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(54) **Control apparatus for automatic opening systems**

(57) Apparatus for the control of an automation opening system, usable, in particular, for sliding gates, sliding doors, balancing doors, shutters and similar, of the type which comprises a first trans-receiving element (2), suitable to send a signal, and a second trans-receiving element (3), disposed in the covering zone of the first one, and suitable to receive said signal sent from the first element in order to give back a correspondent response

signal, apparatus characterized in that the first trans-receiving element (2) is provided with first transmission means (20) suitable to transmit a radiation and in that the second trans-receiving element (3) is fixable to the gate (11) to be controlled, in order to be mobile together with the latter, and is provided with sensor means (30) suitable to transform the received radiation in current for feeding its own transmission section (33).

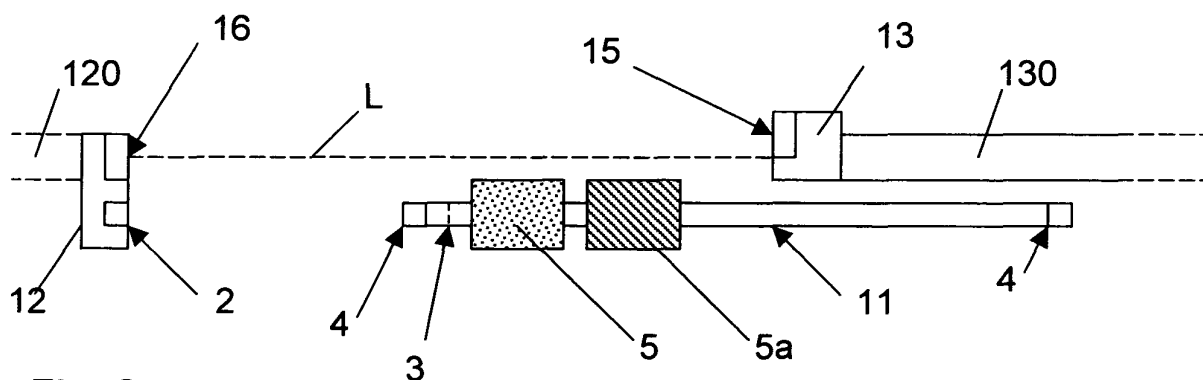


Fig. 2

Description

[0001] The present invention relate to a control apparatus for automations of opening systems, usable, in particular, for sliding gates, sliding doors, balancing doors, shutters and so on.

[0002] It is known that the automations for opening systems must be controlled by relevant control apparatus. Among the tasks of the control apparatus there is the surveying of eventual obstacles in the operating zone of the opening system.

[0003] In particular, as it is stated by the rules relevant the safe of the automated closings (in Italy Dir. Macchine 98/37/CE and, in specific, European Rule EN 12453), it is necessary that the aforesaid control apparatus are able to guarantee or determine that the impact forces on the obstacles do not exceed established values.

[0004] For this reason, in the greater part of the cases, in order to exercise the control in correspondence of the entire zone of risk, the gate is provided with a rib or sensitive edge, that is an edge sensitive to the pressure, able to supply a signal in case of impact of the gate with an obstacle. This solution is negatively characterized by the fact that it is necessary to realize an electrical connection, fixed to the gate, in order to bring back the signals of the detector (the safety edge) to the control unit or, according to the type of detector, in order to supply an electrical feeding to the same detector. This involves greater costs of planning and installation due to the necessity to realize an electrical connection mobile with the gate, connection which increases the possibilities of risk and the relative precautions for the safety and the accident prevention.

[0005] Moreover, in order to satisfy the minimum protection requirements established from the above-mentioned rules, this solution must be used, in the greater part of the applications, in conjunction with a detector provided with photoelectric cell.

[0006] At last, the regulations establish that the devices used for the protection must be realized so that their operation can be controlled by the control unit of the automation.

[0007] Also in this case, if a sensitive edge is mounted on a gate, it is necessary an electrical connection, integral with the mobile part of the gate, for controlling its operation, with the disadvantages of installation above described.

[0008] The main aim of the present invention is to provide an apparatus for controlling an automated opening system which can eliminate the above mentioned drawbacks and to provide a means which can satisfy the requirements of the above mentioned rules.

[0009] This result has been achieved according to the invention thanks to the idea of producing an apparatus having the features described in the independent claim. Other features relate to the dependant claims.

[0010] Among the advantages of a present invention there is that the apparatus doesn't need any electrical connection fixed to the mobile part of the gate, so elimi-

nating all the installation difficulties and reducing the risks related to electrical cables in movement; that the apparatus allows a complete satisfaction of the minimum levels of protection of the Automated opening stated by the relevant rules, allowing the simultaneous use of a sensitive edge and a detector with photoelectric cell; that the apparatus can be controlled by the control apparatuses of the automated opening, according to relevant safety rules.

[0011] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig.1 is a schematic frontal view of a possible embodiment of an apparatus according to the invention;
- Fig.2 is a schematic plan view of the example of Fig. 1;
- Fig.3 is a block diagram which represents a possible example of disposition and connection of the parts that compose the apparatus;
- Fig.4 is a schematic plan view relevant to another embodiment of the example of Figs.1 and 2, in which the sliding gate is composed by two opposed wings or parts, each of these being provided with the apparatus realized in compliance with the invention.

[0012] In the present description will be described a horizontally sliding gate; obviously, the description and the designs are referred only to one of the possible embodiments of the invention, being the idea of the invention transferable to all the similar solutions.

[0013] According to the enclosed drawings, an apparatus (1) realized in compliance with the present invention is usable for the control of an automated opening system as, for example, a sliding gate (11).

[0014] In the schematic designs enclosed, the gate has been marked with (11) and it is of the type mobile on wheels (14) along a horizontal rail, along the direction indicated with the double arrow (F). The gate (11) is destined at the closure of a opening defined by two jambs (12) and (13), placed at the extremities of two corresponding walls (120) and (130). The motor means for moving the gate (11) have not been represented.

[0015] The apparatus (1) is of the type which comprises a first transceiver element (2), suitable to send a signal (V1), and a second transceiver element (3), disposed in the covering-transmitting zone of the first one, and suitable to receive said signal (V1) sent from the first element in order to give back a correspondent response signal (V2).

[0016] The response signal (V2) can be processed by the first element rice-transmitter (2) and be sent to the control unit (C) of the automated opening system. The control unit (C) can be connected, in a known way, to a detector with photoelectric cell. In Fig. 2 the line (L) be-

tween the two portions marked with (15) and (16) schematically represents a photoelectric cell detector acting between the two jambs (13) and (12).

[0017] According to the invention, the first transceiver element (2) is provided with first transmission means (20) suitable to transmit an electromagnetic radiation, preferably with wavelength substantially comprised in the range between 250 nm (ultraviolet radiation) and 1000 nm (infrared radiation). The second transceiver element (3) can be fixed to the gate (11) to be controlled in order to be mobile with the same gate, and it is provided with sensor means (30) suitable to transform in current the (luminous) radiation received, for feeding the transmission section (33) of the element (3).

[0018] Theoretically, the electromagnetic radiation sent can also be of an value external to the above-mentioned interval, provided that the same radiation is usable by the sensor means (30) of the second element (3) for being transformed in current and feeding the transmission section (33).

[0019] The signal sent by said first transmission means (20) can be, for example, an infrared signal, an ultraviolet signal, or a visible luminous signal, generated by emitter/sending diodes, with various characteristics according to the wavelength of the used radiation.

[0020] In the example, the first element (2) is fixed to the jamb (12) and comprises a control circuit (22), fed by the supply mains (R) and connected to the transmission (20) and receiving (21) sections or elements and to the control unit (C) of the automated opening system.

[0021] The radiation sent by the transmission section (20) of the element (2) is used by the element (3) for feeding itself. Practically, the signal (V1) emitted by the first element (2) transmits not only information but also energy. In Fig.3 the block (30) represents the sensors means suitable to transform the received radiation in current: such means can be constituted, for example, of photodiodes with suitable curve of sensitivity according to the wavelength used by the transmission means (20) of the element (2).

[0022] According to another embodiment, the first transmission means (20) can be constituted of transducers suitable to emit a sound signal with frequency comprised in the range of ultrasounds. In this case, the sensor means (30) are of piezoelectric type, suitable to transform in current the received sonorous signal, for feeding the transmission section (33) of the element (3).

[0023] Practically, in compliance with the invention, the first transceiver element (2) can be provided with first transmission means (20) suitable to transmit an electromagnetic radiation or a sound signal; the corresponding second transceiver element (3) will be provided with sensor means able to transform in current the received signal.

[0024] The current supplied from device (30) is used for the operation of the element (3) which, in the example, comprises a control circuit (32) connected to a relative emitter (33) which emits the response signal (V2).

[0025] The transmission of the energy could be always active even if the relative efficiency, understood as the percentage of the radiation used by the second element, will be greater in case of limited distance between the two elements (2) and (3). The greatest transmission of energy will be obtained with gate (11) in closing configuration, that is with the two elements which are substantially in contact.

[0026] Moreover, the second element (3) is provided with storage means (31) connected and fed by said sensor means (30). The storage means can be constituted from rechargeable storage batteries.

[0027] In addition to the feeding supplied through the signal of the first element (2), the apparatus can be connected to a photovoltaic device (5) suitable to supply an auxiliary feeding to said storage means (31). Such device (5) can be constituted of a cell (5) fixed to the gate (11) in a zone interested by the solar radiation or can be lodged inside of the same container of the element (3).

[0028] In alternative, or in addition to the described photovoltaic device, the apparatus can be connected to an inertial transducer (5a) suitable to supply an auxiliary feeding to said storage means (31). Such device (5a) is integral with the gate and supplies energy to the second element (3) as a result of the variations of speed of the same gate.

[0029] The gate (11) can be equipped with ribs or sensitive edges (4), that is profiles sensitive to the pressure, for providing a signal in case of impact of mounting of the gate with an obstacle. The second element (3) can be connected to said sensitive edges (4); in this way, a possible signal emitted by one of the sensitive edges (4), which are connected to the control circuit (32), will be transmitted through the transmission section (33). In this way, it is obtained a control along all the length of the edge of the gate, not only in correspondence of the points in which the transceiver elements (2) and (3) are placed.

[0030] Obviously, it is possible to dispose more couples of transceiver elements (2) and (3) disposed at different height along the gate, so as to control more levels.

[0031] A particular case of the described invention is the sliding gate with two sliding doors or parts schematically represented in Fig.4.

[0032] Two parts (17) and (18) of the sliding gate close the opening between the two jambs (19) and (19') and they join each other in an intermediate point of the opening.

[0033] The transceiver elements (2) are disposed on the jambs (19) and (19') and the transceiver elements (3) are disposed on the sliding parts (17) and (18) of the gate. Every couple of elements (2) and (3) operates independently, similarly to the example above described, relative to the gate with a single door. The two elements (2, 3) of every couple will be suitably oriented in order to be mutually coupled, that is in order to allow the transmission and the reception of the relevant signals.

[0034] A sensitive edge (4) can be mounted on the front and posterior edge of every sliding parts, similarly

to the example above described, relative to the gate with a single door.

[0035] Some of the moving, command and control means of the described and shown elements are of the known type for the technicians of the automation and, therefore, they have not been described in detail for sake of simplicity. Moreover, changes may be made to the form, dimensions, component part locations, and type of materials employed in the embodiment described and illustrated herein without, however, departing from the scope of the present invention.

Claims

1. Apparatus for the control of an automation opening system, usable, in particular, for sliding gates, sliding doors, balancing doors, shutters and similar, of the type which comprises a first trans-receiving element, suitable to send a signal, and a second trans-receiving element, disposed in the covering zone of the first one, and suitable to receive said signal sent from the first element in order to give back a correspondent response signal, apparatus **characterized in that** the first trans-receiving element (2) is provided with first transmission means (20) suitable to transmit a radiation and **in that** the second trans-receiving element (3) is fixable to the gate (11) to be controlled, in order to be mobile together with the latter, and is provided with sensor means (30) suitable to transform the received radiation in current for feeding its own transmission section (33). 20
2. Apparatus according to claim 1, **characterized in that** the radiation sent by said first transmission means (20) is an electromagnetic radiation having a wavelength substantially comprised in the range between 250 nm and 1000 nm. 35
3. Apparatus according to claim 1, **characterized in that** the second element (3) is provided with storage means (31) connected and fed by said sensors means (30). 40
4. Apparatus according to claim 1, **characterized in that** the first element (2) is fixed and is connected to supply mains (R). 45
5. Apparatus according to claim 3, **characterized in that** that said second element (3) is connected to a photovoltaic device (5) able to supply an auxiliary feeding to said storage means (31). 50
6. Apparatus according to claim 3, **characterized in that** said second element (3) is connected to a inertial transducer (5a) able to supply an auxiliary feeding to said storage means (31). 55
7. Apparatus according to claim 5, **characterized in that** said photovoltaic device (5) is included in the container of said second element (3).
8. Apparatus according to claim 1, **characterized in that** the signal sent by said first transmission means (20) is a radiation of infrared type. 5
9. Apparatus according to claim 1, **characterized in that** the signal sent by said first transmission means (20) is a radiation of visible luminous type. 10
10. Apparatus according to claim 1, **characterized in that** the signal sent by said first transmission means (20) is a radiation of ultraviolet type. 15
11. Apparatus according to claim 1, **characterized in that** the signal sent by said first transmission means (20) is of sound type with frequency in the range of the ultrasounds and, correspondently, sensor means (30) is of piezoelectric type, suitable to transform in current the received sound signal. 20
12. Apparatus according to claim 1, **characterized in that** said second element (3) is connected to one or more sensitive ribs or edges (4), that is edges sensitive to the pressure, suitable to supply a signal in case of impact of the gate (11) with an obstacle, as a result of which said second element (3) transmits an information to control unit of the automation opening system. 25
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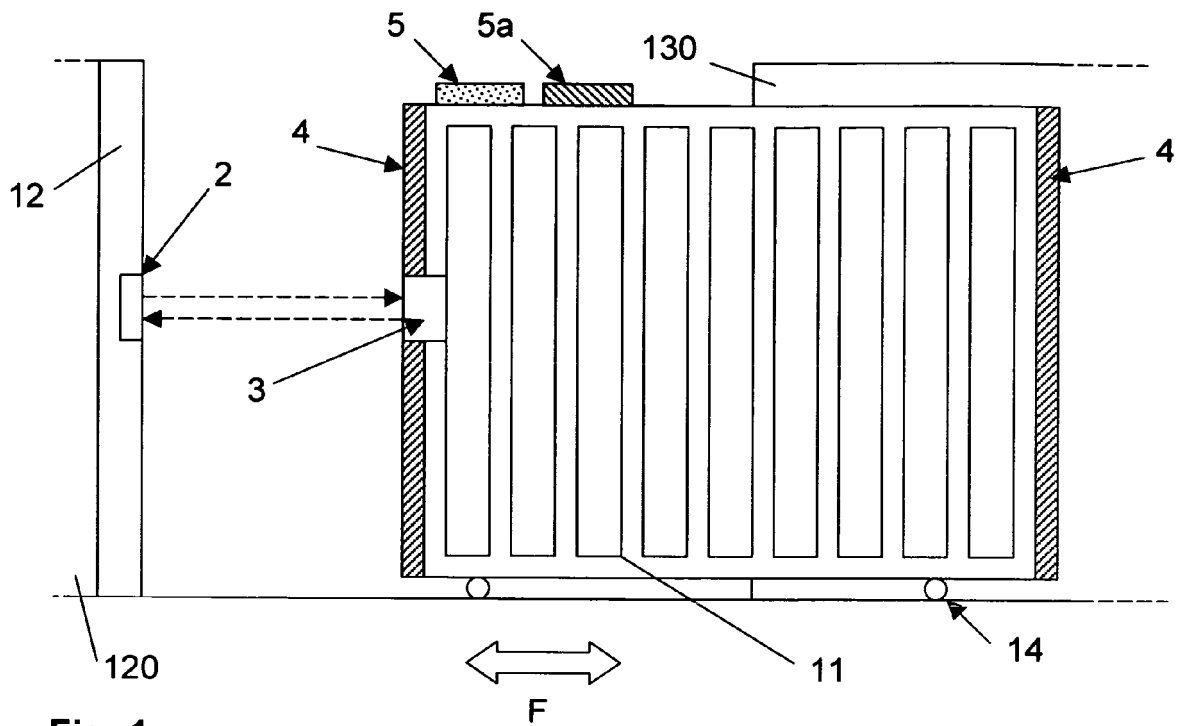


Fig. 1

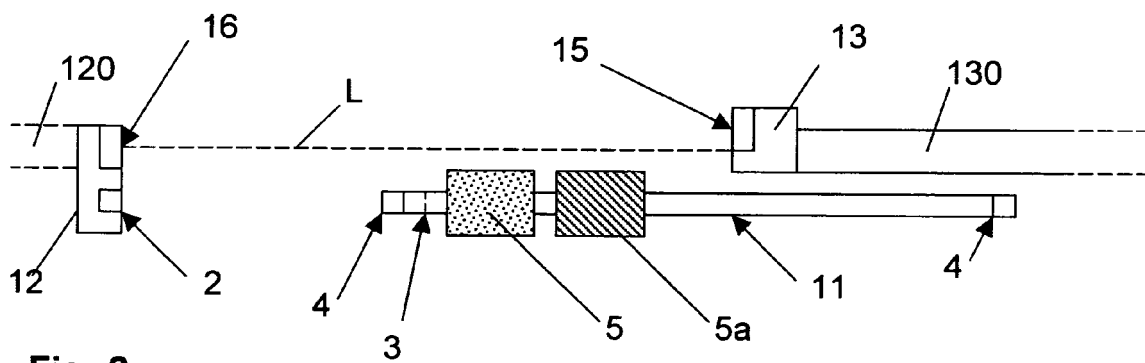


Fig. 2

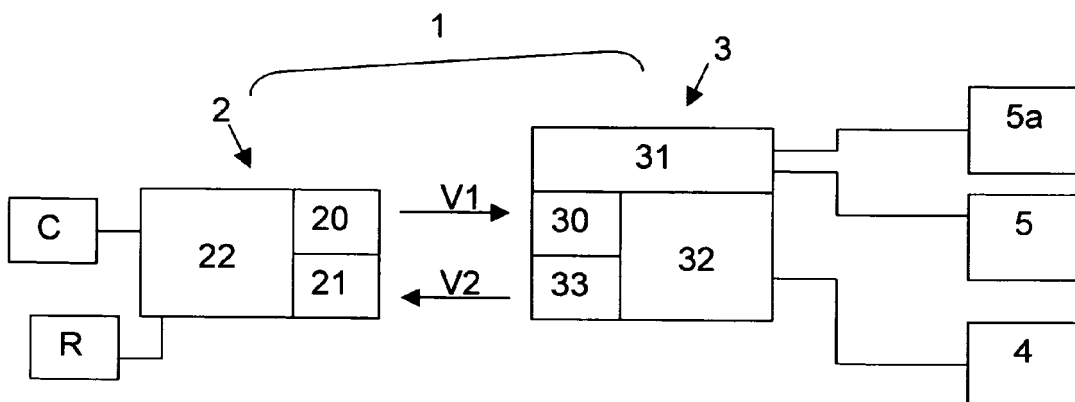


Fig. 3

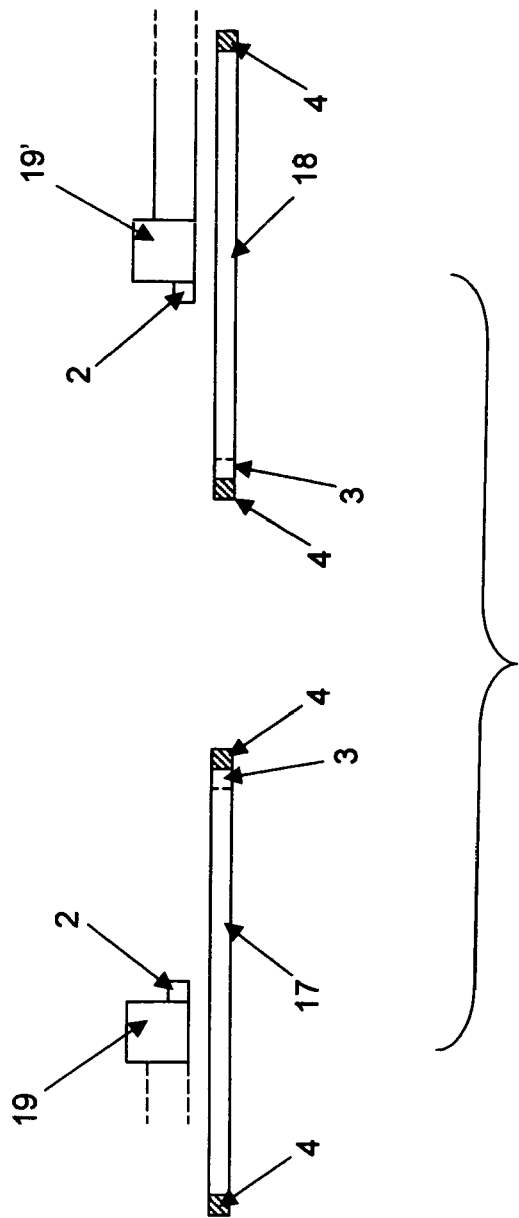


Fig. 4