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(72) Inventor: **De Robertis, Michele**
14019 Villanova D'Asti (IT)

(74) Representative: **Robba, Pierpaolo et al**
INTERPATENT S.R.L.,
Via Caboto No.35
10129 Torino (IT)

(71) Applicant: **David Automations S.R.L.**
14021 Buttigliera D'Asti (AT) (IT)

(54) **Control device for automatic gates and the like**

(57) A device for controlling the opening and closing of an automatic gate (1) is mounted within a quadrangular upright (57) of the gate and comprises a driving motor (13) capable of causing the axial sliding of a movable member (17, 19, 21) inside the upright. That member slides over a rod (23) mounted in the upright (57) and provided with helical grooves (39), and includes a bushing (21) with internal teeth (61) engaging said helical grooves (39), whereas the external surface of the bushing (21) houses a pair of balls (59), each engaging a pair of adjacent walls in the upright (57).

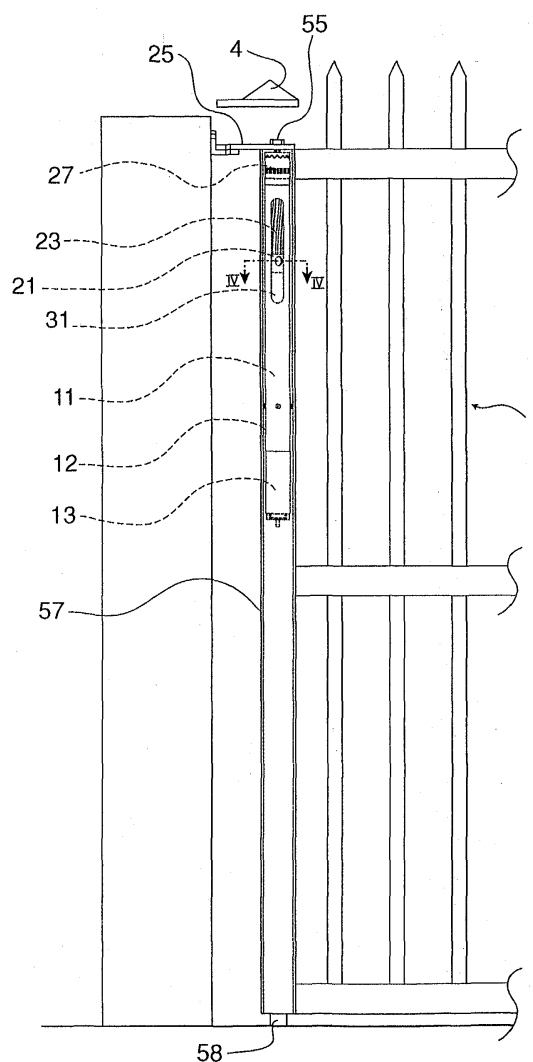


Fig. 1

Description

[0001] The present invention relates to control devices for controlling the opening and closing of automatic gates and doors and the like, and more particularly to a control device of the kind housed within an upright of the gate, door or the like.

[0002] A device of this kind is disclosed for instance in Italian Patent No. 01285228. It comprises a slide equipped with rollers resting upon a blade which is helically wound around its axis and is axially mounted inside the upright. The rollers are mounted on rolling bearings resting on opposite internal faces of the upright and connected by tie rods to a nut with which a threaded shaft of the driving motor meshes, causing the axial translation thereof. Thus, the variation of the roller orientation during the roller displacement over the blade surface because of the axial displacement of the nut causes gate rotation. In the lower portion of the device a clutch emergency device is provided comprising a plurality of rollers which can be made to leave their seats by manually operating the gate, to allow manoeuvring the gate while the motor is off.

[0003] Using the slide connected by tie rods to the nut driven by the motor makes the known device relatively complex. Also the clutch device comprising a plurality of rollers adds to the device complexity. Moreover, the clutch device only operates when the motor is off and it does not intervene in case of an excessive resistance due to an obstacle: consequently the risk exists that the control device can become damaged.

[0004] On the contrary, according to the invention there is provided a control device with a simple structure, comprising also clutch safety members arranged to prevent the device from being damaged when the gate, door or the like meets with a high resistance during its normal operation.

[0005] The device comprises a driving motor capable of making a movable member slide over a rod axially mounted in quadrangular upright and provided with helical grooves. The movable member has a portion with internal teeth arranged to engage said helical grooves, said internally toothed portion having moreover on its external surface diametrically opposite radial seats for a pair of balls, each engaging a pair of adjacent walls in the upright.

[0006] A clutch assembly is inserted between an upright securing plate and the helically grooved rod. That assembly comprises a pair of hubs with shaped front jaws, of which a primary hub, axially slidable towards said rod, is opposed by a spring, and a stationary secondary hub is secured to said plate.

[0007] Further features of the invention will become more apparent from the following description of a preferred exemplary embodiment, given by way of non limiting example and shown in the accompanying drawings, in which:

- Fig. 1 is a diagrammatic view of part of a gate equipped with the control device according to the invention;
- Fig. 2 is an elevation of the tubular housing of the device;
- Fig. 3 is an elevation showing part of the actual driving members and the safety members;
- Fig. 4 is a cross-sectional view of a gate upright and of the control device, taken along line IV - IV in Fig. 1; and
- Fig. 5 is an elevation of the driving motor and of its threaded shaft.

[0008] Referring to Fig. 1, reference 1 denotes a portion of a wing of an automatic gate, comprising an upright 57 formed by a square or rectangular box-shaped member housing the control device according to the invention, generally denoted 10, and the relevant electric drive motor 13.

[0009] In a wholly conventional manner, wing 1 is connected at its upper portion with a jamb or column 2 through a plate 25 fastened to a bracket 3 supported by column 2, whereas the lower portion of upright 57 has a projection 58 which can rotate within a seat (not shown) formed in the ground.

[0010] As disclosed in greater detail below, device 10 essentially comprises means that, when motor 13 is actuated, perform a combined movement of axial translation and of rotation about a vertical axis coinciding with the axis of upright 57, and transmit the rotary movement to the upright. Fig. 1 shows a bushing 21 axially sliding on a vertical rod 23 having helical grooves.

[0011] Device 10 further comprises a clutch assembly 27, which is located between rod 23 and plate 25 and which intervenes when the rotation of wing 1 meets with a resistance exceeding a given threshold. Such an assembly is adjustable through a bolt 55.

[0012] A protection cap 4 covers bracket 25 and bolt 55.

[0013] Device 10 is housed within a tubular housing 11, secured onto the upper portion of motor 13 by means of screws 12. More particularly, as shown in Fig. 5, to this aim motor 13 has a ring 33 with threaded radial bores 34 engaged by screws 12.

[0014] As better shown in Fig. 2, housing 11 has, in the upper portion of its side surface, a pair of diametrically opposite slots 31, allowing passage of a pair of balls 59 (shown in Fig. 4), which are the members capable of transmitting the rotary motion to upright 57.

[0015] Those balls are housed in a pair of radial hollows 37 formed in diametrically opposite positions on the external surface of bushing 21, as shown in Fig. 3, and, passing through slots 31 in housing 11, they rest each on a pair of adjacent internal faces of upright 57, as shown in Fig. 4.

[0016] Still referring to Fig. 3, bushing 21 is arranged at the end of a sliding tube 19 that, at the opposite end, has an internally threaded ring 17 which is engaged by

a threaded output shaft 15 (Fig. 5) of motor 13. The shaft is mounted within a ball bearing 35.

[0017] Bushing 21 has an internal surface with teeth 61 (Fig. 4), intended to engage helical grooves 39 of rod 23. The latter has such a length that the helical grooves turn by 180° from the bottom to the top. At its upper end, rod 23 is mounted in a ball bearing 41 and, thanks to the latter, is rotatably supported in plate 25 with the interposition of clutch assembly 27. The plate has bores 51 for the bolts fastening it to bracket 3 (Fig. 1).

[0018] Adjustable clutch assembly 27 comprises a pair of hubs 47, 49 with shaped front jaws. Hub 47 is a sliding primary hub, opposed by a cup spring 45. The lower end of said spring rests on a ring 43 having threaded radial bores 44 for fastening the clutch assembly 27 inside housing 11 by means of screws 14 provided in the upper portion of housing 11. Hub 49 is a stationary secondary hub, blocked inside plate 35 through pins 53.

[0019] The operation of the described device is immediately apparent from the above description. Actuation of motor 13 makes threaded shaft 15 rotate and hence makes ring 17, tube 19 and bushing 21 axially slide. Thanks to internal teeth 61 engaging helical grooves 39 of rod 23, bushing 21 rotates and trails with it balls 59 engaging the square profile of upright 57 of wing 1. Thus the latter is made to rotate, for being opened or closed depending on the rotation direction of shaft 15. If the rotation of wing 1 meets with a resistance exceeding a certain threshold, clutch assembly 27 intervenes: as known to the skilled in the art, secondary hub 49 pushes primary hub 47 downwards until the front jaws in both hubs become disengaged, thereby releasing actuating device 10 from stationary bracket 25.

[0020] The preceding description clearly shows the constructive simplicity of the device according to the invention, as concerns both the members making upright 57 rotate and the safety members. The latter are moreover capable of intervening also during the normal, motor-driven operation, thereby reducing the possibility of damages to the device in case of obstacles hindering the gate movement.

[0021] It is to be appreciated that, for sake of simplicity, neither the devices for stopping the gate, door and the like at the end of its stroke and for causing inversion of its movement, nor the safety devices preventing the gate from closing while a person or a vehicle is passing therethrough. On the other hand such devices are well known to the skilled in the art and are not concerned by the present invention.

[0022] It is clear that the above description has been given only by way of non limiting example and that changes and modifications are possible without departing from the scope of the invention, as defined by the appended claims.

Claims

1. A device for controlling the opening and closing of an automatic gate (1) or the like, the device being mounted within a quadrangular upright (57) of the gate or the like and comprising a driving motor (13) capable of causing the axial sliding of a movable member (17, 19, 21), **characterised in that** said movable member (17, 19, 21) is arranged to slide over a rod (23) axially mounted in the upright (57) and provided with helical grooves (39), and has a portion (21) with internal teeth (61) arranged to engage said helical grooves (39), said internally toothed part (21) having moreover on its external surface diametrically opposite radial seats (37) for a pair of balls (59), each engaging a pair of adjacent walls in the upright (57).
2. A device as claimed in claim 1, **characterised in that** said movable member (17, 19, 21) comprises a tube (19) having at one end an internally threaded ring (17) arranged to engage a threaded output shaft (15) of said motor (13), and having at the other end a bushing (21) forming said internally toothed part.
3. A device as claimed in claim 1, **characterised in that** said rod (23) is rotatably supported in a plate (25) fastening the upright (57) to a jamb or column (2) with the interposition of a clutch assembly (27) comprising a pair of hubs (47, 49) with shaped front jaws, of which a primary hub (47), which may be axially pushed towards said rod (23), is opposed by a spring (45), and a stationary secondary hub (49) is secured to said plate (25).
4. A device as claimed in claim 3, **characterised in that** the clutch assembly (27) has means (55) for its adjustment at the installation of the device (10).
5. A device as claimed in any preceding claim, **characterised in that** it comprises a tubular housing (11), which is for housing said moving member (19) and said rod, and which is secured to rings (33, 43) provided in an upper portion of said motor (13) and in a lower portion of said clutch assembly (27), respectively.
6. A device as claimed in claim 5, **characterised in that** said tubular housing (11) has a pair of diametrically opposite slots (31) through which said balls (59) pass.

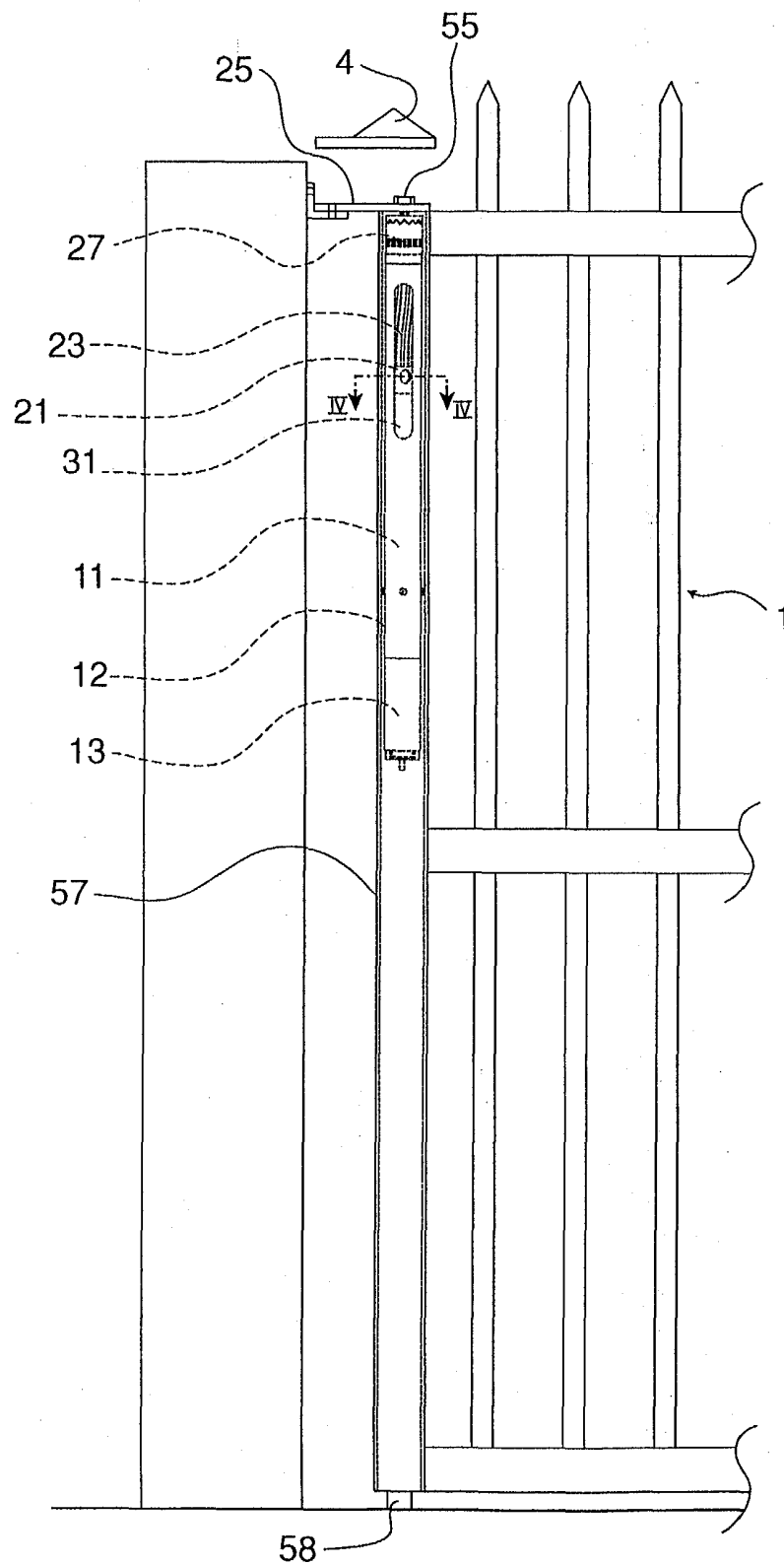


Fig. 1

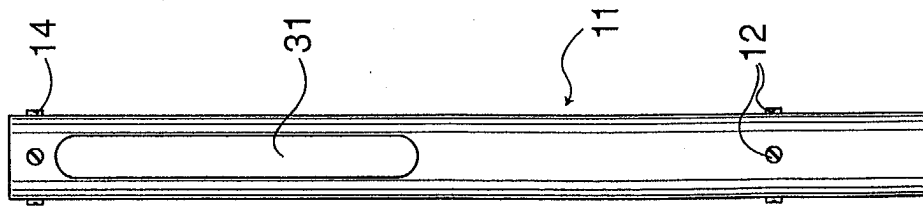


Fig. 2

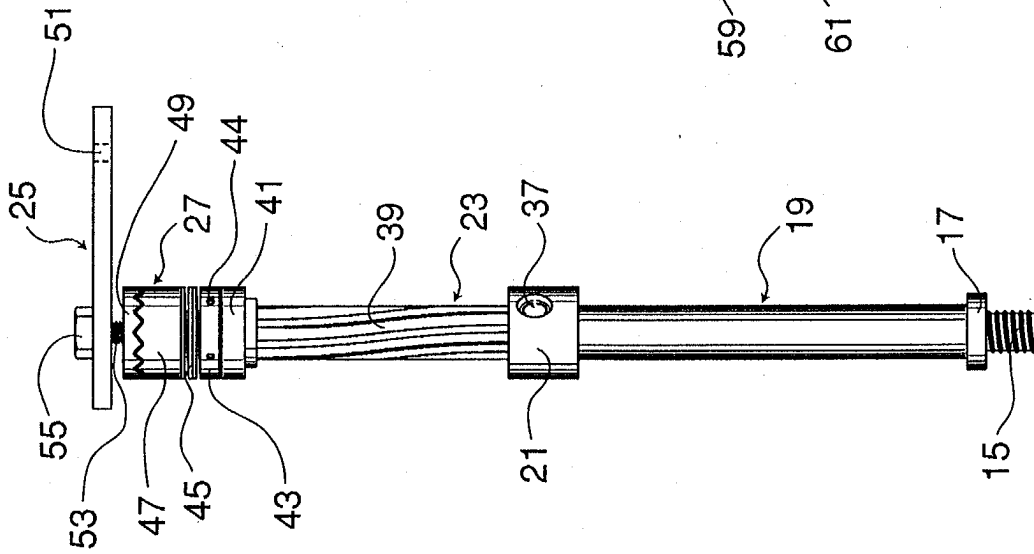


Fig. 3

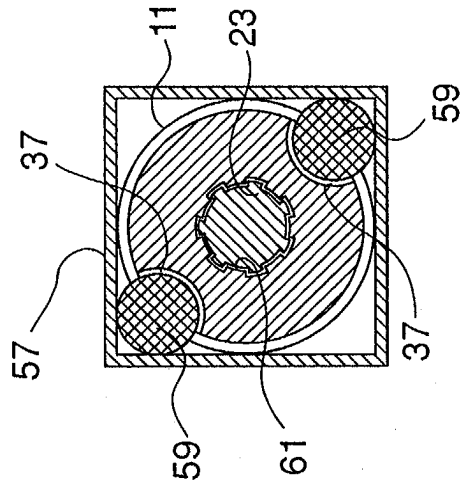


Fig. 4

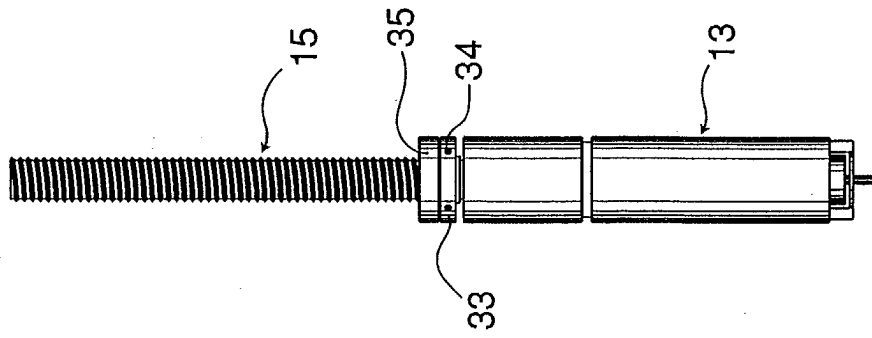


Fig. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5528

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)
A	DE 32 19 192 A (UNTERREITER ERICH) 24 November 1983 (1983-11-24) * claims 1,2; figures 1-7 *	1	E05F15/12
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		16 January 2004	Guillaume, G
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 42 5528

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The members are as contained in the European Patent Office EDP file on
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