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(54) **A safety device of pneumatic sensing edge type for motorized doors**

(57) A safety device of pneumatic sensing edge type for motorized doors, with a wireless connection between a transmitter (28) associated with said door (2) and controlled by said pneumatic sensing edge (4), and a control

unit (8) for the electric motor (6) which drives said door, characterised in that said transmitter (28) is provided with a rechargeable battery (24) which, when said door is in its closed state, is mains-powered via a contactless magnetic coupling device (18, 20).

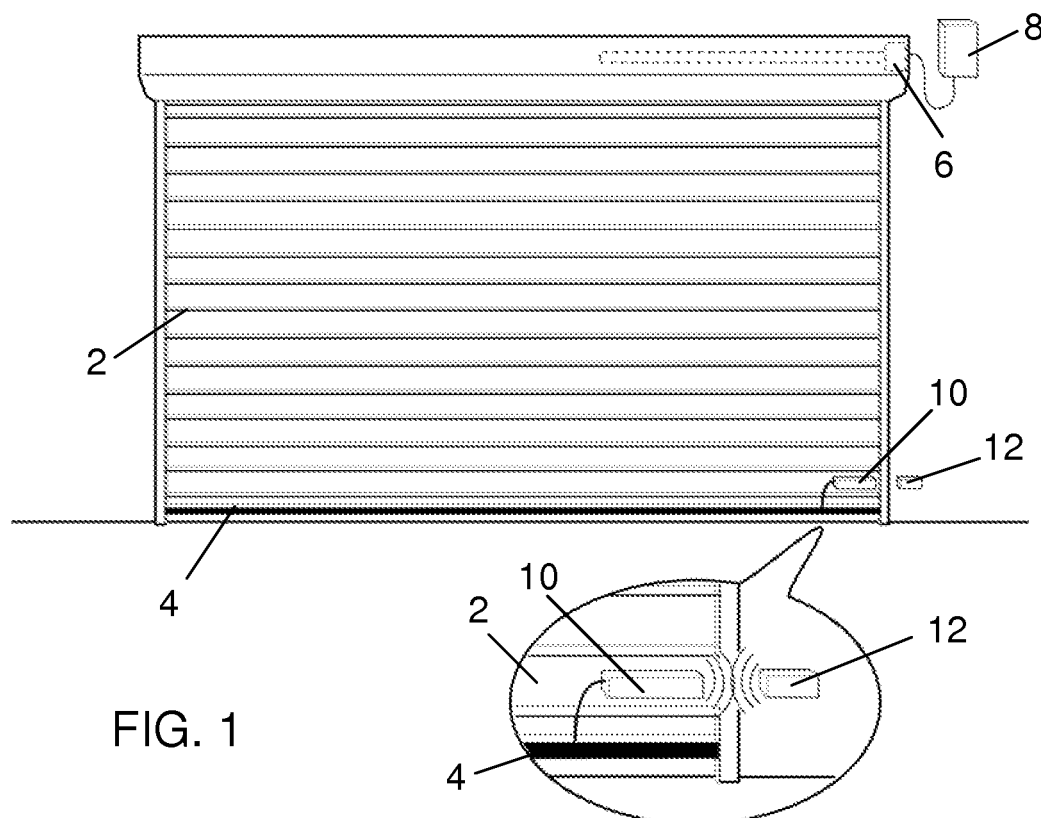


FIG. 1

Description

[0001] The present invention relates to a safety device of pneumatic sensing edge type for motorized doors.

[0002] Motorized doors are known in the form of sectional doors, sliding doors, sliding gates etc., and generally doors which move along a controlled gap. The movement is generally provided by an electromechanical actuator controlled by a control unit via traditional limit switches.

[0003] Current regulations require that when the edge of the door strikes against an obstacle occasionally present within the gap with which the door is associated, the control system senses the presence of the obstacle and immediately halts the door, preferably with rapid temporary reversal of its movement.

[0004] This is currently achieved by a safety device, commonly known as a "pneumatic sensing edge" consisting essentially of a deformable tubular profile, generally of rubber, which is applied along the door edge and, if an obstacle is present, strikes it first. When this impact takes place, the pneumatic sensing edge deforms and, by magnetic, optical, capacitive, inductive or mechanical effect, transmits a signal to the control unit which then halts the actuator and causes it to rapidly make a temporary reverse movement to distance the door from the obstacle by an amount sufficient to prevent the door from pressing against it and enable it to be removed.

[0005] The signal generated by the pneumatic sensing edge is transmitted to the control unit via cable which, as the door is in movement while the control unit is fixed, has to be flexible and extensible to ensure the connections for any position of the door and under any condition of movement.

[0006] To dispense with a cable connection between the pneumatic sensing edge and the control unit, it has already been proposed to use in the door a radio or infrared transmitter associated with the pneumatic sensing edge, and a receiver associated with the control unit. In this manner, installation of the assembly has been considerably simplified because of the elimination of the connection between the door and the control unit and the elimination of any restriction in positioning the control unit.

[0007] However the elimination of this connection cable has made it impossible to power the pneumatic sensing edge by mains electricity, so that a battery-powered transmitter has to be used, with all the problems related to the need for periodic battery replacement.

[0008] This drawback is eliminated according to the invention by a safety device of pneumatic sensing edge type for motorized doors as described in claim 1.

[0009] The present invention is further clarified hereinafter with reference to the accompanying drawings, in which:

Figure 1 is a front schematic view of a sectional door provided with the safety device of pneumatic

sensing edge type according to the invention, and

Figure 2 shows a block diagram of the two parts of the safety device, for transferring electrical energy to the rechargeable battery of the transmitter installed in the sectional door.

[0010] As can be seen from the figures, the device of the invention is applied to a motorized door, for example a sectional door 2 provided on its free edge with a traditional pneumatic sensing edge 4.

[0011] A gearmotor 6 is associated with the sectional door 2, this gearmotor being connected to a control unit 8.

[0012] A radio device 10 connected to the pneumatic sensing edge 4 is applied to the sectional door 2, while a device 12 is applied to the masonry structure in a position facing said radio device 10 when the sectional door is closed, to transfer electrical energy to the radio device 10 by magnetic coupling.

[0013] More specifically, the energy transfer device 12 comprises within a casing a mains connector 14 to power a magnetic field generator 16, which itself powers a magnetic field emitter 18.

[0014] The radio device 10 comprises a magnetic field receiver 20 which, when the safety device 2 is closed, is faced by and is magnetically coupled to the magnetic field emitter 18, to transfer electrical energy to the device 10. The magnetic field receiver 20 is connected to a battery charger unit 22 connected to a rechargeable battery 24.

[0015] This battery 24 powers a microcontroller 26 and a radio receiver/transmitter 28, which is controlled by the microcontroller 26 and tuned to a radio receiver/transmitter installed in the control unit 8.

[0016] The microcontroller 26 is also connected to an interface circuit 30 for connection to the pneumatic sensing edge 4, in order to be able to feed suitable signals to the microcontroller 26 when the pneumatic sensing edge 4 is activated.

[0017] The safety device of the invention operates in the following manner. Under normal conditions the movements of the door 2 in the opening and closure directions are provided by the gearmotor 6 under the control of the control unit 8.

[0018] If during closure an obstacle accidentally appears within the passage gap with which the safety device 2 is associated, the moving pneumatic sensing edge 4 strikes against the obstacle, undergoes deformation and generates a signal, which is fed to the microcontroller 26 via the interface 30. The signal is then processed by the microcontroller 26, which causes the receiver/transmitter 28 to generate a corresponding signal. This is received by a receiver/transmitter provided in the control unit 8, which then interrupts power to the gearmotor 6 and reverses it for a short instant, to withdraw the pneumatic sensing edge 6 from the obstacle.

[0019] Whenever the safety device reaches its closed state, the radio device rigid with the door 2 faces the

energy transfer device 12, and in particular the magnetic field emitter 18 mounted in the energy transfer device 12 faces the magnetic field receiver 20, to transfer electrical energy to the battery charger circuit 22. This can therefore charge the rechargeable battery 24 of the radio device 10 and/or maintain it charged. 5

[0020] This ensures that the battery 24 is always charged, without ever having to replace it.

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Claims

1. A safety device of pneumatic sensing edge type for motorized doors, with a wireless connection between a transmitter (28) associated with said door (2) and controlled by said pneumatic sensing edge (4), and a control unit (8) for the electric motor (6) which drives said door, **characterised in that** said transmitter (28) is provided with a rechargeable battery (24) which, when said door is in its closed state, is mains-powered via a contactless magnetic coupling device (18, 20). 15 20
2. A device as claimed in claim 1, **characterised by** comprising a radio device (10) applied to the door (2) and connected electrically to said pneumatic sensing edge (4). 25
3. A device as claimed in claim 1, **characterised by** comprising an energy transfer device (12) fixed to the structure to which the door (2) is applied and magnetically coupled to said radio device (10) when said door (2) is closed. 30
4. A device as claimed in claim 2, **characterised in that** the radio device (10) applied to the door (2) comprises an interface (30) for connection to the pneumatic sensing edge (4), a transmitter (28) tuned to a receiver/transmitter with which the control unit (8) is provided, a rechargeable battery (24) a battery charger (22) powered by the mains via said contactless magnetic coupling device (18, 20) and a micro-controller (26). 35 40
5. A device as claimed in claim 3, **characterised in that** the energy transfer device comprises a mains connector, a magnetic field generator (16) powered by the mains via said connector (14), and a magnetic field emitter which is connected to said generator (16) and which when said door (2) is closed is coupled without contact to a magnetic field receiver (20) connected to the battery charger (22) of the radio device (10). 45 50

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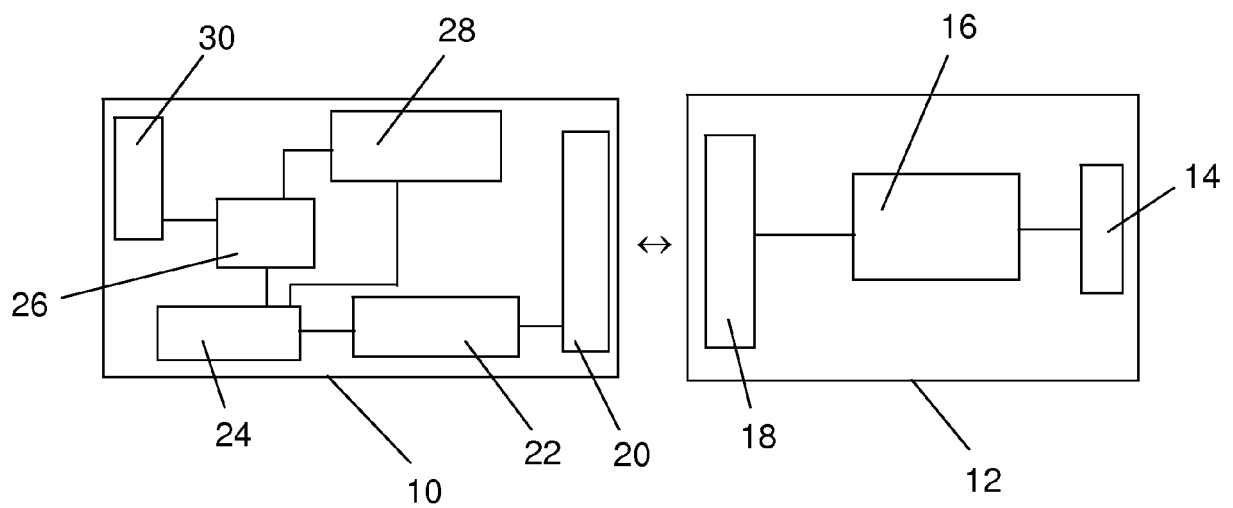
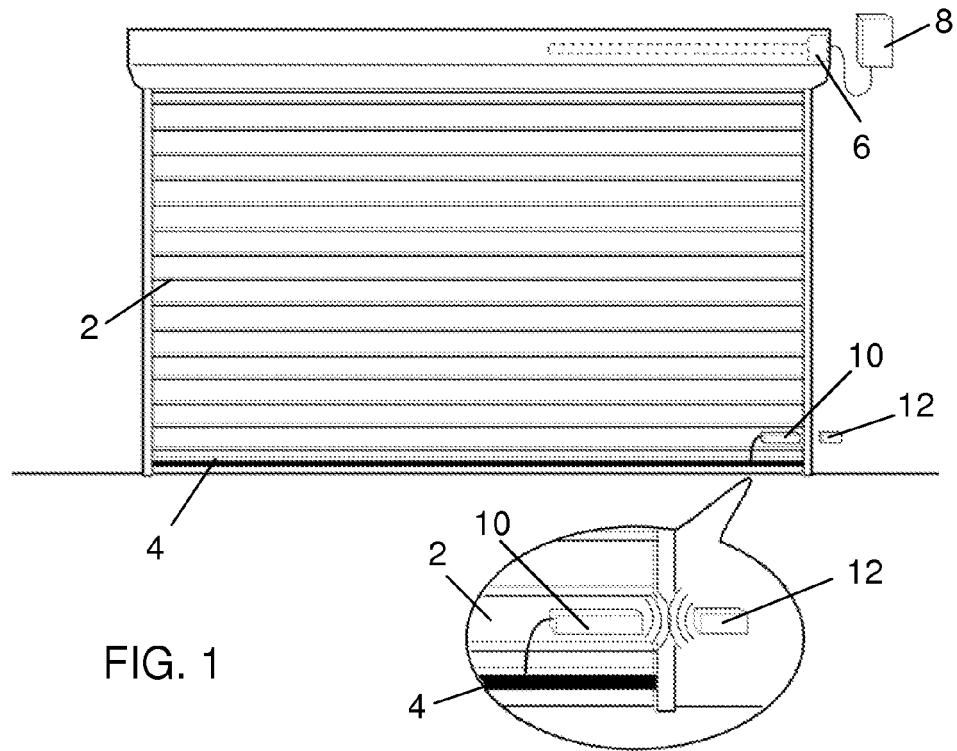


FIG. 2