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(54) **Automatic device for powered gate opener with electronic sensing of end of travel.**

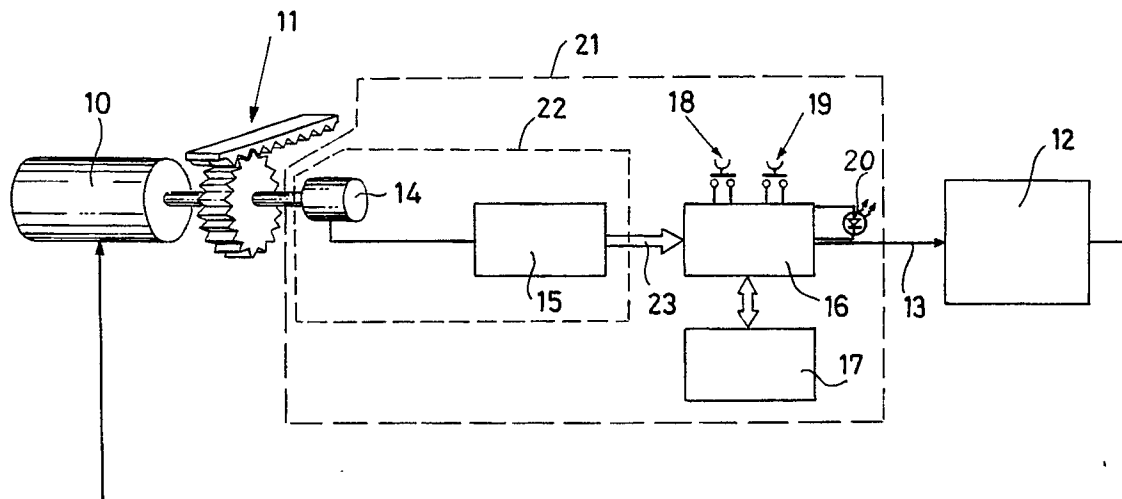
(57) A control device for powered opening of gates or the like comprises a ratiomotor (10) which operates a gate or the like by means of a kinematic motion device (11) of the known art.

The ratiomotor (10) is actuated by a control logic (12) to which is connected a circuit (21) to communicate thereto the reaching by the gate of the desired ends of travel.

Said circuit (21) comprises a device (22) for detecting the absolute position of the gate, a circuit (16) for management and comparison of position data taken by the device (22) with two predetermined values, two pushbuttons (18) and (19), re-

spectively to control memorization in nonvolatile memory means (17) of said predetermined values obtained as position data for the gate in the two positions considered end positions of its travel, a luminous status indicator (20) indicating completion of memorization.

The device (22) for detection of the absolute position of the gate is embodied to advantage with an analog/digital conversion circuit (15) for a signal coming from a potentiometer (14) applied to the ratiomotor (10) so as to be operated during movement of the gate.



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AUTOMATIC DEVICE FOR POWERED GATE OPENER WITH ELECTRONIC SENSING OF END OF TRAVEL

The present invention relates to an innovative control device for powered opening of gates and the like.

In the known art the automatic devices commonly known by the name 'gate opener' have two limit switches, e.g. mechanical, to detect the reaching by the gate, moved by a special ratiomotor mechanism, of the end positions of its travel so as to be able to correctly perform the opening and closing.

Usually the gate-opening devices are provided in ranges of models each of which is applicable for a certain group of gates or the like, ordered by type and size. It is thus necessary to provide means of regulation of the position of intervention of the limit switch to allow correct operation with a certain independence from the kind and amplitude of the movement of the particular gate served.

A solution of the known art calls for positioning the limit switch near the ends of the opening and closing travel of the gate so as to be operated directly thereby (optionally with the application of strikers integral with the gate). But this involves the problem that, upon installing the gate opener, the limit switches must be put in place (variable depending on the type of gate operated) and connected electrically, which can prove to be relatively long and costly especially if the ends of travel of the gate are very distant

Another solution of the known art provides for positioning of the limit switches in a fixed position adjacent to the mechanical part which provides movement of the gate opener. Said positioning can thus be provided directly during construction in the factory of the opening and closing device. Operation of said limit switches takes place by means of strikers applied on some part of the moving gate-opening mechanism in a manner proportional to the movement of the gate. Such a second solution involves a certain mechanical intervention during installation to adapt the positions of the strikers to the particular movement of the gate with a resulting loss of time.

The general object of the present invention is to overcome the above mentioned shortcomings by providing a device for powered opening of a gate or the like which would not use limit switch means and would eliminate the need for further mechanical adjustments or installation of electrical connections for setting of the limits to the opening and closing travel of the gate or the like.

In view of said object there has been conceived in accordance with the invention a device for powered gate-opening of the type comprising a ratiomotor moving the gate or the like through a

kinematic motion and operated by a control logic which controls the opening and closing of the gate and is connected to means of signalling to said control logic of the reaching by the gate of the ends of travel provided and characterized in that said means comprise in combination means of detecting the absolute position of the gate and a circuit for comparison of the position data taken by said detection means with two previously memorised values in a nonvolatile memory.

To clarify the explanation of the innovative principles of the present invention and its advantages compared with the known art there is described below with the aid of the only schematic drawing annexed a possible embodiment as an example of a powered gate opening and closing device applying said principles.

With reference to the figure said device comprises a ratiomotor 10 which moves a gate or the like (not shown) by means of a kinematic motion device 11 of the known art, e.g. diagramed in the figure with a rack. The ratiomotor 10 is operated by a control logic 12 of the known art and therefore not further illustrated and which controls opening and closing of the gate with processes well known to those skilled in the art. In accordance with the present invention a circuit 21 is connected through a line 13 to the controller 12 to communicate thereto the reaching by the gate of the predetermined ends of travel.

Said circuit 21 comprises a device 22 for detection of the absolute position of the gate, a circuit 16 (embodiable to advantage with a microprocessor) for management and comparison of the position data detected by the device 22 with two predetermined values, two pushbuttons 18 and 19 for commanding memorization in nonvolatile memory means 17, e.g. of the RAM type with buffer batteries or E² PROM memories, of said predetermined values obtained as gate position data (supplied by the device 22) in the two positions considered as its ends of travel, a luminous status indicator 20 indicating that memorization has been completed.

The device 22 is embodied to advantage with an analog/digital conversion circuit 15 for the signal coming from a potentiometer 14 and applied to the ratiomotor 10 in such a manner as to be operated during the movement of the gate as a result of the conversion and representing the absolute position of the gate to be transmitted by means of a line 23 to the circuit 16.

The operation of the device described is as follows.

The position of the cursor of the potentiometer

14 is proportional to that of the gate, both being moved by the self-same operation and hence the position of the gate is known instant by instant by the circuit 16 as a binary number supplied by the converter 15. The potentiometer 14, e.g. of the multirevolution type, must have a cursor travel sufficient to cover the movement of a gate having the maximum travel applicable to the gate opener.

Once installation of the opening and closing device has been completed, to set the ends of travel of the gates it is sufficient to bring the gate, e.g. manually, to the fully open position (or the position it is intended to set as the end of opening travel) and press the push button 18, then move the gate to the fully closed position and press the push button 19.

In this manner, upon pressing of the key 18 the circuit 16 memorizes in the memory 17 the binary number supplied by the converter 15 and representing the position of the potentiometer cursor 14 and hence of the gate at the end of opening travel and upon pressure of the key 19 the binary number supplied by the converter 15 and representing the position of the potentiometer cursor 14 and hence of the gate at the end of closing travel.

The luminous indicator 20 can be used to advantage to indicate, e.g. by flashing, the completion of memorization of said positions.

During normal operation of the powered gate movement device the circuit 16 continues to compare binary numbers arriving from the converter with the two memorised in the memory 17 and representing the ends of the range of admissible numbers, i.e. the permissible ends of travel of the gate. If it detects that a number arriving is equal to the number representing an end, or beyond the ends of said allowed range, it sends a signal 13 to the controller 12 communicating the reaching or exceeding of a limit switch position. In this manner the control circuit 12 stops the movement of the gate as happened with the circuits of the known art having limit switch devices.

The circuit of the present invention can provide to advantage another action. Indeed, the circuit 16 can be provided to perform comparison of the speed of variation of the numbers arriving from the converter and a predetermined reference number representing the speed of change of said numbers when the gate moves at its normal opening or closing speed. Every deviation from said reference value indicates that the gate is hindered in its movement, e.g. because of a foreign body in the path of the gate, and said condition is signalled by the circuit 16 to the controller 12 through the line 13. The controller 12 can thus for example stop the gate instantaneously if it was opening and reverse travel if it was closing.

In this manner overloading damage to the

mechanisms of the gate opener and especially to the bodies accidentally lying in the path of the moving gate can be avoided.

It is to be understood that the above-described embodiments are simply illustrative of the principles of the invention. Various other modifications and changes may be made by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

For example although the solution presented is particularly effective and economical the device 22 can be embodied with any absolute position detector such as for example an absolute position encoder with output in the form of a binary number connected to the management and comparison circuit 16.

Claims

1. Device for powered gate-opening of the type comprising a ratiomotor (10) moving the gate or the like through a kinematic motion device (11) and operated by a control logic (12) which controls the opening and closing of the gate and is connected to means of signalling (21) to said control logic (12) of the reaching by the gate of the ends of travel provided and characterized in that said means (21) comprise in combination means (22) of detecting the absolute position of the gate and a circuit (16) for comparison of the position data taken by said detection means (22) with two previously memorised values in a nonvolatile memory (17).
2. Device in accordance with claim 1 characterized in that the two values previously memorised are numerical position data detected by said detection means (22) memorised in the nonvolatile memory (17) upon operation of the means of memorization command.
3. Device in accordance with claim 1 characterized in that the means (22) of detection of the absolute position of the gate comprise an analog/digital conversion circuit (15) for the signal coming from a potentiometer (14) applied to the ratiomotor (10) in the sense of being operated upon movement of the gate, obtaining a numerical datum which is the result of the conversion and representing the absolute position of the gate.
4. Device in accordance with claim 2 characterized in that the means of commanding memorization comprises a first push button (18) enabling memorization of a value as a representation of the limit switch position of the closing of the gate and a push button (19) enabling memorization of a value as a representation of the limit switch position of opening of the gate.
5. Device in accordance with claim 1 characterized in that the nonvolatile memory means (17) are

provided in the form of E²PROM memories.

6. Device in accordance with claim 1 characterized in that the nonvolatile memory means (17) are embodied in the form of RAM memories with buffer battery.

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7. Device in accordance with claim 1 characterized in that the comparison circuit (16) comprises a luminous status indicator (20) of completed memorization in the nonvolatile memory (17).

8. Device in accordance with claim 1 characterized in that the comparison circuit (16) is provided in the form of a microprocessor circuit.

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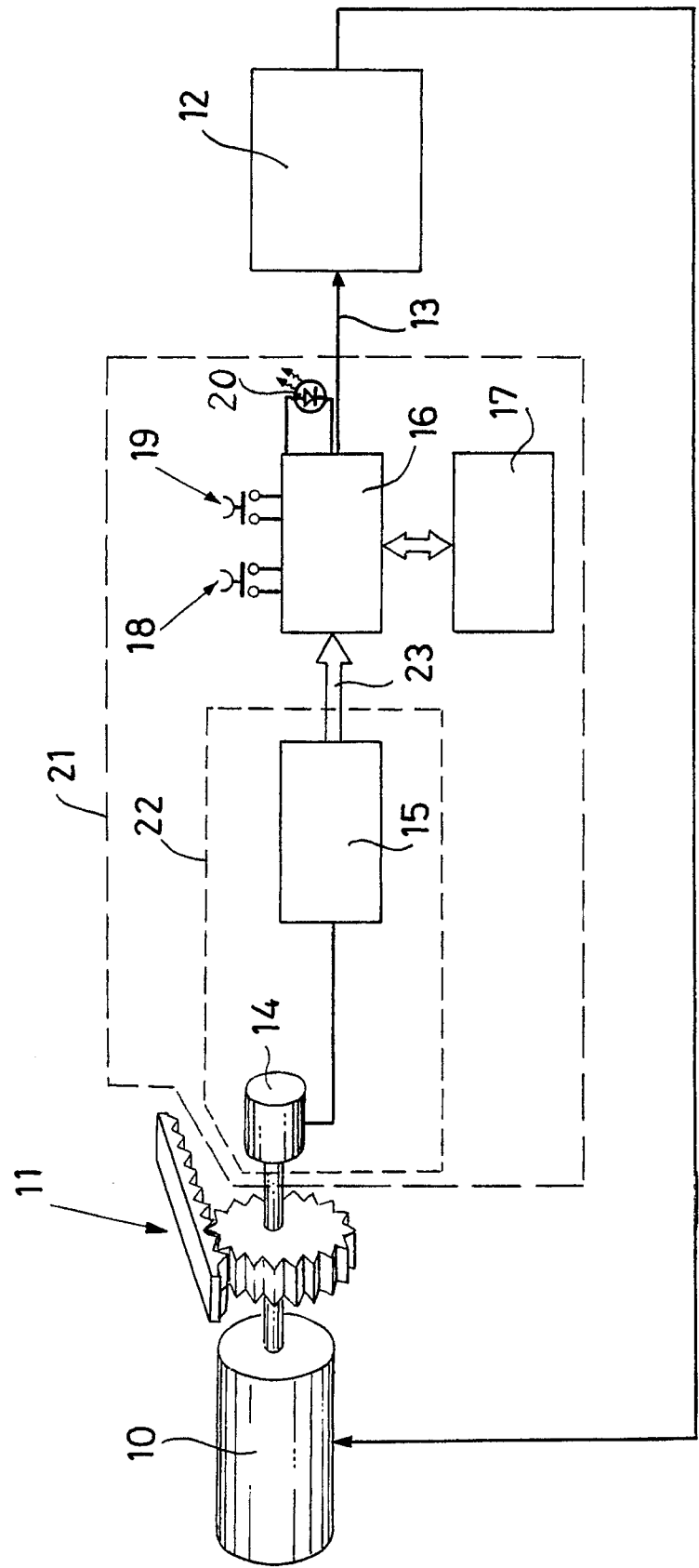
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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2557

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.5)		
X	DE-U-8 800 517 (HÖRMANN KG) * Page 13, last 10 lines; claims 1-4,11,14,15 * - - -	1,2,4	H 02 P 7/00 E 05 F 15/20 E 05 F 15/14		
Y		3,8			
A		5,6			
Y	DE-A-3 602 567 (GEZE) * Column 8, lines 31-40; figure 3 * - - -	3			
Y	EP-A-0 182 699 (RENAULT) * Page 4, paragraphs 4,5 * - - -	8			
A	- - - - -	3			
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)		
			E 05 F		
The present search report has been drawn up for all claims					
Place of search The Hague		Date of completion of search 18 December 90	Examiner VAN KESSEL J.J.		
<table><tr><td>CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention</td><td>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasonst. &: member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention	E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasonst. &: member of the same patent family, corresponding document
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