

MOTOR-OPERATED DEVICE FOR RADIALY OPENING AND CLOSING SWINGING GATES AND DOORS

SUMMARY

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This is a device that allows swing gates and doors to be opened automatically using a radially driven gearmotor, causing the end of the leaf attached to the pillar to rotate on its axis. This system can be activated by any remote system, such as a remote control, cell phone, etc., or manually using a pushbutton or switch with a numeric key.

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Specifically, it consists of a pinion mounted on the gearmotor shaft that drives a special toothed bushing. This gearmotor is fixed to the same pillar where the tensioner bushings and the lower bushing are mounted, which rotate on their own axis, allowing the gate or door leaf to open or close within a range of up to 180°.

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The gearmotor is mounted on a support system that releases the traction between the pinions so that it can be opened manually in the event of a power outage.

EXTENSIVE REPORT

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This application aims to present a motorized opening and closing device for radially swinging gates and doors.

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STATE OF MARKET

Currently, the market offers various devices for automatically opening swing gates or doors. These devices allow swing gates to be opened using hydraulic and mechanical
5 rack-based systems. Both systems operate linearly, which considerably limits space requirements because certain parameters are required for the installation of these systems. In addition to the space restriction, these linear devices operate at very low speeds, so the time lag is high both for opening and closing the gate or door.

10 Another disadvantage is the difficulty in controlling the final position of the gate or door, both when opening and closing; there are many user feedback related to this problem.

Another system on the market is the sliding system, where the leaf moves straight along a rail and the gate is driven by an electric motor that transfers its energy through a pinion
15 connected to a rack attached to the gate leaf.

Although it's the most common system, it also requires lateral space to move the gate when opening. Another drawback is its dependence on a rail attached to the floor to guide the gate, which often becomes dirty, making operation difficult. Furthermore, the ground
20 must be level for the gate to close properly; otherwise, a hole forms, causing rainwater to collect and making it difficult to pass through.

This application proposes a solution based on providing alternatives for those who lack the space to install sliding gates or who do not meet the parameters and lengths that make
25 it possible to install a hydraulic or mechanical rectilinear swing gate system.

Another solution is to install the system at entrances with different levels where the street has height differences on either side. The system can also extend the length of the door

to a width of 6 m thanks to the tensioning system that holds the door in position throughout the opening and closing process.

This device also offers a security advantage: sliding gates are known to be very easy to dismantle and are often stolen. The solution offered meets the security requirement because an angle grinder would be required to cut the pillar (which uses a system of bushings that fully enclose it). It also has a tensioner at the top, allowing for multiple attachment points throughout the structure.

10 BRIEF DESCRIPTION OF THE FIGURES

Figure 1: represents a general front view of the invention with details of the various points described below.

15 Figure 2: represents detail A of Figure 1, showing the drive system (3), the hub support (11), and the upper tensioner hub (13).

Figure 3: represents detail B of Figure 1, showing the lower hub (9) resting on the hub support (11) and the connection of the lower hub (9) to the gate or door leaf (1), all
20 mounted on the pillar (2), which, in turn, is anchored to a concrete base.

Figure 4: represents detail A of Figure 1 where the drive system can be seen in which the pinion (6) of the motor meshes with the upper drive hub (5) which, in turn, supports the gate or door leaf (1). The gearmotor is mounted on a movable support system (4) which,
25 by means of guides, springs and a thread with a small crank, allows it to move away from the upper hub gear, releasing the traction between both gears. In this way, the gate can be operated manually in case of a power outage. Everything is fixed to the pillar (2) with the installation of some clamps.

DETAILED DESCRIPTION OF THE INVENTION

This device consists of a built-in pillar (2) that has bushings mounted with perforated fins, designed to support the weight of the door or gate leaf (1) to be automated. In one of the
5 bushings there is a fixed gear that moves radially thanks to a drive system (3), which consists of a gearmotor with a gear on its output shaft. The drive system (3) is mounted to a support with a system of guides and springs (4), which allows the gearmotor to be moved away from the pillar by turning a small crank. In this way, the traction between both gears is released to open it manually in case of a power outage. Everything is
10 attached to the same pillar (2) that supports the leaf.

An electronic board is used to control the drive system (3), which has different relays that allow the door or gate to be opened and closed using a remote control, switch, or cell phone. The opening percentage is determined by a travel limit switch in a range of 0 to
15 180°. The mechanical system can be manufactured for different capacities, depending on the needs and dimensions for which it will be used. The pillar (2) can be installed on its concrete base (10) or anchored with bolts to the pre-existing pavement. Once the pillar (2) is fixed, the following elements are installed in an orderly and sequential manner:

- 20 1. Lower support bushing (11) consisting of a ring welded to the pillar by means of Allen stud bolts.
2. Lower bushing (9) installed in the support ring. This bushing has lubricant distribution slots and a grease fitting to provide smoothness to the process.
3. Dust cover consisting of a rubber ring that prevents grease contamination by dust
25 and protects the joint from rain.
4. Upper support bushing (11) which performs the same function as the lower support bushing.

5. Upper drive hub (5) which has the particularity of having a machined gear in its upper part; this is responsible for transmitting the folding movement of the gate leaf.
6. Dust cover.
- 5 7. Drive system (3) or drive hinge, which consists of a metal base attached to the pillar by means of clamps. The gear motor is installed vertically downward on its output shaft at the base (4), where it has a gear (6) mounted in such a way that it meshes with the upper drive bushing (5). The electronic board that will control the system with the use of different devices is attached to the motor.
- 10 8. At the upper end of the pillar, a third upper tensioner bushing (13) is installed with its respective support that holds the weight of the leaf by means of a tensioner (8) from the end of the gate leaf (1).
9. Once the mechanical elements have been installed, the gate or door leaf (1) is installed. This leaf can be made of iron or wood depending on the user's preference. This leaf can be secured with bolts or simply welded to the bushings.
- 15 10. The opposite end of the pillar has the closing pillar (12), which is where the electric lock and the stoppers that allow the positioning of the leaf in the closure are installed.

CLAIMS

1. Motorized device for opening and closing swing gates and doors that operates with a radial movement. It is **CHARACTERIZED** by the electric gearmotor (3) being installed on the main pillar (2) and secured with clamps above the swing gate (or door), so that it does not hinder its opening and closing.
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2. Motorized device for opening and closing swing gates and doors that works with a radial movement. According to claim 1, it is **CHARACTERIZED** in that the main pillar (2) acts as a pivot axis for the drive hub (5), lower hub (9) and tensioner hub (13) at the same time, these acting as part of the same element, in this case the swing leaf (1), allowing the gate (door) to open at an angle of up to 180 degrees (even more if necessary), driven by the gear motor that meshes with the drive hub, making the gate (door) open and close in a very stable and cantilevered manner at a constant speed.
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3. Motorized device for opening and closing swing gates and doors that operates with a radial movement. According to claims 1 and 2, it is **CHARACTERIZED** in that the upper drive hub (5) has a machined circular gear with the necessary teeth to achieve an opening of 0 to 180°, which in turn is mounted on the main pillar (2), as well as the lower hub (9) and the upper hub of the tensioner (13). These hubs wrap around the diameter of the main pillar and have cavities to distribute grease evenly to lubricate the contact points of the hubs with the main pillar.
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4. Motorized device for opening and closing swing gates and doors that operates with a radial movement. According to claims 1, 2 and 3, it is **CHARACTERIZED** in that the support (4) has a system that allows the electric

garmotor (3) to be moved away from the upper drive support (5), which allows the gate to be opened manually in the event of a power failure.

5. Motorized device for opening and closing swing gates and doors that operates with a radial movement. According to claims 2, 3 and 4, it is **CHARACTERIZED** because, as it operates on a cantilever supported only by the main pillar (2) at one end of the threshold, it does not require the ground under the gate or door to be level, and can even be placed in a field with earth or mud without impeding its correct operation.
6. Motorized device for opening and closing swing gates and doors that operates with a radial movement. According to claims 1, 2 and 3, it is **CHARACTERIZED** in that both the main drive hub (5) and the upper tensioning hub (13) and the lower hub (9) have fins that allow the swing leaves to be mounted with welding or bolts of the material and design that the user decides. In addition, these hubs have specially designed channels in their inner perimeter to maintain the lubrication that is applied by means of grease fittings.
7. Motorized device for opening and closing swing gates and doors that operates with a radial movement. It is designed to be used as a gate for livestock, as it can be opened from 0 to 180° and the opening can be configured according to the direction of the livestock movement.