(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 463 452 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **91109518.0**

(51) Int. Cl.5: **E05F 15/12**

(22) Date of filing: **10.06.91**

(30) Priority: **22.06.90 IT 1247790**

(43) Date of publication of application:
02.01.92 Bulletin 92/01

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **ULTRAFLEX S.r.l.**
Via Sturla 32
I-16131 Genoa(IT)

(72) Inventor: **Gai, Giorgio**
Via Donato Somma, 8
I-16167 Genova(IT)

(74) Representative: **Siniscalco, Fabio et al**
Jacobacci-Casetta & Perani S.p.A. Via Visconti di Modrone, 7
I-20122 Milano(IT)

(54) An electromechanical actuator for closing and opening gating fixtures.

(57) An electromechanical actuator for opening and closing gating fixtures is provided with associated current sources (12) for powering the actuator, which are independent of any mains supply and directly positioned at the actuator location.

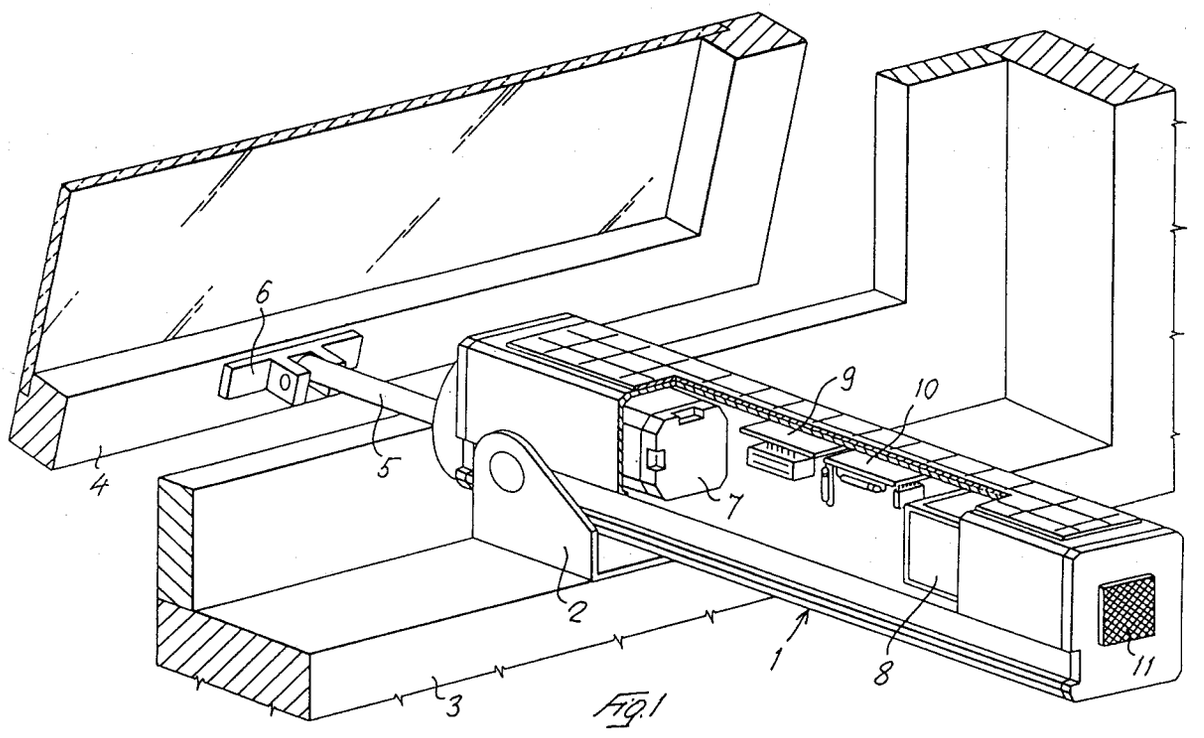

Fig.1

EP 0 463 452 A1

The invention relates to an electromechanical actuator for opening and closing such gating fixtures as windows, doors, skylights, etc.

Electromechanical actuators for opening and closing fixtures are usually mounted directly to the individual fixture to be operated thereby. In general, such actuators would be powered either directly off the mains or via buffer batteries to provide a degree of operability for the actuators on the occurrence of a power outage. However, each conventional actuator, whether equipped with buffer batteries or not, requires heretofore connection to the mains through some suitable power supply arrangement. Consequently, the cost for this power supply arrangement is added to the actuators own costs. Such additional cost is as usually comparatively heavy because actuators are of interest where the fixtures to be served are hard or inconvenient to get at, or provided in comparatively large numbers, or set long distances apart. It is indeed in these circumstances, where the installation of remotely operated actuators is advisable and which are most frequently encountered at industrial shed premises, greenhouses, and the like, that the provision of a power supply arrangement involves relatively high costs adversely affecting the overall expense.

Accordingly, it is an object of this invention to provide an electromechanical actuator for opening and closing gating fixtures, which can obviate the aforementioned drawbacks in an inexpensive and readily implemented way.

The invention achieves this object with an electromechanical actuator for opening and closing gating fixtures, characterized in that it has an associated actuator power supply current-generating means which is independent of any mains supply and provided at the actuator location.

This supply current generating means is preferably enclosed within the actuator case, thereby forming a unit therewith.

Advantageously, photovoltaic cell panels are employed as the electric current generating means.

In a preferred embodiment, these photovoltaic cell panels are an adequate size to provide a sufficient charge current for a re-chargeable battery powering the actuator, an electronic, battery charge control circuit being also provided. Furthermore, the photovoltaic cell panel is conveniently arranged to one side of the actuator case enjoying better exposure to sunlight, preferably the top side thereof, and has advantageously approximately the same dimensions as said side.

Thus, an electromechanical actuator embodying this invention can be made truly independent of the mains supply and its placement involves no unduly expensive installation. The use of photovoltaic cells and sizing of the panels as battery charging elements enable the actuator manufacturing costs to be limited and its space requirements held low, if not practically unaltered. In addition, by disposing the panels directly on the actuator case, the need for electric connection lines, however short, between the actuator and the current generating means or panels can be obviated.

The invention is also directed to provide features to further improve this actuator as set forth in the sub-claims.

The peculiar features of the invention and advantages to be derived therefrom will be more clearly understood from the description of a preferred embodiment thereof, shown by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an electromechanical actuator according to the invention, being of a linear type and mounted to a fixture represented by a window; and

Figure 2 is a block diagram of the electric circuit for the actuator in Figure 1.

In the drawing figures, the invention is illustrated as a linear-type actutator for opening and closing gating fixtures, but may be embodied by any equivalent kind of electromechanical actuator. This linear electromechanical actuator comprises an outer case in the form of an elongate shape, prismatic box 1, which has one end connected pivotally to a bracket 2 affixed to the stationary portion 3 of a window frame; by virtue of this pivotal connection, the box 1 is allowed to swing in a transverse direction to its main dimension. The actuator is disposed perpendicularly to the plane of the window, and from its business end next to the window moving portion, in the form of a leaf 4, there extends a drive rod 5 whose free end is pivoted to the window leaf 4 by means of a suitable fitting 6. The drive rod 5 is housed within the box 1 for axial displacement in either directions. It is driven, in turn, by an electric motor 7 through a suitable drive arrangement, not shown in detail because conventional. Also accommodated inside the box 1 of the linear actuator are a re-chargeable supply battery 8, an electronic control circuit 9 for controlling the supply battery 8 charging cycle, and an electronic, actuator monitoring circuit 10 to which a sensor 11, such as an infrared sensor, is connected to remotely control the actuator functions. Advantageously, the sensor 11 is disposed on the bottom side of the box 1 facing inwardly, i.e. next to the fixture. Secured on the top side of the actuator is a panel 12 comprising a plurality of photovoltaic cells. The dimensions of the panel 12 are substantially the same as those of the top side of the box 1, and in particular, they should be selected such that the panel 12 will generate a sufficient amount of electric current to effectively

keep the battery 8 charged.

As brought out best in Figure 2, the photovoltaic cell panel 12 is connected to the re-chargeable battery 8 through the battery charging cycle control circuit 9. This circuit 9 is effective to maintain optimum electrical link conditions at all times between the current supply source, or panel 12, and the load, or battery 8, while ensuring best battery 8 charging effectiveness and preventing it from being progressively deteriorated.

The drive motor 7 for the electromechanical actuator is powered from the re-chargeable battery 8 via the monitoring circuit 10. This circuit 10 may be constructed to perform any desired number of functions. Specifically, it should be operative to monitor the operating conditions of the motor 7, for example, to de-activate it in the event of the mechanical parts becoming stuck or the motor overloaded, and the charge state of the battery 8. Connected to the monitoring circuit 10 is the sensor 11, for turning on and off the actuator by remote control. This sensor 11 may be optionally utilized to also feed the actuator state back to the user. Additionally to the sensor 11, the monitoring circuit 10 may be provided with communication channels and interfacing units, generally shown at 13, for connection to additional actuator controls, such as travel limit sensors, timers, programmable or non-programmable control and operation units, further alternative separate power supply sources, or else.

Understandably, the invention is not limited to the embodiments just described and illustrated, and may be broadly altered and modified, especially construction-wise, without departing from the inventive principle set forth hereinabove and claimed hereinafter.

The actuator could include one or more photovoltaic cell panels encased in the actuator body or kept separate from the actuator but disposed at the actuator location.

The photovoltaic cell panels could be replaced with some equivalent independent current generating means.

The electromechanical actuator could include an electric motor, to be powered from the independent current generating means, for driving a drive member connected to the moving portion of the gating fixture to open and close it. In the example shown, this drive member comprises the drive rod 5, but the drive member could alternatively be a drive chain operated by the electric motor through suitable driving arrangements.

The electromechanical actuator may be in general any electrically powered type.

The actuated fixture may be any selected type.

Claims

1. An electromechanical actuator for opening and closing gating fixtures, characterized in that it has an associated actuator power supply current-generating means (12) which is independent of any mains supply and provided at the actuator location.

2. An actuator according to Claim 1, characterized in that said current-generating means comprises one or more panels (12) composed with photovoltaic cells.

3. An actuator according to either Claim 1 or 2, characterized in that the current-generating means (12) is encased within a box (1) constituting the actuator outer case, thereby forming a unit with the actuator.

4. An actuator according to Claim 2, characterized in that it comprises a box (1) constituting the actuator outer case, and that it is provided with a photovoltaic cell panel (12) disposed to that side of the box which enjoys best exposure to sunlight.

5. An actuator according to Claim 4, characterized in that the photovoltaic cell panel (12) is placed on the top side of the box (1).

6. An actuator according to Claim 5, characterized in that the photovoltaic cell panel (12) has substantially the same dimensions as the top side of the box (1) whereon it is placed.

7. An actuator according to either Claim 2 or 6, characterized in that it is provided with a re-chargeable battery (8) as a power supply for the actuator, said battery being connected to the photovoltaic cell panel(s) (12).

8. An actuator according to Claim 7, characterized in that the re-chargeable battery (8) powers an electric drive motor (7) for the actuator, whereas the photovoltaic cell panel(s) (12) only supply the re-chargeable battery (8) through an electronic circuit (9) for controlling the battery (8) charge cycle.

9. An actuator according to Claim 8, characterized in that it includes an electronic circuit (10), connected between the re-chargeable battery (8) supply and the motor (7), for monitoring the operating state of the motor (7) and the battery (8).

10. An actuator according to Claim 9, wherein the electronic monitoring circuit (10) includes a

sensor (11) for remotely controlling the actuator.

11. An actuator according to Claim 9, wherein the electronic monitoring circuit (10) includes communication and interfacing means (13) with such actuator control devices as travel limit sensors, timers, electronic control units, or further alternative independent power supplies.

12. An actuator according to Claim 1, characterized in that the current-generating means (12) powers an electric motor (7) driving a drive member (5) connected to the moving portion (4) of the fixture to open and close it.

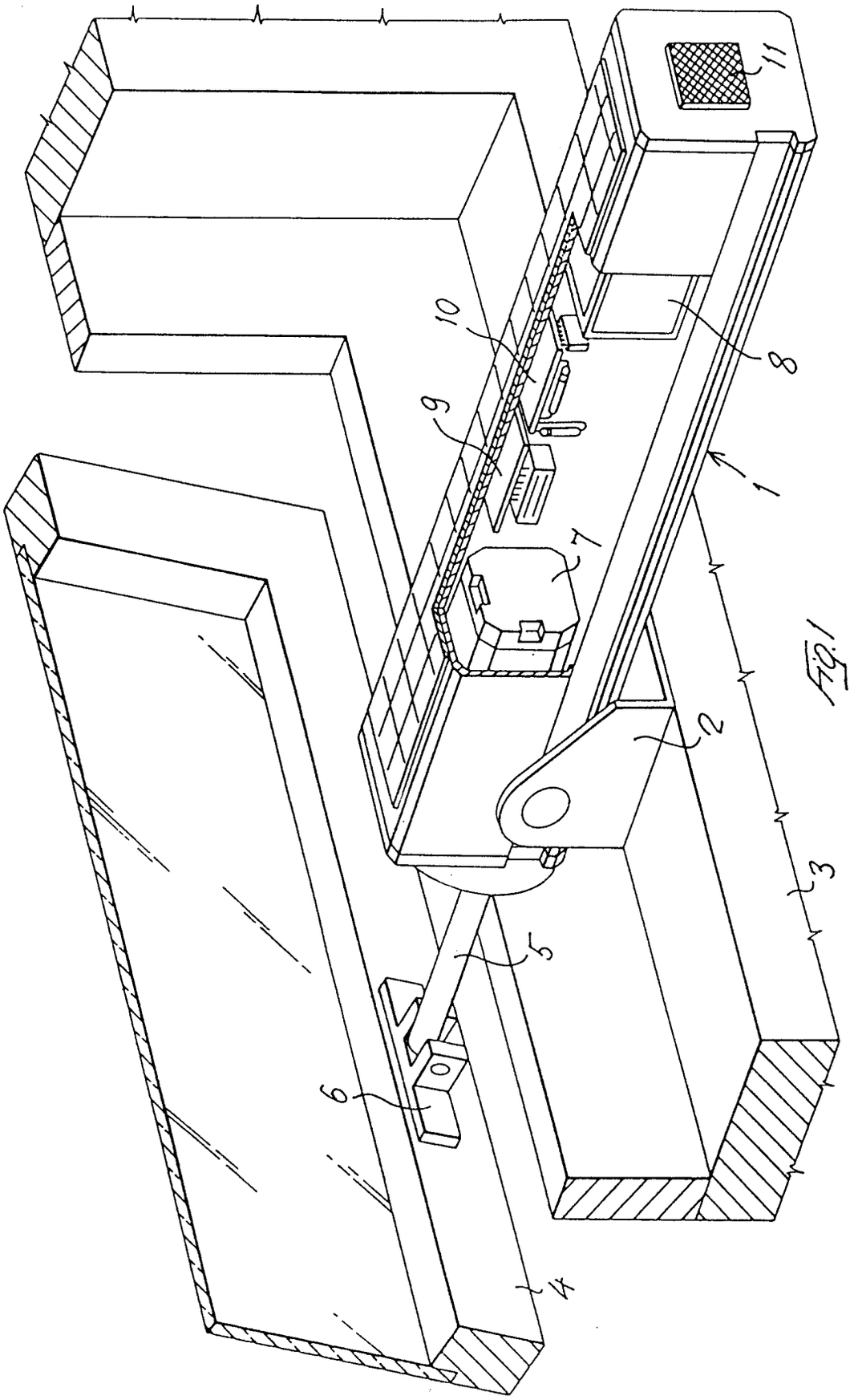

Fig.1

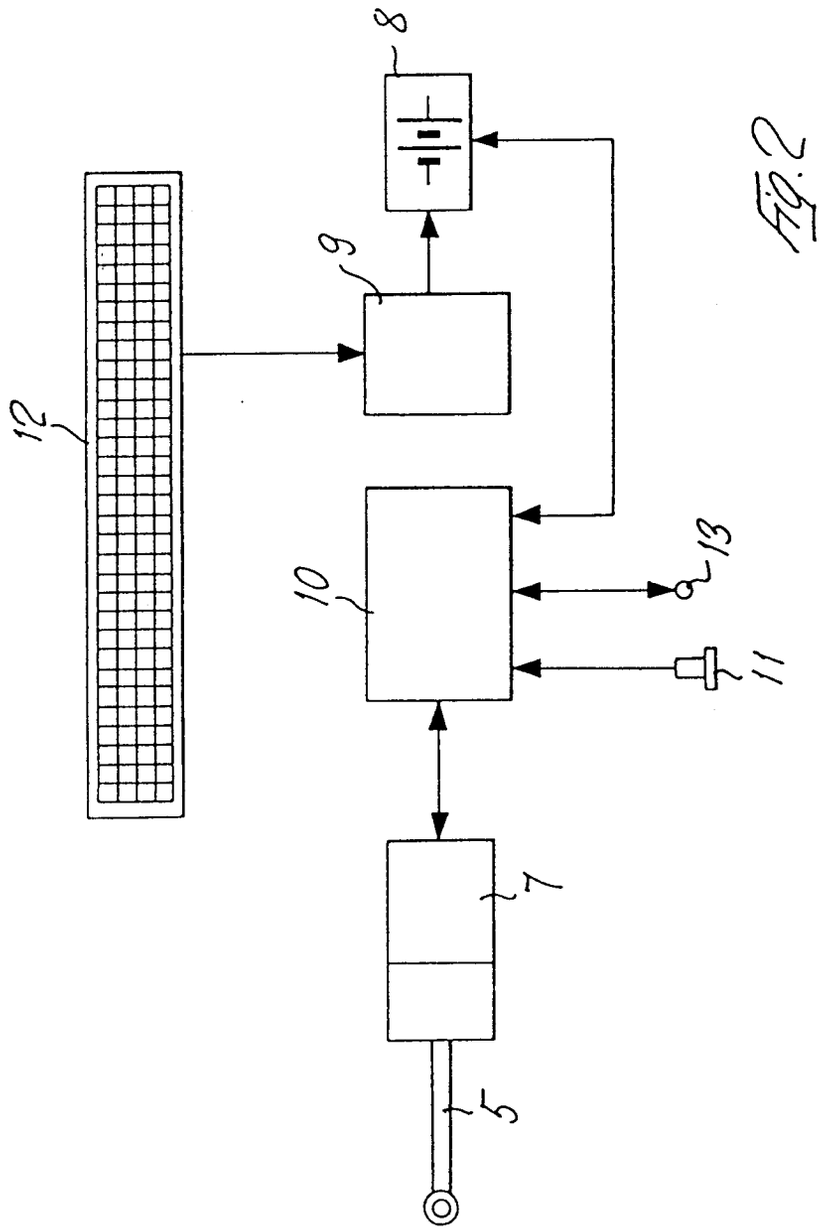

Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 10 9518

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	US-A-4 735 018 (DUNCAN) * column 1, line 55 - column 2, line 3 * * column 2, line 12 - line 36 * * column 4, line 38 - line 42 * * column 5, line 20 -line 33 * * column 6, line 3 - line 36; figures 1,2,4 *	1-12	E 05 F 15/12
A	DE-A-3 408 396 (BATTELLE-INSTITUT) * page 6, line 1 - line 33; figures 1,2 *	1-12	
X	US-A-4 782 628 (GADDIS) * column 3, line 39 - line 68 * * column 4, line 41 - line 43 * * column 6, line 16 - line 28; figures 1-3,5 *	1,2,7-12	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 05 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	17 September 91	GUILLAUME G.E.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same catagory
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 reasons

& : member of the same patent family, corresponding document