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(54) **RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM**

(57) The invention relates to a retaining device which is intended to slow-down the closing of a door that has been left open. The invention is **characterised in that** the device comprises an oil-hydraulic cylinder (1), the rear end of which is articulated with a support (8) that is solidly connected to a vertical section (7) whereat the door (11) is connected using hinges (6). In addition, an end section of a rod (2) is equipped with an end piece (9) that is articulated with another support (10) which is fixed to the door (11), The invention also comprises at least one communication conduit between the two chambers (14 and 15) of the cylinder (1) and means for regulating the passage of fluid essentially from the front chamber (14) to the rear chamber (15) as the door closes. The rear chamber houses a main spring which compresses when the door is opened, such as to build up tension that is released as the door closes.

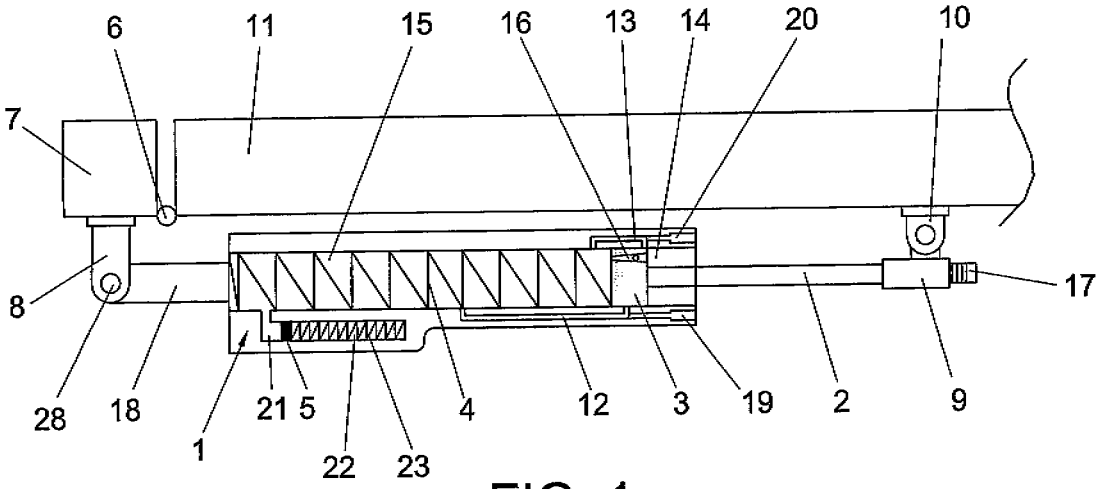

FIG. 1

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Description

OBJECT OF THE INVENTION

[0001] As stated in the title of this descriptive specification, the present invention relates to a retaining device for a door closure system which has as its aim above all to slow down the closure of the door as well as make it gentler in order to prevent it hitting against the frame and also guarantee the closure of said door. It defines a retaining system for door closure with lateral action that functions correctly.

[0002] It is applicable to doors which do not have a frame in the upper part, and its use can be extended to any kind of door with an upper portion of frame or without such. It is particularly applicable to community doors of great width.

PRIOR ART OF THE INVENTION

[0003] The doors of buildings that give out into the street and, in general, the doors of buildings of private estates and communities currently incorporate a device associated with the respective door and the upper part of the frame.

[0004] This device has the task above all of closing the door passively and also of slowing down the final closure thereof in order to avoid noises and blows.

[0005] Said device generally comprises a spring housed in a casing, which is tensed via an articulated arm when the door is opened. The accumulated tension of this spring during the opening facilitates the closure of the door afterwards, slowing it down thanks to the choking of a fluid when it passes through a valve incorporated inside the casing.

[0006] One drawback of these devices is that they require a piece in the upper part of the door for fixing the articulated arm and it is sometimes not possible to incorporate that piece or it is very difficult to do so. When the upper piece is not incorporated, another kind of device is then fitted where the door is hinged.

[0007] These novel devices incorporate a direct action spring without retention during closure of the door, in such a way that if the spring is tensed too much in order to ensure closure then blows and noises are produced at the end of closing the door, and if the tension is not sufficient, the door remains open. Even if a fine adjustment is carried out to the tension of the spring, it can happen that it sometimes closes and other times not.

DESCRIPTION OF THE INVENTION

[0008] The retaining device for door closure systems constituting the object of the invention is defined on the basis of an oil-hydraulic cylinder with an interior piston integral with a rod protruding from the front end of the cylinder, said piston separating two chambers, a front one where a main helical spring is housed tending to push the piston towards the front and a rear chamber, the piston including at least one joint that is in contact with the inner face of the cylinder in order to ensure the sealing between the two chamber.

[0009] It is characterised in principle in that the piston incorporates a one-way valve with a control mechanism which permits the fluid to pass easily in one direction but blocks it in the opposite direction.

[0010] The rear end of the cylinder is coupled in an articulated fashion to a rear support integral with a vertical section where a door is coupled by means of the respective hinges, while an end section of the rod has an end piece for coupling, also in an articulated fashion, to a forward support fixed to the door, its position being able to be adjusted in the axial direction.

[0011] With this arrangement that is described, when we open the door after having released its bolt or other door mechanism from its securing, the plunger is displaced towards the rear against the resistance of the main spring. In turn, during this opening, the fluid in the rear chamber passes to the front chamber without any resistance being offered through the one-way valve of the plunger or piston, the door thereby successfully being opened with virtually no effort at all.

[0012] On the other hand, when we release the door, the tension accumulated in the main spring exerts pressure on the plunger, which becomes displaced forwards, at the same time as the oil in the front chamber moves to the rear chamber by means of certain characteristic circuits with a certain resistance thanks to the incorporation of some means of regulation associated with those circuits, with which the action of the helical spring is slowed down and so too is the door as it moves towards the closed position, thereby achieving a closure that is gentle and a retention in two phases with different speeds.

[0013] The means of regulation for varying the cross-section for passage of oil in one direction permits us to vary the speed at which the door closes in each of the passage circuits for the liquid mentioned above.

[0014] Moreover, connected to the rear chamber is an elongated cavity where a moving piston is located acting against the resistance of a smaller spring, a smaller piston which separates a forward space where just the spring and a rear space are to be found connected to the said chamber, with the functioning of the inventive device slowing down the movement of this smaller piston.

[0015] Means have also been provided for blocking the door in its maximum opening position. To do this, the rear end part of the cylinder and the support integral with the vertical section which supports the door assembly incorporate a characteristic blocking mechanism which allows the door to remain open stably when necessary, for example, during everyday tasks such as bringing in the shopping and others.

[0016] In another simpler embodiment, the two chambers are connected together by means of a single exterior conduit in which a valve has been inserted with a control

mechanism for being able to regulate the passage of oil between the two chambers, at least in one of the two directions.

[0017] Considering this latter embodiment, during the opening of the door, the oil passes from the rear chamber to the front chamber via the exterior conduit without offering any resistance, thus succeeding in opening the door without any effort.

[0018] On the other hand, when we release the door, the tension accumulated in the spring exerts pressure on the plunger with the joint, displacing them towards the front, at the same time as the oil in the front chamber passes to the rear chamber, now with a certain resistance thanks to the oil-hydraulic regulating mechanism, which causes the recovery of the piston towards its rest position due to the action of the helical spring to take place more slowly, and so too therefore does the movement of the door towards the closed position, thereby achieving a gentle closure with retention.

[0019] The said regulating mechanism for varying the cross-section for passage of oil in one direction permits us to vary the speed of closure of the door.

[0020] Below, in order to facilitate a better understanding of this specification and forming an integral part thereof, some figures are attached in which, on an illustrative rather than limiting basis, the most characteristic details of the invention have been represented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figure 1.- Shows an elevation view of the retention device for a door closure system, the inventive object. It is found in a forward position with the door closed or on the point of closing.

Figure 2.- Shows a view similar to the above, where the device is found in a retracted position with the door open.

Figure 3.- Shows a plan view of the inventive device applied to the door, in an open position and in another closed position.

Figures 4 and 5.- Show some plan views essentially representing a stable blocking mechanism in the maximum opening position of the door.

Figure 6.- Shows another view of the inventive device.

DESCRIPTION OF THE PREFERRED FORM OF EMBODIMENT

[0022] Considering the numbering adopted in figures 1 to 5, the inventive device comprises an oil-hydraulic cylinder 1 inside which is fitted a larger piston 3 provided with a one-way valve 16 which only permits the passage of fluid in a single direction between the two chambers: front 14 and rear 15, separated from each other by the said piston 3. The direction of passage will be from the rear chamber to the front chamber corresponding to the opening of the door. During the closure, this one-way valve becomes blocked 16.

[0023] The larger piston 3 is integral with an elongated rod 2 which protrudes towards the outside via the front part of the cylinder 1 and whose end section possesses a thread 17 to which is coupled an end piece 9 that can be axially adjusted thanks to said thread 17. By means of this end piece 9 the rod 2 of the cylinder 1 is coupled in an articulated fashion to a front support 10 integral with a cross-piece of the door 11. In another embodiment an end piece 9' coupled in the rod 2 is axially adjustable in the direction thereof by means of an intermediate nut 33 coupled in an end threading of said rod.

[0024] The cylinder 1 possesses a rear end portion 18 in its rear part for coupling in an articulated fashion to another fixed rear support 8 integral with a vertical section 7 where it is connected to the door by means of hinges 6.

[0025] Moreover, the two chambers 14 and 15 of the cylinder 1 are connected together by means of two conduits or circuits, a larger one 12 and a smaller one 13, with respective nuts for regulation of the flow 19 and 20 having been inserted between said conduits, and which control the passage of liquid from the front chamber 14 to the rear chamber 15 which corresponds to the oil of the door 10 in order to slow it down.

[0026] The closure of the door 11 is done passively by means of the action of a main spring 4 which is found within the rear chamber 15, such that during the opening of the door 11 that spring 4 becomes tensed due to its length being reduced when the piston 3 and rod 2 are displaced backwards, while when the closure takes place the tension accumulated in the spring 4 presses and pushes against the piston of the cylinder 1 displacing it towards the front in order to close the door passively.

[0027] The body of the oil-hydraulic cylinder 1 includes a small piston 5 housed in an elongated cavity connected via one end to the rear chamber 15, this small piston 5 separating a front space 22 without fluid where a smaller spring 23 is located and a rear space 21 with fluid which is connected to the rear chamber 15.

[0028] Thanks to the incorporation of this small piston 5 acting against the resistance of the small spring 23, we manage to compensate with greater effectiveness the capacities of the chambers 14 and 15 during the movement of the larger piston 3.

[0029] During the displacement of the larger piston 3 towards the rear (door in the process of opening), the rear space 21 of the elongated cavity will fill with fluid due to the increase in its volume against the resistance of the small spring 23, with the reduction in the volume of the front space 22 housing the smaller spring 23.

[0030] Evidently, in this process of opening, the larger spring 4 reduces its length, thereby storing energy, with the volume of the rear chamber 15 also being reduced.

[0031] On the other hand, the small piston 15 returns fluid to the rear chamber 15 during closure of the door 11.

[0032] Moreover, provision has also been made for a

mechanism for keeping the door 11 open stably in its maximum opening position.

[0033] To achieve this, the rear fixed support 8 incorporates a spring 24 and a ball 25 acting against the resistance of that spring, both elements being housed in a front orifice 26 of the rear support 8, in such a way that said ball 25 which partially protrudes towards the outside, is in contact with a rounded end part 27 of the end portion 18 of the cylinder 1. That rounded end part 18 is equidistant from the point of rotation 28 of the cylinder 1 in such a manner that in the maximum opening position of the door 11, the ball 25 is located in a recess or notch of that end part 27 in order to ensure the stable position of maximum opening of the door 11.

[0034] In a particular embodiment, the rounded end part 27 includes a small projecting stud 29 which, during the opening of the door, causes the door 11 to become blocked once the stud 29 has exceeded the position of the ball 25 thanks to the fact that said stud 29 meets up against a projecting portion of the ball 25.

[0035] Prior to the maximum opening of the door 11 and at the start of closure beginning from the maximum opening, the stud 29 momentarily introduces the ball 25 towards the inside against the resistance of the spring 24.

[0036] The maximum opening of the door 11 can be 90°, though it can also be greater or less than this angle.

[0037] Figure 6 shows a simpler embodiment in which the two chambers 14 and 15 are connected by means of an intermediate conduit 30 and two end bends 21, with a flow regulator valve 32 having been inserted into that conduit in order to control the passage of oil from the front chamber 14 towards the rear chamber 15 which corresponds to closure of the door 11 in order to slow it down.

Claims

1. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, which, being essentially destined for slowing down the closure of a door when it is released after opening, is **characterised in that** it comprises an oil-hydraulic cylinder (1) connected in an articulated fashion via its rear end to a support (8) integral with a vertical section (7) where the door (11) is coupled by means of hinges (6), while in an end section of the rod (2) it has an end piece coupled in an articulated fashion to another support (10) fixed to the door (11); including at least one communication conduit between the two chambers (14 and 15) of the cylinder (1), furthermore including means for regulating the passage of fluid between the two chambers (14 and 15) in order to control the fluid, essentially from the front chamber (14) to the rear chamber (15) during closure of the door (11), said rear chamber (15) housing a main spring (4) which is retracted when the door opens accumulating tension which will then be released during closure; all this in order to obtain a gentle closure of the door.

2. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to claim 1, **characterised in that** it includes two communication conduits (12 and 13) between the two chambers (14 and 15) when the larger piston (3) is located between the end mouths of those conduits (12 and 13).

3. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to claim 2, **characterised in that** the means of flow regulation via the conduits (12 and 13) essentially consist of some screws (19 and 20) which regulate the cross-section for passage of these conduits (12 and 13).

4. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of the above claims, **characterised in that** the larger piston (3) incorporates a one-way valve (16), which essentially permits the passage of fluid from the rear chamber (15) to the front chamber (14).

5. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of the above claims, **characterised in that** the body of the oil-hydraulic cylinder (1) incorporates an elongated cavity where a smaller piston (5) is located which rests via one of its faces against a smaller spring (23) housed within a front space (22) of that elongated cavity, there existing on the other side of the smaller piston (5) another rear space (21) with fluid which connects with the rear chamber (15).

6. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of claims 2 to 5, **characterised in that** the front exit mouth of the larger conduit (12) is located in a plane established between the planes containing the two exit mouths of the smaller conduit (13), while the rear exit mouth of the larger conduit (12) is located behind the rear exit mouth of the smaller conduit (13) at a large distance.

7. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of the above claims, **characterised in that** it incorporates a blocking mechanism to keep the door (11) open in a stable position in its maximum opening position.

8. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to claim 7, **characterised in that** the blocking mechanism is defined starting from a small spring (24) and a ball (25) both housed in a front orifice (26) of the rear fixed support (8), said ball (25) partially protruding to the outside, and at the same time is in contact with a rounded end part (27) of the end position (18) equidistant from a point of rotation (28), said end part (27) having means of

retention complementary with the ball (25) in order to ensure the stable position of maximum opening of the door (11).

9. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to claim 8, **characterised in that** the means of retention of the end part (27) of the end portion (18) consists of a projecting stud (29) which meets up against the ball (25), once it has been exceeded during the opening of the door (11).

10. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to claim 1, **characterised in that** it includes a communication conduit (30) where a flow regulator value (32) has been inserted which controls the passage of fluid from the front chamber (14) to the rear chamber (15).

11. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of the above claims, **characterised in that** the end piece (9) is axially adjustable by means of a threading (17) of the rod (2) on to which said end piece (9) threads.

12. RETAINING DEVICE FOR A DOOR CLOSURE SYSTEM, according to any of claims 1 to 10, **characterised in that** the end piece (9') coupled in the rod (2) is axially adjustable in the direction thereof by means of an intermediate nut (33) coupled in an end threading of said rod.

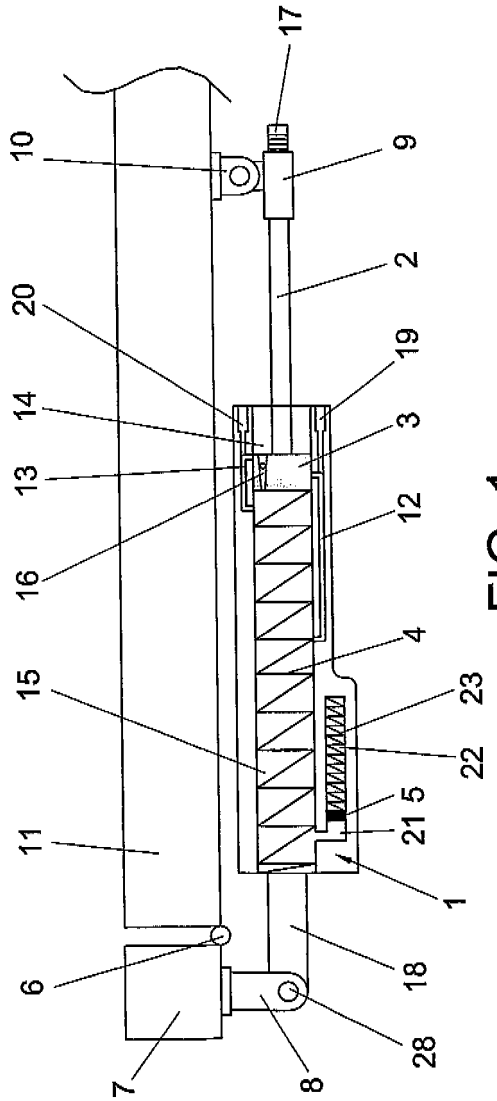

FIG. 1

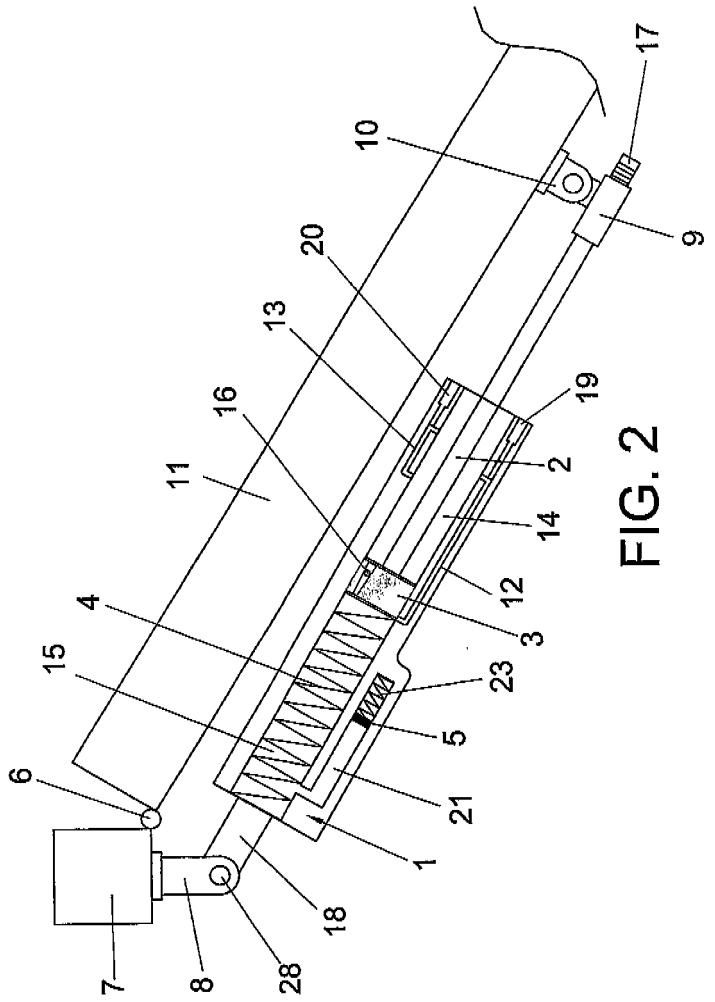

FIG. 2

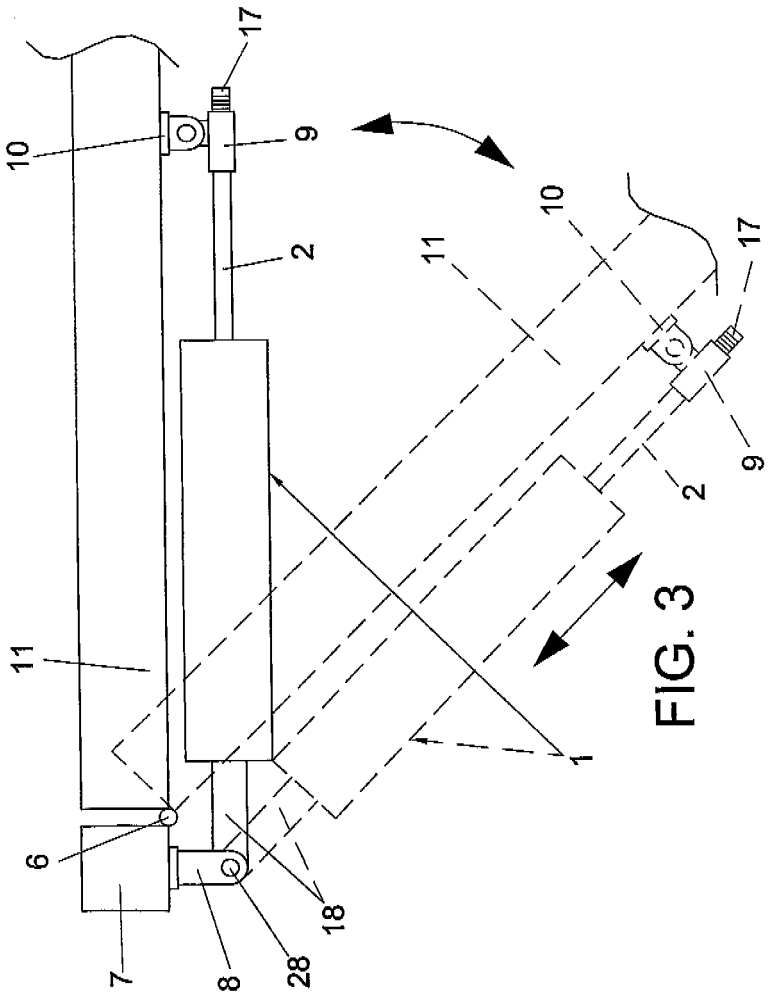

FIG. 3

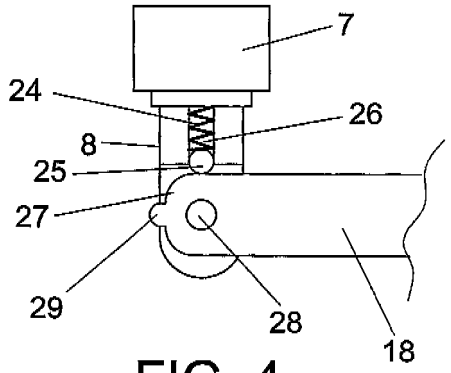

FIG. 4

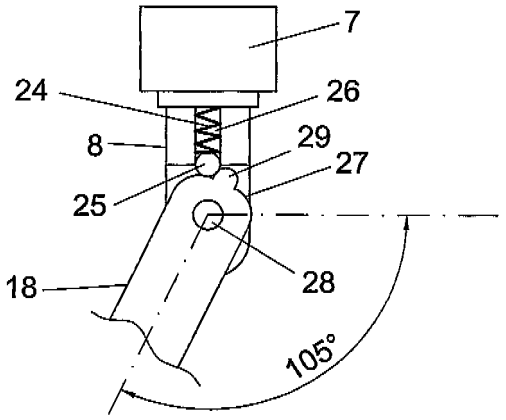

FIG. 5

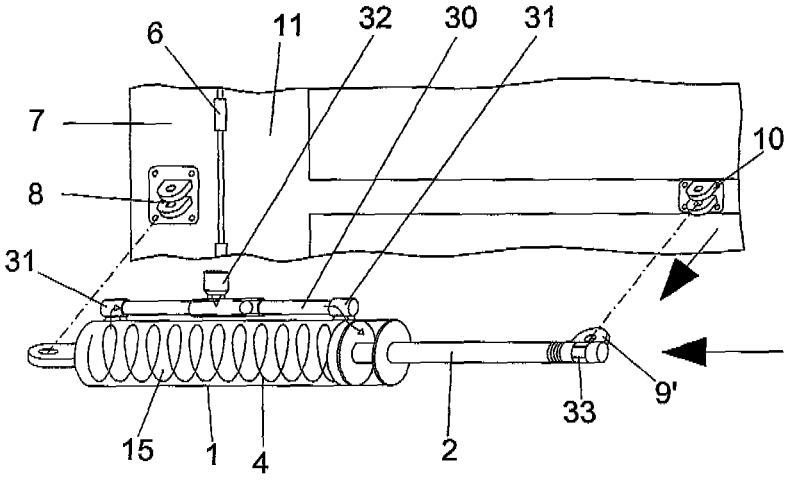

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2006/000221

A. CLASSIFICATION OF SUBJECT MATTER

E05F 3/04 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05F3/04,E05F3/12,E05F3/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT,EPODOC,WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5016317 A (Hung) 21.05.1991, column 1, line 63 - column 4, line 25; images.	1 3-5
A	US 4573238 A (Philips) 04.03.1986, abstract; claim 1; images.	1,2,10
A	GB 2244759 A (Jebron Ltd.) 11.12.1991, the whole document.	1,2,10
A	US 6634057 B2 (Wartian) 21.10.2003, claim 1; images.	7-9
A	WO 02063125 A1 (Samuel Heath) 15.08.2002, the whole document.	1-4
A	DE 4005386 A1 (Daempf & Schliess Tech.) 22.08.1991, abstract; images.	1-4

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 September 2006 (04.09.2006)	(08-09-2006)
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304	Authorized officer V. Anguiano Mañero Telephone No. + 34 91 3495538

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ ES 2006/000221

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REFIofGB2244759 5 9 A D o	----ment	NONE	----------
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REFIofDE4005386 8 6 A 1 D o	----ment	NONE	----------

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