



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 943 774 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.09.1999 Bulletin 1999/38

(51) Int. Cl.⁶: **E05F 15/10**, E05F 15/12

(21) Application number: **98830725.2**

(22) Date of filing: **02.12.1998**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **18.03.1998 IT BO980038 U**

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(54) Actuator with adjustable stroke

(57) A linear actuator with a chain, with adjustable stroke, comprises a box-shaped casing (1) which houses a chain (2), wound inside the casing (1) and which can be driven by drive means (3); between the casing (1) and the chain (2) means are envisaged which are designed to control the locking of the chain (2) unwinding stroke, said means consisting of an insert

(12) which may be removed from the chain (2) and may be attached to the latter to allow the predefinable adjustment of the value of the chain (2) unwinding stroke, and a sensor (15) which detects the passage of the insert (12) when the latter is attached to the chain (2).

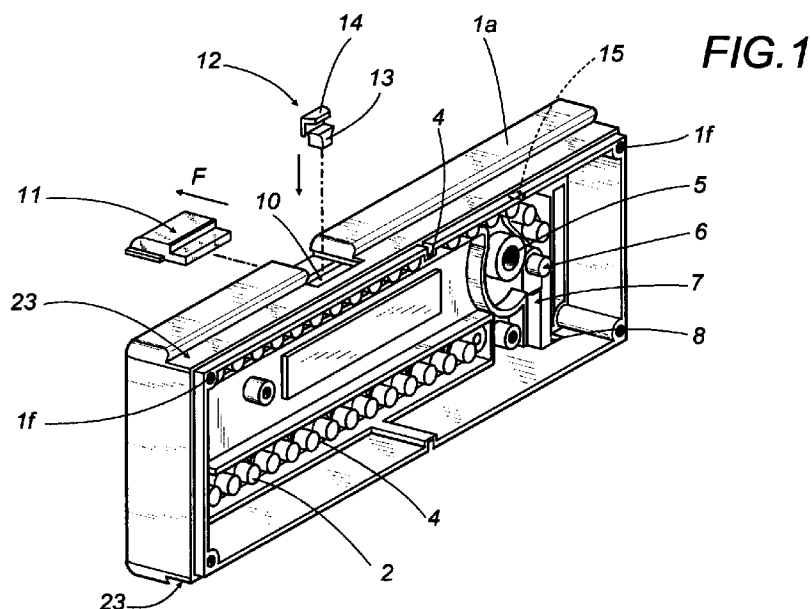


FIG. 1

EP 0 943 774 A2

Description

[0001] The present invention relates to a linear actuator for driving two units that are mobile relative to one another: in particular, although without limiting the scope of application, in the sector of mechanisms which drive fittings such as side hung window frames, tilt and turn window frames and similar.

[0002] The prior art has for some time envisaged that this type of driving movement be provided by actuators using a flexible element, in particular a chain, housed in a casing and made to exit said casing by electric drive means. The opening angle of the fitting is, therefore, determined by the outward stroke of the chain, controlled by mechanical or electronic devices. The stroke detection means of the former consist of a pin fixed to the chain during construction of the actuator, in a predefined position corresponding with the desired stroke value of the actuator; the pin is then detected by suitable means (normally a microswitch) which transmit the command to the main motor. In contrast, the latter use a device which controls the rotation of the motor (for example, an encoder) or a drive timer which allows adjustment of the desired stroke.

[0003] The first solution described has the advantage of being economical, but constitutes a "rigid" actuator, in the sense that its working stroke can only be adjusted during construction.

[0004] The second solution, thanks to the use of electronic adjustment means, allows the desired stroke to be adjusted continuously during installation, but is more expensive than the previous solution.

[0005] The aim of the present invention is, therefore, to overcome the above-mentioned disadvantages by providing an actuator of the type with a chain, with adjustable stroke, where it is possible to make said adjustment at any time and using mechanical means, thus making the solution both practical and economical.

[0006] The technical features of the present invention, in accordance with the above aims, are apparent in the claims herein, and the advantages are more clearly described in the detailed description below, with reference to the accompanying drawings, which illustrate an embodiment of the invention, without limiting the scope of its application, and in which:

- Figure 1 is a perspective view with some parts illustrated in the exploded form, of the actuator according to the present invention, with the casing open;
- Figure 2 is a view of the actuator illustrated as in Figure 1, but with the casing in the closed configuration;
- Figure 3 illustrates a detail of the portion of the box-shaped casing relative to the guide for the drive chain.

[0007] With reference to the accompanying drawings, the actuator disclosed comprises a box-shaped casing

1, consisting of two halves 1a and 1b which can be joined using fixing means schematically illustrated and labelled if in Figure 2.

[0008] The box-shaped casing 1 houses a flexible element 2, in this case consisting of a link chain, which winds onto a track 4 made inside the half 1a, said chain being driven by an electric motor illustrated with a dashed line and labelled 3 in Figure 2, which, in the known way, controls the rotation of a toothed pulley 5 which engages with the links of the chain 2.

[0009] One end of the chain 2, called the active end and labelled 6, has a connecting element 7 which can exit an opening 8 in the portion 1a and which connects to one of the two units to be driven, in particular the mobile frame to be opened, which is not illustrated, being of the known type and not part of the subject matter of the present invention.

[0010] The portion 1a of the box-shaped casing has an inspection hole 10, which can be closed with a lid 11, and which allows access to the chain 2 from the outside.

[0011] The numeral 12 indicates a removable insert, the lower section of which comprises a tapered portion 13 shaped in such a way that it fits securely into the space between two consecutive links in the chain 2; in contrast, the upper section of the insert 12 has a cam projection 14 designed to intercept, during the linear stroke of the chain, a microswitch 15 schematically illustrated in Figure 1 and integral with the box-shaped casing.

[0012] Again in Figure 2, the front of the box-shaped portion 1b has an access section 20, the front of which has a hole 21 for the passage of the power leads of the motor 3 and a LED 22 which indicates whether the motor 3 is on or off.

[0013] Finally, the numeral 23 indicates two guides, upper and lower, which act as elements for fixing the entire actuator to the first of the two units, preferably the fixed frame of the fitting.

[0014] The actuator functions and is adjusted as follows: first, when fitting the actuator, depending on the required stroke, the fitter decides on the position of the insert 12. This can be done by simply sliding the lid 11 in the direction indicated by the arrow F, so as to uncover the inspection hole 10 below, through which, as indicated in Figure 3, the insert 12 is inserted in the space between two successive links in the chain 2, labelled 2a and 2b again in Figure 3; when the lid 11 is replaced, the insert 12 remains stably held and guided in the upper horizontal guide 4. Obviously, the positioning of the insert 12 is determined, relative to the microswitch 15, in accordance with the specifications supplied by the manufacturer of the entire actuator.

[0015] The present invention may be subject to numerous variations, all encompassed by the original design concept. Moreover, all parts may be substituted with technically equivalent elements.

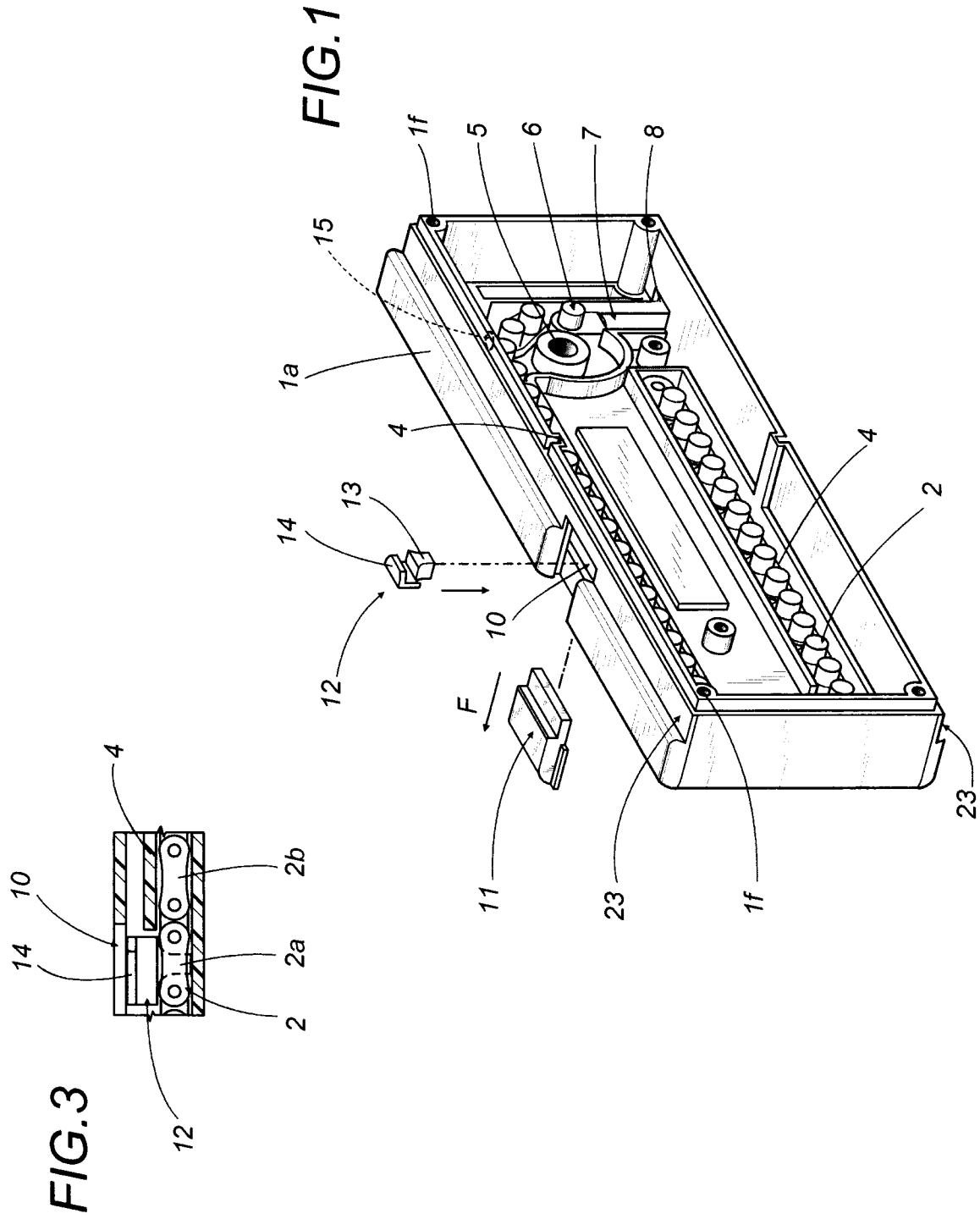
Claims

1. An actuator with adjustable stroke for driving two units which move relative to one another, of the type comprising a box-shaped casing (1) housing a flexible element (2) wound inside said casing (1), the flexible element (2) being driven by drive means (3) which unwind it and cause a predefined section of an active end (6) of it to exit from the casing (1); it being possible to attach said box-shaped casing (1) to the first of the units and it being possible to attach said active end (6) to the second unit; detection means (12, 15) being envisaged for controlling the locking of the unwinding stroke of the flexible element (2) and comprising an insert (12) which can be attached to the flexible element and a sensor (15) which detects the passage of the insert (12), the actuator being characterised in that the insert (12) may be removed from the flexible element (2), and may be stably attached along the length of the latter so as to adjust the value of the unwinding stroke.
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2. The actuator according to claim 1, characterised in that the flexible element (2) consists of a chain and the insert (12) comprises a tapered lower portion (13), the latter being designed so that it can be stably inserted in the space between two successive links (2a, 2b).
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3. The actuator according to claim 1, characterised in that the insert (12) comprises a cam-shaped upper portion (14) designed to be intercepted by the sensor (15).
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4. The actuator according to claim 1, characterised in that the box-shaped element (1) has an inspection hole (10), it being possible to close the latter with a lid (11), said hole being designed to allow access to the flexible element (2) from the outside.
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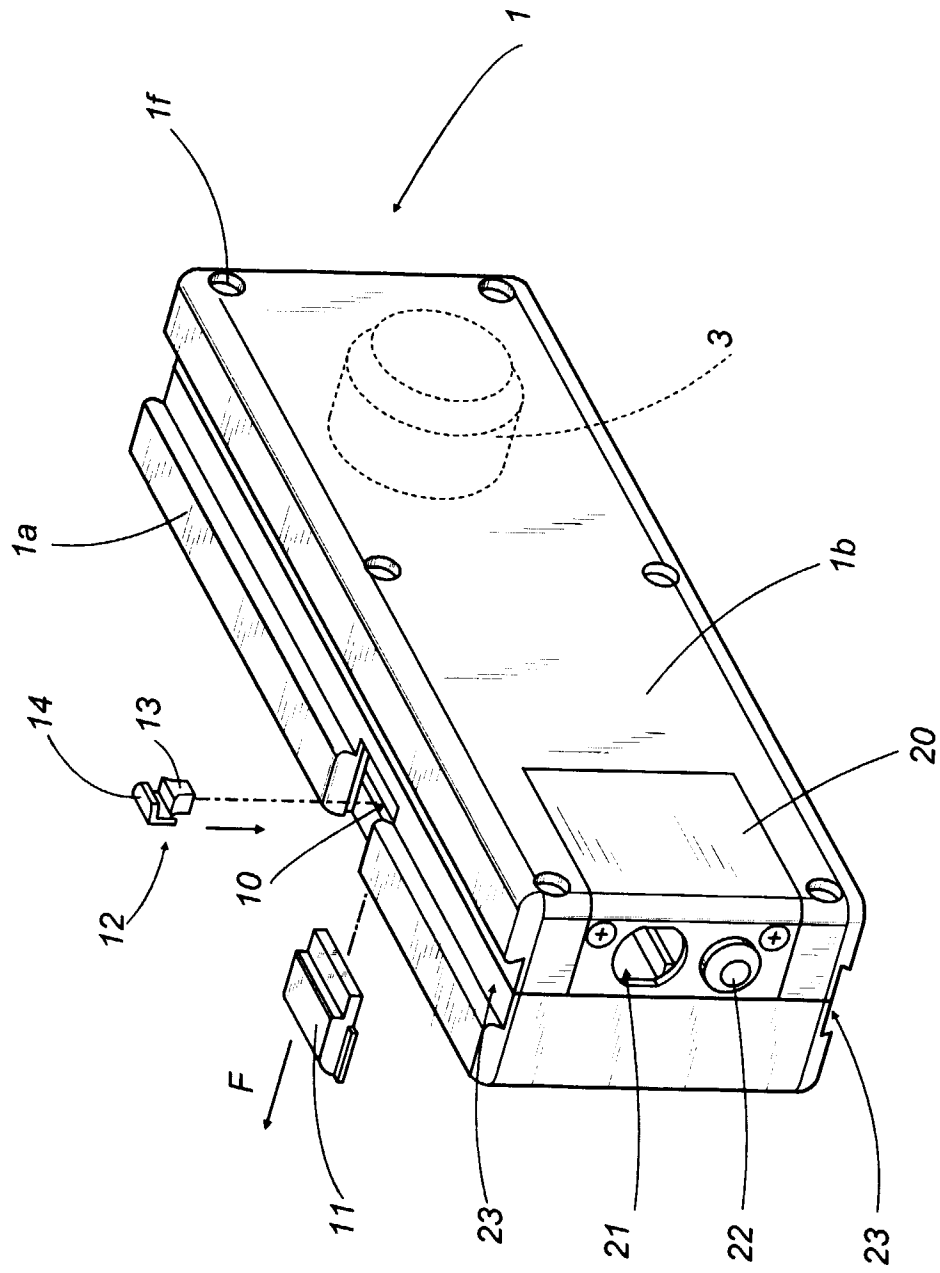


FIG. 2