becoming unscrewed once it has been adjusted.
- a few pressure and locking screws (8) for locking the sliding coupling of the upper part (1) and the lower part (2) after adjustment.

3. A mechanism according to Claim 1 and Claim 2 where the relative sliding between the upper part (1) and the lower part (2), which determines the adjustment of the door or gate, is achieved by hand by means of a key fitting the screw (3) which, once it has fully engaged the threaded female element (4) fixed to the upper or the lower assembly, presses against the opposite assembly, the lower (2) or the upper (1) respectively, spacing this until it is in the desired position.

4. A mechanism according to Claims 1, 2, 3, where the relative sliding between the upper assembly (1) and the lower assembly (2) with only one degree of

freedom of movement, that is vertical in use, is ensured by a coupling of sections, or plate on plate, guided in the said direction but blocked against movement in other directions.

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5. A mechanism according to Claims 1, 2, 3, 4 which, fixed by its upper part to the projecting edge of the dropped leaf of a door or gate, and by its lower portion to an underlying wheel assembly R, stably maintains this position during use of the door or gate.

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