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(54) **Revolving member made of self-lubricating material for spring-holder boxes of rolling gates and shutters and spring-holder device equipped with such member**

(57) A revolving member (1) is disclosed that is made of self-lubricating material, adapted to be used as rolling means for spring-holder boxes on a winding shaft (14) for rolling gates and rolling shutters, in which the revolving member (1) is composed of a circular crown (2) adapted to be coaxially inserted inside a support disk (11) of a

spring-holder device; the circular crown (2) is equipped in its central part with a ring (4) in turn equipped with a central through hole (3) adapted to allow the passage of the winding shaft (14) of the rolling gates and rolling shutters, and is equipped with at least one holding member (7) adapted to hold the revolving member (1) against the support disk (11).

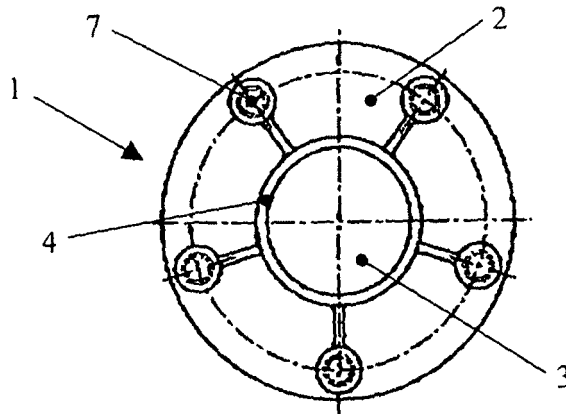


FIG. 1

Description

[0001] The present invention refers to a revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters and to a spring-holder device equipped with such member.

[0002] As known, rolling shutters and rolling gates (herein below, for simplicity, globally called "rolling gates") can be handled with winding systems equipped with a fixed or rotary shaft; the winding system with fixed winding shaft is equipped with two or more substantially cylindrical spring-holder boxes, coaxial with the winding shaft and rotating thereon; function of these spring-holder boxes, to which a rolling gate side is secured, is supporting and allowing winding the rolling gate around the winding shaft and containing the spiral-shaped compensating spring, this latter one having the task of counterbalancing, at least partially, the rolling gate weight, returning during the opening phase, the energy stored as torque during the closing step, thereby making it easier to handle it by an operator.

[0003] Known spring-holder boxes are generally composed of a containing case comprising two supporting disks, mutually spaced by a series of metal tongues constrained thereto, each one equipped in its central position with a hole adapted to allow the shaft to pass; next to such hole, cages are generally secured for containing the rolling rollers, similar to roller bearings but with a much lower mechanical accuracy, adapted to decrease the revolving friction between shaft and spring-holder box when actuating the rolling gate. The rolling rollers, like typically all above-mentioned components of known spring-holder boxes, are almost universally manufactured of metal material, typically sheet, through a series of mechanical workings aimed to shear and mould them. Rarely, for economic reasons, rolling rollers can be found that are manufactured by solids turning.

[0004] In known spring-holder boxes as previously described, the metal rolling rollers, however, after a first phase of use of the rolling gate in which they efficiently reduce the wear, due to the deposit of dust, residues, scales and/or mechanical distortion, physiologically tend to reduce their efficiency, till they block, ruining the external shaft surface and making it extremely tiring, if not impossible, to actuate the rolling gate; moreover, due to the presence of rollers, it is necessary to provide for the manufacture of different boxes with different sizes of holes and roller-holder case depending on the different diameters of shaft on which they must be operated.

[0005] Moreover, the use of metal material for manufacturing rolling rollers, particularly sheet, requires a high number of mechanical workings that negatively affect the finished product cost.

[0006] Therefore, object of the present invention is solving the above prior-art problems by providing a revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters that efficiently replaces the rolling rollers of known spring-

holder boxes, resulting at the same time of a simple and economic production and making the operation of spring-holder boxes more reliable in time. Such revolving member is inserted in the spring-holder device by replacing the whole internal metallic circular crown of every support disk of the device, thereby allowing to save installation costs and above all operating and maintenance costs.

[0007] Another object of the present invention is providing a revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters that allows easily and economically adapting the same spring-holder boxes to winding shafts having different diameters.

[0008] Moreover, another object of the present invention is providing a spring-holder device for rolling gates and rolling shutters equipped with a revolving member made of self-lubricating material that is reliable and simpler and adapted to be more cheaply produced with respect to known spring-holder boxes.

[0009] Another object of the present invention is providing a spring-holder device for rolling gates and rolling shutters equipped with a revolving member made of self-lubricating material that can be easily adapted for being installed on shafts with different diameters.

[0010] The above and other objects and advantages of the invention, as will appear from the following description, are obtained by a revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters as disclosed in claim 1.

[0011] Moreover, the above and other objects and advantages of the invention are obtained by a spring-holder device for rolling gates and rolling shutters equipped with a revolving member made of self-lubricating material as disclosed in claim 16.

[0012] Preferred embodiments and non-trivial variations of the present invention are the subject matter of the dependent claims.

[0013] The present invention will be better described by some preferred embodiments thereof, provided as a non-limiting example, with reference to the enclosed drawings, in which:

- FIG. 1 shows a side view of a preferred embodiment of the revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters according to the present invention;
- FIG. 2 shows a sectional view of the revolving member of FIG. 1;
- FIG. 3 shows a side view of the revolving member of FIG. 1 seen on the opposite side;
- FIG. 4 shows a side view of an embodiment of the spring-holder device with the revolving member made of self-lubricating material for spring-holder boxes of rolling gates and rolling shutters according to the present invention;
- FIG. 5 shows a sectional view of the device of FIG. 4; and
- FIG. 6 shows a side view of the device of FIG. 4 seen

on the opposite side.

[0014] With reference to the Figures, it is possible to note that the revolving member 1 made of self-lubricating material of the present invention is first of all adapted to be used as rolling means for spring-holder boxes on a winding shaft 14 for rolling gates and rolling shutters. Such revolving member 1 is composed of a circular crown 2 adapted to be coaxially inserted inside a support disk 11 of a spring-holder device (not shown); the circular crown 2 is equipped in its central part with a ring 4 in turn equipped with a central through hole 3 adapted to allow the passage of the winding shaft 14 of the rolling gates and rolling shutters. The circular crown 2 is equipped with at least one holding member 7 adapted to hold the revolving member 1 against the support disk 11.

[0015] Preferably, as shown, the holding members 7 are five and are arranged as a star around the ring 4, but it is obvious that any number of holding members 7 can be used at will according to their application.

[0016] Moreover, the revolving member 1 of the invention can be equipped with at least one upsetting pin 9 adapted to center the revolving member 1 onto the support disk 11 upon its installation.

[0017] The revolving member 1, due to its own self-lubricating characteristics, can therefore be used as replacement of traditional roller bearings, or of any other known revolving system, usually employed in known spring-holder boxes note. For such purpose, an internal diameter d of the central through-hole 3 can obviously be determined in such a way as to propose a revolving member 1 that is able to be easily coupled with any existing winding shaft: in particular, taking into account the most used winding shaft diameters, the internal diameter d of the central through-hole 3 is preferably included between 32 and 34 mm, still more preferably equal to 33 mm; alternatively, the internal diameter d of the through-hole 3 is preferably included between 41 and 43 mm, still more preferably equal to 42 mm; alternatively, the internal diameter d of the central through-hole 3 is preferably included between 60 and 61 mm, still more preferably equal to 60.4 mm; still alternatively, the internal diameter d of the central through-hole 3 is preferably included between 76 and 77 mm, still more preferably equal to 76.6 mm; in another preferred embodiment, the internal diameter d of the central through-hole 3 is preferably included between 48 and 49 mm, still more preferably equal to 48.5 mm.

[0018] Similarly to what has been stated above, an external diameter D and/or a thickness S of the revolving member 1 can be such as to advantageously allow the insertion into their seats of known spring-holder boxes aimed to house traditional containing boxes of rolling rollers; the external diameter D and the thickness S can therefore be defined in compliance with diameters and thicknesses of housing seats for rolling rollers of known spring-holder boxes that are most widely used; taking into account what has been stated above, the external

diameter D is preferably included between 99 and 101 mm, still more preferably equal to 100 mm; alternatively, the external diameter D is preferably included between 72 and 74 mm, still more preferably equal to 73; in another preferred embodiment, the external diameter D is preferably included between 115 and 117 mm, still more preferably equal to 116 mm. Similarly, thickness S is preferably included between 15 and 17 mm, still more preferably equal to 16 mm; alternatively, thickness S is preferably included between 10 and 11 mm, still more preferably equal to 10.5 mm; in another preferred embodiment, thickness S is preferably included between 15 and 16 mm, still more preferably equal to 15.3 mm.

[0019] It is clear that the revolving member 1 according to the present invention, in addition to be able to have any other size in addition to the above-listed ones, can be defined by any other combination of values of internal diameter d , external diameter D and thickness S that have been preferably included above.

[0020] The revolving member 1 can obviously be manufactured of any self-lubricating material that has the physical and mechanical properties adapted to guarantee its adequate operation in its specific field of application. For such purpose, it has been preferable, and complying with all desired requirements aimed to simultaneously obtain the necessary reliability and competitive manufacturing costs, to use an acetalic resin having as its major properties: di una resina acetlica avente come principali proprietà: dimensional stability, stiffness, fatigue and corrosion resistance, very low friction coefficient, in addition to resistance to very high thermal differences and wide temperature ranges. A currently-marketed example of such acetalic resin is the family of resins called Delrin® (in particular, Delrin® 100) produced by company DuPont of Nemours (France).

[0021] As previously stated, it is easy to appreciate that the revolving member 1 according to the present invention has all the following features:

- it can be easily and economically manufactured since it does not require several and different mechanical workings, as occurs for traditional rolling rollers;
- it is of a more efficient and reliable operation, since it is more resistant to fatigue and wear than traditional rolling rollers, and does not generate deteriorations or damages to the winding shaft;
- it can be easily used on traditional spring-holder boxes replacing their rolling rollers.

[0022] The spring-holder device for rolling gates and rolling shutters is composed of at least two supporting disks (of which only one is shown in FIG. 4 to 6, designated with reference 11) that are substantially equal one to the other, each one equipped at its own center with a housing seat for the revolving member 1 (that replaces, as stated, the traditional winding rollers), inside which a winding shaft 14 will pass, and has a plurality of spacers

(not shown), that are able to be inserted in suitable securing slots 13, adapted to mirror-like connect and to suitably mutually space two disks 11 in such a way as to create between them an appropriate space for housing a compensating spring (not shown). The revolving member 1 is secured in its housing seat through suitable securing means 16. Concentrically to the through-hole 12, a housing seat is arranged, that is preferably equipped with securing means, with at least one revolving member 1 made of self-lubricating material replacing the traditional rolling rollers or, more generally, the known revolving systems. For the correct operation of the revolving member 1, and in particular of the spring-holder device according to the present invention, it is clear that the housing seat diameter must be concentric and greater than the external diameter d of the revolving member 1.

[0023] As described above, it is clear that the spring-holder device for rolling gates and rolling shutters equipped with the revolving member 1 can be manufactured more easily and economically since it does not require the mechanical workings related to the manufacture and securing of traditional rolling rollers; moreover, the spring-holder device according to the present invention is obviously more efficient and reliable, since the revolving member 1 with which it is equipped is more resistant to fatigue and wear than the traditional rolling rollers and does not generate deteriorations or damages to the winding shaft. It is also extremely advantageous both from the production and from the economic points of view, that the supporting disks 11 and the spacers of the spring-holder device according to the present invention can be those traditionally used in known spring-holder boxes, without any particular manufacturing modification, since the revolving member 1 can be easily and advantageously housed in the seat of rolling rollers by replacing them.

Claims

1. Revolving member (1) made of self-lubricating material, **characterised in that** it is adapted to be used as rolling means for spring-holder boxes on a winding shaft (14) for rolling gates and rolling shutters, said revolving member (1) being composed of a circular crown (2) adapted to be coaxially inserted inside a support disk (11) of a spring-holder device, said circular crown (2) being equipped in its central part with a ring (4) in turn equipped with a central through hole (3) adapted to allow the passage of said winding shaft (14) of said rolling gates and rolling shutters, said circular crown (2) being equipped with at least one holding member (7) adapted to hold said revolving member (1) against said support disk (11).
2. Revolving member (1) according to claim 1, **characterised in that** said holding members (7) are five and are arranged as a star around said ring (4).
3. Revolving member (1) according to claim 1, **characterised in that** it is further equipped with at least one upsetting pin (9) adapted to center said revolving member (1) onto said support disk (11) upon its installation.
4. Revolving member (1) according to claim 1, **characterised in that** it has an the internal diameter d of the central through-hole 3 preferably included between 32 and 34 mm, still more preferably equal to 33 mm.
5. Revolving member (1) according to claim 1, **characterised in that** it has an internal diameter d of the through-hole 3 preferably included between 41 and 43 mm, still more preferably equal to 42 mm.
6. Revolving member (1) according to claim 1, **characterised in that** it has an internal diameter d of said central through-hole (3) preferably included between 60 and 61 mm, still more preferably equal to 60.4 mm.
7. Revolving member (1) according to claim 1, **characterised in that** it has an internal diameter d of said central through-hole (3) preferably included between 76 and 77 mm, still more preferably equal to 76.6 mm.
8. Revolving member (1) according to claim 1, **characterised in that** it has an internal diameter d of said central through-hole (3) preferably included between 48 and 49 mm, still more preferably equal to 48.5 mm.
9. Revolving member (1) according to claim 1, **characterised in that** it has an external diameter D preferably included between 99 and 101 mm, still more preferably equal to 100 mm.
10. Revolving member (1) according to claim 1, **characterised in that** it has an external diameter D preferably included between 72 and 74 mm, still more preferably equal to 73 mm.
11. Revolving member (1) according to claim 1, **characterised in that** it has an external diameter D preferably included between 115 and 117 mm, still more preferably equal to 116 mm.
12. Revolving member (1) according to claim 1, **characterised in that** it has a thickness S preferably included between 15 and 17 mm, still more preferably equal to 16 mm.
13. Revolving member (1) according to claim 1, **characterised in that** it has a thickness S preferably included between 10 and 11 mm, still more preferably

equal to 10.5 mm.

14. Revolving member (1) according to claim 1, **characterised in that** it has a thickness S preferably included between 15 and 16 mm, still more preferably equal to 15.3 mm. 5
15. Revolving member (1) according to any one of the previous claims, **characterised in that** said self-lubricating material is acetalic resin. 10
16. Spring-holder device for rolling gates and rolling shutters, **characterised in that** it comprises two supporting disks (11), each one of said supporting disks (11) being equipped at its own center with a housing seat for said revolving member (1) and with a plurality of spacers adapted to mirror-like connect and to mutually space said support disks (11). 15
17. Spring-holder device according to claim 16, **characterised in that** it comprises securing means (16) of said revolving member (1) in said housing seat. 20

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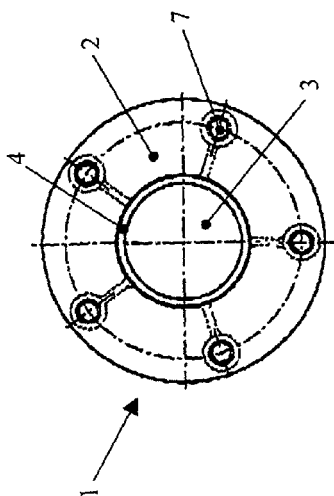


FIG. 3

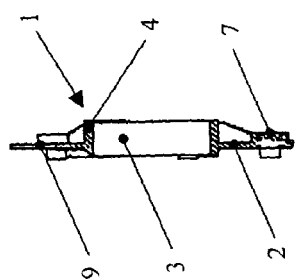


FIG. 2

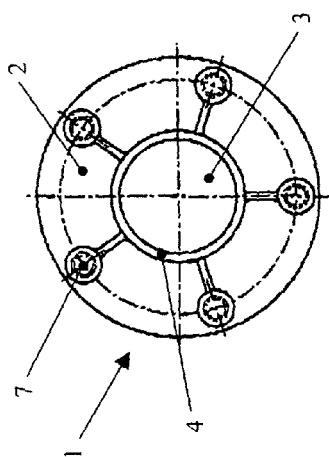


FIG. 1

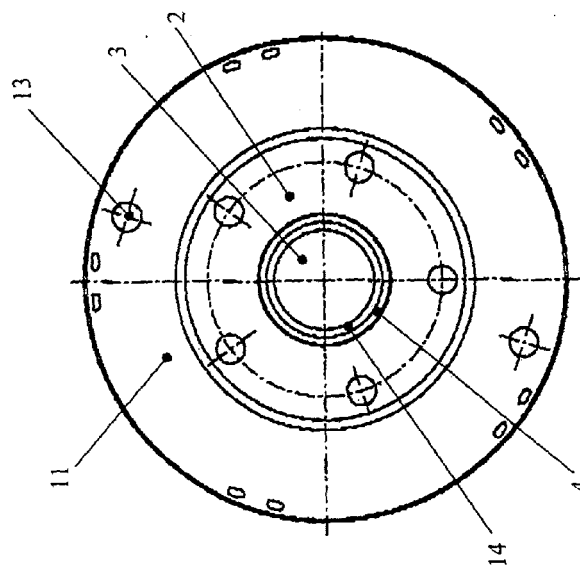


FIG. 6

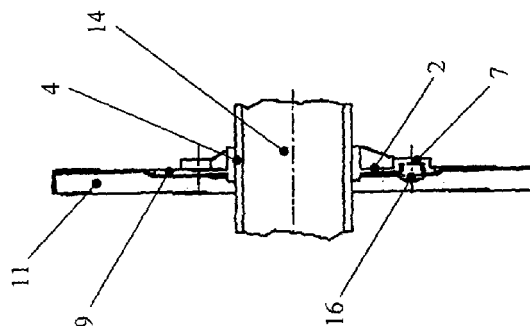


FIG. 5

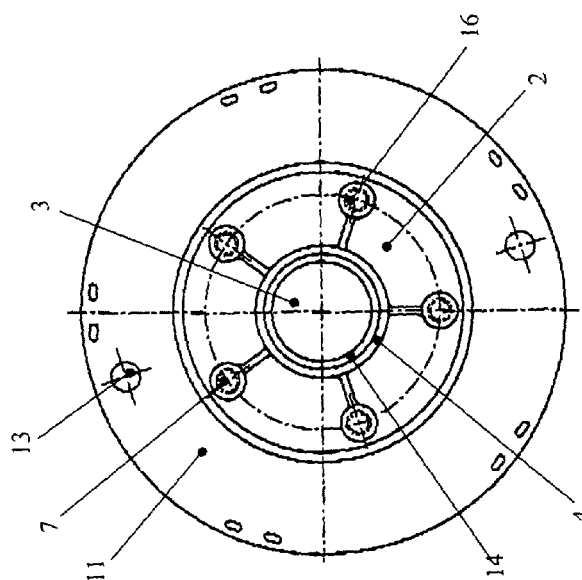


FIG. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5290

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 155 327 A (WELLS ET AL) 5 December 2000 (2000-12-05) * abstract * * column 2, line 49 - column 3, line 39; figures 1,4,6 *	1-17	E06B9/174 E06B9/60
A	GB 353 122 A (BRUNO NEGRINI) 23 July 1931 (1931-07-23) * figures 3,4 *	1-3	
A	US 5 284 199 A (FINCH ET AL) 8 February 1994 (1994-02-08) * figures 1-5,11 *	1-3	
A	US 3 317 255 A (WEHLAU CHRISTIAN HENRY) 2 May 1967 (1967-05-02) * column 2, line 42 - line 45 *	15	
X	FR 1 600 857 A (FELLER SAMUEL) 3 August 1970 (1970-08-03) * page 2, line 15 - page 3, line 21; figures 1-3 *	1-17	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 October 2005	Examiner Severens, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 42 5290

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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