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(54) **Oleodynamic device for opening swing gates on sloped roads**

(57) Swing gate comprising a gate door and an hydraulic device configured to rotate and simultaneously lift the gate door to open the latter.

FIG. 1a

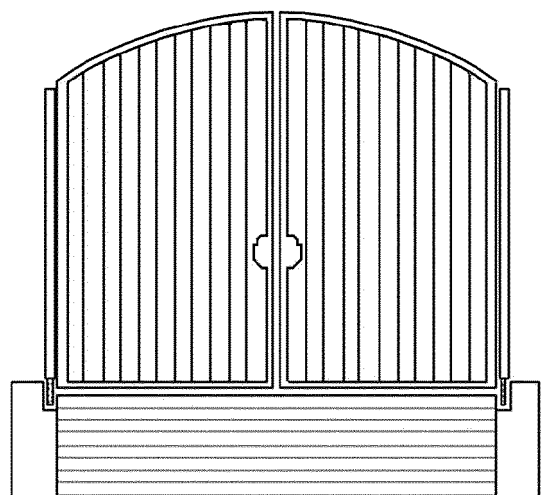


FIG. 1b

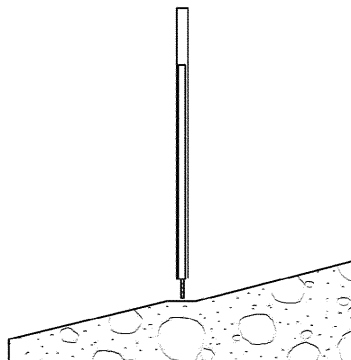


FIG. 1c

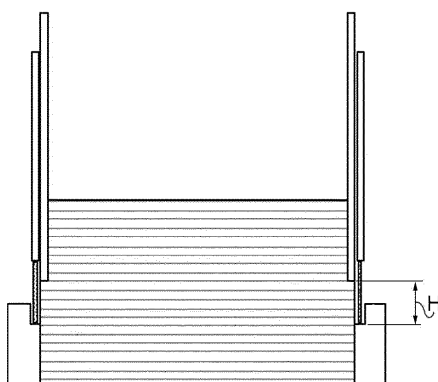
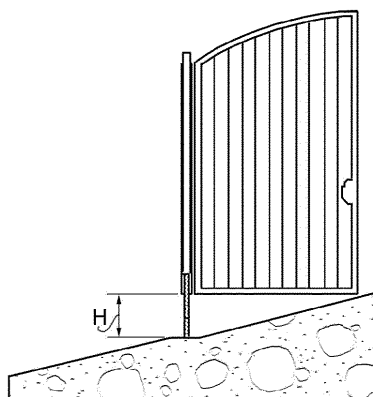


FIG. 1d



Description

[0001] Up until now the problem of preventing the interference between one or more shutters or gate doors with the sloping ground has been solved by opening the gate doors towards the outside, where, due to the slope, the detachment of the gate door from the ground increases; this solution presents various problems, one of which being that of stopping the incoming vehicle at a distance greater than the length of the gate door and, therefore, in case of entering flush to the roads, invading part of the roadway itself.

[0002] The device according to the present invention allows the opening of the doors of any gate placed on sloped paths towards the inside, i.e., where the detachment of the gate door from the ground decreases progressively, until reaching zero, thanks to the rotation and simultaneous lifting of the gate door itself.

[0003] The device allows the opening of the doors of any gate placed on sloped paths towards the inside, i.e., where the detachment of the gate door from the ground decreases progressively, until reaching zero, thanks to the rotation and simultaneous lifting of the gate door itself.

[0004] The invention will now be described with reference to the accompanying drawings, which illustrate examples of nonlimiting embodiments, of which:

- Figures 1a, c are respective front views of a gate according to the present invention in respective closing and opening positions;
- Figures 1b, d are respective side views of the gate of Figure 1 in respective closing and opening positions;
- Figures 2a, b are respectively a side view and a plan view of a first component of the gate of Figure 1;
- Figures 3a, b are respectively a section along a diametral plane and a plan view of a second component of the gate of Figure 1;
- Figures 4a, b, c are respective bottom, side and plan views of a constructive assembly of the gate of Figure 1;
- Figures 5a, b are respectively an enlarged section along a diametral plane of a detail and a plan view of a further element of the gate of Figure 1; and
- Figure 6 is a section along a diametral plane of an assembled detail of the gate of Figure 1.

[0005] The iron device of the present invention (*the one shown below is a non binding embodiment relating to a gate door of about 2 meters on slopes of approximately 12%*) consists mainly of four parts, whose components are all commercially available:

a first component is formed by a profiled element, or square profile **A1** of h 35 cm, with a section of 26x26 mm with a twist along its axis of gravity of 120° fixed on a support crown ø 90 mm and defining a helical guide **A2** 12 mm thick, with two loop holes **A3** nec-

essary for the proper and necessary adjustment. The square rod is fixed to the ground and remains stationary during operation.

[0006] A second component comprises an iron tube **B5** 35 cm long of ø 60 mm in diameter, 4 mm thick, and, therefore, with a net internal diameter of ø 52 mm, with internal head thread **B3** and fixing hole **B4**. This component is positioned vertically on the crown **A2**. At the base of said tube **B5** are attached two tubes 20 mm long and with a diameter of 25 mm with internal thread and referred to as **B1** for the inlet and **B2** for the outlet. The outer cylinder is connected rigidly to the crown **A2** (being shown separated from the latter element for simplicity and greater understanding regarding installation) and houses the square profile **A1** for the outlet. In addition, the outer cylinder **B** defines a guide for an upright **D1** which will be better described later.

[0007] Coupled to the square profile **A1** is a piston **C1** which is an iron tube of diameter ø 40 mm positioned within a screw cap **C2** of internal diameter ø 40 mm and outer diameter ø 52 mm, which constitutes the closure of the cylinder **B5**. In particular, the screw cap **C2** is fixed in use and the piston **C1** slides within the screw cap **C2** when the door of the gate is opened/closed. At the base of the piston is rigidly secured a support **C4** for rubber seals which, preferably in one piece, defines a housing **C3** of internal dimension 27x27 mm and has appropriate sliding seals to prevent leakage of oil for the guided sliding of the square rod **A1** of the piston **C1**. Between the cylinder **B5** and the piston **C1** is defined a chamber **G** which is closed by means of the screw cap **C2** and appropriate sliding seals in contact with the piston **C1** and receives oil under pressure from the pump to control the displacement of the support **C4** and the closure of the gate door.

[0008] The last component is a tube **D1**, or iron upright, with a diameter ø 64 mm, 2 mm thick and of internal diameter ø 60 mm, to which is fixed the gate door. Within this cylinder there is a stopper **D2** under which the piston **C1** acts. The upright **D1** rests, by way of the stopper **D2**, upon the head of the piston **C1** that, therefore, supports its weight. The upright **D1** is connected rigidly to rotation to the piston **C1** by way of a removable pin **S** preferably by hand. Through the pin **S** the rotation of the piston **C1** during the lifting/lowering is transmitted to the gate door connected to the upright **D1**.

[0009] In use, at the opening of the gate door by way of a 12 volts motor **M**, an oil pump **P** operates, which injects oil into the cylinder **B5** through the inlet **B1**. The oil injected by the pump in the cylinder lifts the piston **C1**, thus defining a linear actuator, which, thanks to the hole **C3**, slides around the rod **A1** lifting by a quantity **H** and rotating at the same time. The displacement of the piston **C1** placed under the stopping **D2** lifts and rotates at the same time the upright **D1** of the gate to which is fixed the door of the gate that, therefore, will rotate and lift at the same time. When the gate door is closed, the pressurized

oil is sent into the chamber **G** by way of an appropriate valve **V** so that the linear actuator is double acting.

[0010] The displacement of the piston lifts and rotates at the same time the cylinder of the gate to which the door is fixed which, therefore, will rotate and lift. The opening is adjustable up to 90° and/or up to 120°. The hydraulic device further comprises an oil pressure sensor and a safety device that connects the device to the discharge to dramatically decrease or cancel the pressure of the fluid. In this way, especially during the closure, the safety device prevents the gate door from crushing by way of the hydraulic power of the linear actuator, delicate objects or also possible limbs of a user or bystander or animal trapped under the gate door during closure.

[0011] In the absence of electricity, operation is ensured by a 12 volt battery **F** positioned within the mechanism of the gate and connected to the electric motor **M**. The device is in any case equipped with manual unlocking of each gate door with opening to the outside through the pin **S**.

[0012] The impulse is sent to the unit by remote control and/or key switch.

[0013] The chamber **G** can be connected in various ways to the valve **V**. In particular, the connecting tube between the valve **V** and the chamber **G** can be external to the upright **D1** so that the latter presents a suitable groove shaped to allow the opening and closure. Furthermore, it is also possible to align the tube wall **B5** or provide a fixed intermediate element between the tube **B5** and the upright **D1** so that said duct has at least a portion parallel to the axis of displacement of the piston **C1** arranged within the tube **B5**. In this way it is not necessary to provide a groove in the upright **D1** and the tube does not radially pass through an outer wall of the upright itself. For example, the intermediate element may present a cylindrical outer surface coupling with the upright **D1**, a wall inside which runs the tube connected with the valve **V**, and a cylindrical seat for housing the tube **B5**. The portion of the tube connected to the valve **V** enters inside the upright **D1** together with the tube **B5** through the same opening of the upright itself.

tate the piston while the gate door is guided in an open position and the piston (**C1**) is lifted.

4. The gate according to claim 3, **characterized in that** said linear actuator is double acting to also control the closure of the gate door.
5. The gate according to claim 4, **characterized in that** a hydraulic conduit to control the closing of the gate door has a portion inside the upright (**D1**) without radially passing through an outer wall of the latter.
6. The gate according to any one of the preceding claims, **characterized in that** said hydraulic device comprises an electric motor, an electric pump driven by the electric motor and a battery to power the electric motor.
7. The gate according to any one of the preceding claims, **characterized by** comprising a mechanical manual stop (**S**) arranged between the upright (**D**) and the hydraulic device to open the gate door in case of malfunction of the hydraulic device.
8. The gate according to any one of the preceding claims, **characterized in that** said hydraulic device comprises a pressure sensor and an automatic device to discharge the hydraulic device when a maximum level of pressure inside the hydraulic device is reached.

Claims

1. A swing gate comprising a door and an hydraulic device configured to rotate and simultaneously lift the gate door to open the latter.
2. The gate according to claim 1, **characterized by** comprising an upright (**D1**) for supporting the gate door and by the fact that the hydraulic device comprises a linear actuator housed vertically in the upright and having a movable piston (**C1**) rigidly connected to the gate door.
3. The gate according to claim 2, **characterized in that** said actuator comprises an helical guide (**A1**) to ro-

FIG. 1a

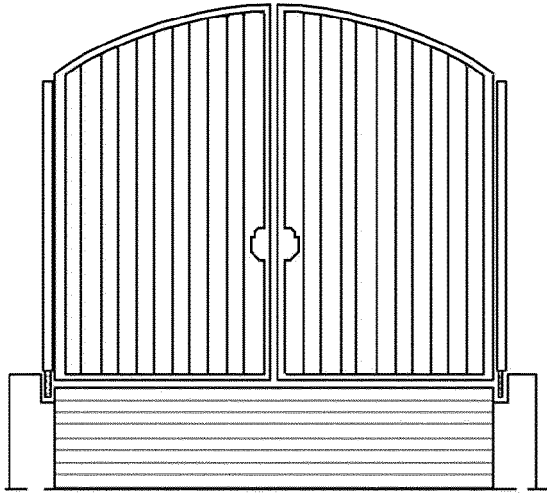


FIG. 1b

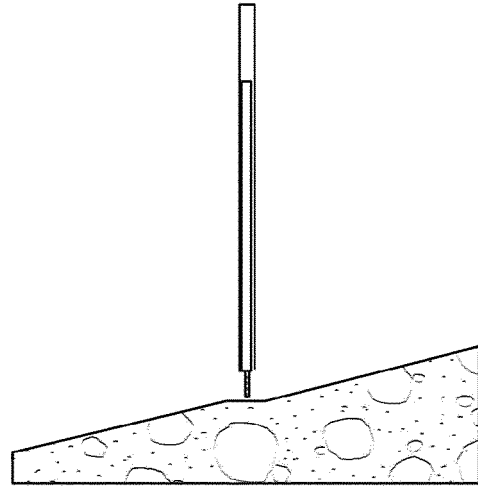


FIG. 1c

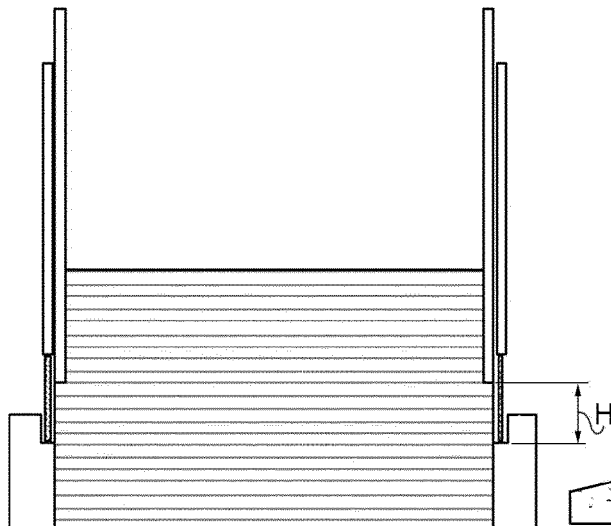


FIG. 1d

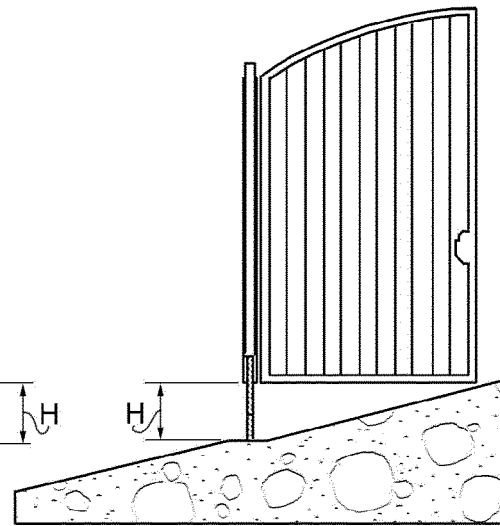


FIG. 2b

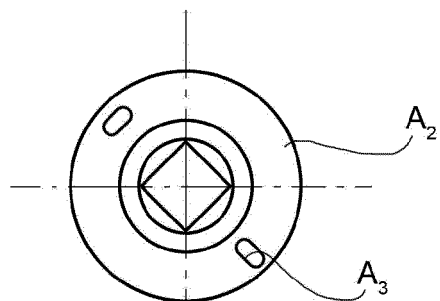


FIG. 2a

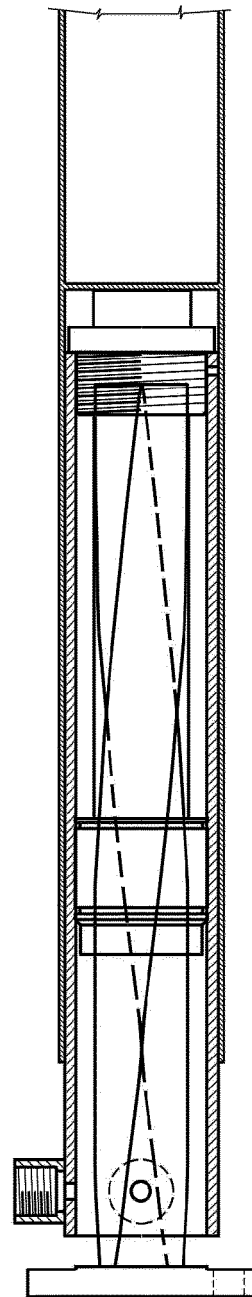
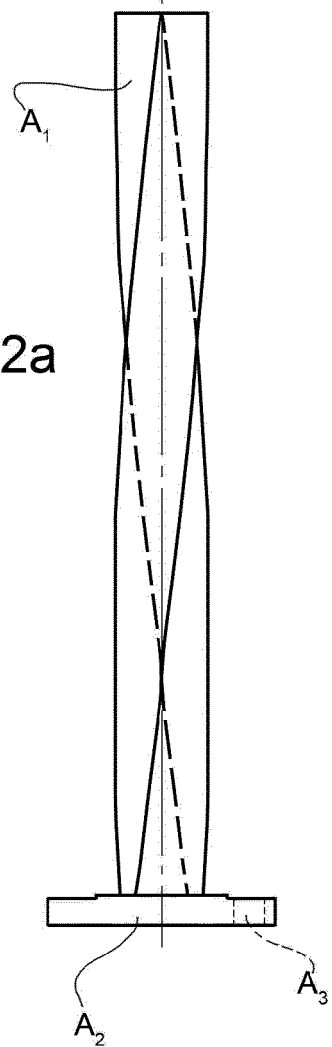


FIG. 3b

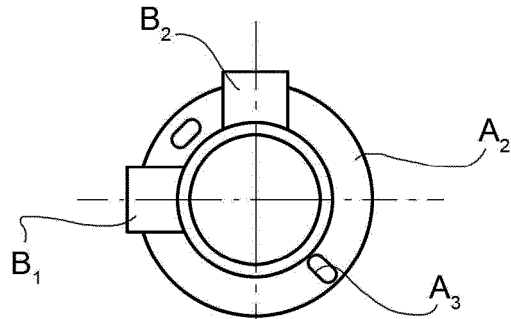


FIG. 3a

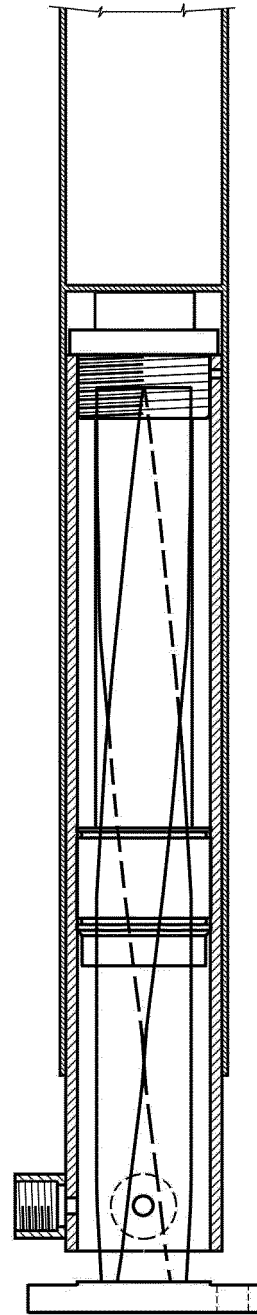
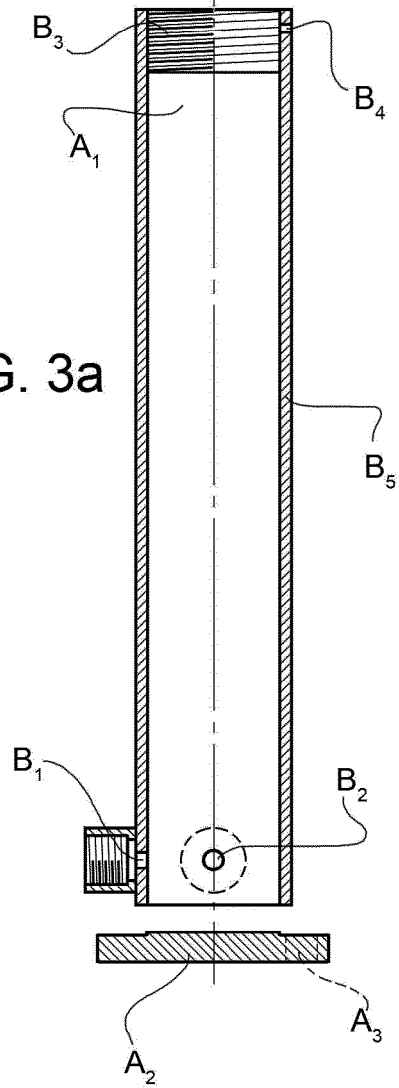


FIG. 4c

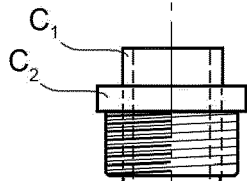
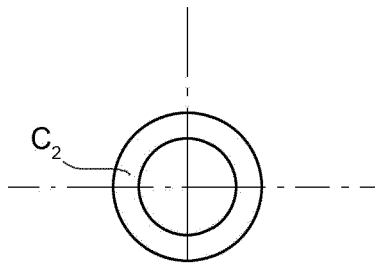


FIG. 4a

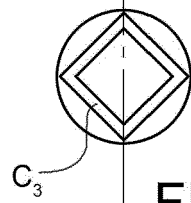
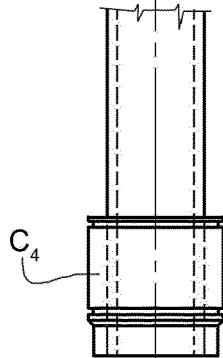


FIG. 4b

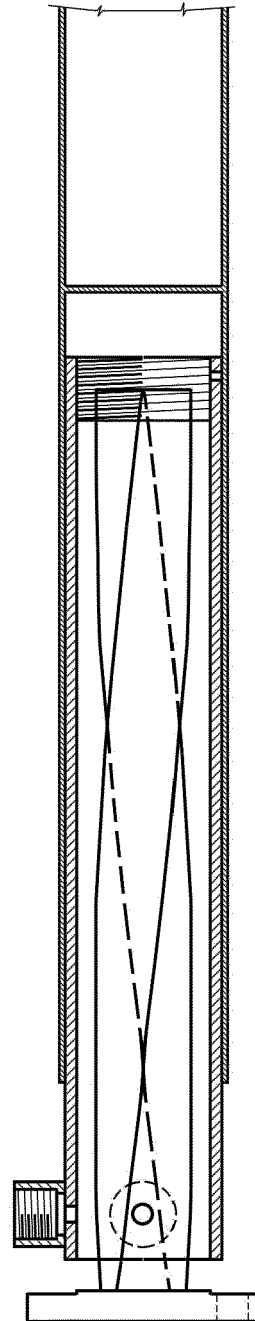


FIG. 6

FIG. 5b

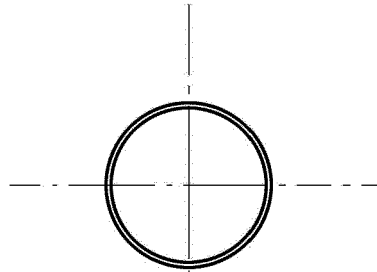


FIG. 5a

