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(54) A device for rotatively driving an awning control rod.

(57) The invention relates to the technical field of the sunshade awning control, and in particular to a device for rotatively driving an awning control rod.

The technical problem on which the present invention is based is to provide such a device with fully automatic operation features in order to avoid the need for any manual effort, as well as with a simple low cost construction, so that additionally to being convenient to use it can find wide-spread application potentials.

The problem is solved by the provision of a device comprising a substantially closed body (7,7a) rotatably engageable with one end of an awning (1) control rod (2) and at least one handgrip (8,23a) enabling an operator to handle said body (7,7a), as well as an internally mounted electric motor (16,16a), a reduction gear (14,14a) connecting said electric motor (16,16a) to said rod (2) and including a number of gear pairs defining a high step-down ratio, members (17,17a) for supplying an electric current to said electric motor, and control elements (19,19a) for said electric motor (16,16a) enabling an operator to selectively control the motor direction of rotation.

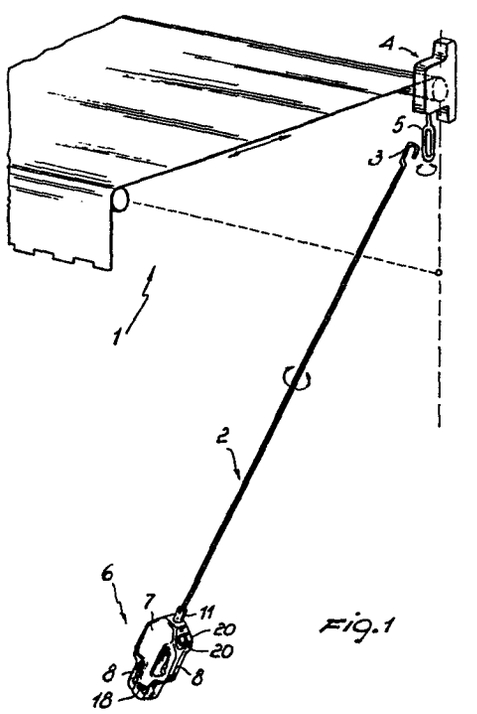

Fig.1

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This invention relates to a device for rotatively driving an awning control rod, in particular the control rod of sunshade awnings with rolling/unrolling capabilities.

Well known is the use of rods or sticks for remotely driving the rolling/unrolling members of awnings and the like more easily and conveniently. Such rods have a hooked end for operative connection to the member to be remote operated, while the other end forms a simple device for rotatively driving the rods, which is practically a cross arm carrying a hand hold element for the operator at its free end. That hand hold element, which extends transversely to said arm, enables the rod rotational movement to be controlled manually with the operator steadying the rod with his/her other hand.

The configuration and size of such very simple manual control devices depend on the peculiarities of the member to be driven and hence of the sunshade awning to be rolled/unrolled.

The disadvantages and inconvenience of such rod or stick manual rotation devices are well known because experienced dayly. In fact, they require application of a certain manual effort which may be inconvenient to some, and in all cases relatively strong where the awnings to handle are many or of large size. Further, such manual operation devices are slow acting, which may result in uncomfortable situations, owing to the outdoor location thereof.

In spite of the above situation, the Applicants are aware of no devices having been provided heretofore which could replace the manually operated ones. This because such devices are to meet conflicting requirements: on the one side, they must be quite economical, lightweight, and simple to operate in order to be practical and convenient to use, and on the other side, these same devices are required to handle relatively heavy loads without resorting to outside power sources which would not be generally available outdoors. Further, such devices are required to provide immediate and accurate reversal of the awning direction of movement, and to be usable with a manual type of control.

It is an object of this invention to substantially obviate such prior deficiencies in the field of devices for operating awnings, by providing a device for rotatively driving said rods or sticks, which requires no manual efforts, is fully satisfactory as to functionality and autonomy, and of simple construction, low cost and convenient to use.

This object is substantially achieved by a device for rotatively driving an awning control rod, which is characterized in that it comprises a substantially closed body rotatably engageable with one end of said rod and having at least one handgrip adapted to allow an operator to handle said body and an internally mounted electric motor, a reduction gear interconnecting said electric motor to said rod and

including a number of gear pairs defining a high step-down drive ratio, members for supplying said electric motor with an electric current, and control elements extending to the outside of said body and adapted to enable an operator to select the direction of rotation of said electric motor.

Further features will be more apparent from the following description of two preferred embodiments of the device according to this invention, with reference to the accompanying drawings, where:

Figure 1 shows schematically a rod rotary drive device at a position for hooking onto a sunshade awning rolling/unrolling member, only schematically outlined;

Figure 2 is a partly cut-away front view of a preferred embodiment of the device of this invention;

Figure 3 is a side view of the device of Figure 2;

Figure 4 shows, in a quite schematical and illustrative way, a further embodiment of the inventive device partly in full view and in section; and

Figures 5 and 6 are detail views of an arrangement according to Figure 4 in two different operating positions thereof.

Making now reference to the drawings, and especially to Figure 1, shown therein is a schematical representation of an awning 1 in an operative position and adapted for operation through a control rod 2 which is driven by means of a device according to the

invention. It should be appreciated that this device is applied to the same end of the rod 2 which is usually engaged by conventional manually operated rolling/unrolling means, while the opposed end of the rod 2 has a hook 3 formed thereon for connection to an awning rolling/unrolling member 4. This rolling/unrolling member 4 is a part of the tent 1 system and known per se. In practice, it is defined by a small capstan whence a ring 5 protrudes which is adapted for hooking by the hook 3 of the rod 2. Rotation of the ring 5 drives the rolling/unrolling member 4, with consequent taking up or paying out of the tent 1, depending on the direction in which the ring 5 is rotated.

The rod 2 drive device, which represents the specific subject of this invention, is generally designated with the reference numeral 6 in Figures 1 to 3, which show a first preferred embodiment thereof.

With this embodiment, the device 6 comprises on the outside thereof a body or enclosure 7, which is substantially closed and has two handgrips 8 formed integrally with the body 7. The handgrips 8 are located on opposite sides with respect to the axis of the rod 2 intersecting the body 7 substantially at the middle thereof.

For engagement with the device 6, the rod 2 is divided in two sections: a first section 9 of greater length which carries the hook 3, and a second section 10 of shorter length which is partly embedded in the body 7. The two sections are made mutually rigid

through a sleeve 11 engaging both sections with keying elements of the throughgoing variety, more specifically a set screw and locking pin arrangement. The second section 10 is supported in a pair of bushings 12 engaging with the body 7, and a bearing 13, also engaging with the body 7 on the interior thereof.

Keyed onto the second section 10, which forms the end of the rod 2 entering the body 7, is a gear making a part of a reduction gear 14 which includes a number of gear pairs and is extended to a pinion gear 15 of an electric motor 16. The reduction gear 14 is advantageously sized to provide a high step-down drive ratio from the pinion gear 14 of the electric motor 16. Further, the latter is preferably of the DC type and can rotate the pinion 15, in no load condition, at a high rpm.

A number of tests carried out have shown that optimum conditions are achieved with a relatively small number of gear pairs, such that the rpm of the pinion gear 15 are reduced from 50 to 100 times, and by using a DC electric motor having a power of substantially 50 Watts and capable of driving the pinion gear 15, with the latter under no load, at an angular velocity of nearly 15,000 rpm.

It has been ascertained experimentally that in this condition, an awning of sizable proportions jutting out for about 2.50 meters can always be rolled up within a time period slightly exceeding a half minute. Under load, the electric motor 16 provides a

considerable reduction in the rpm of the pinion gear 15 and the rpm of the rod 2 are further decreased at the rolling/unrolling member 4, which is provided with gear pairs of its own.

Provided in the body 7 are members adapted to supply an electric current to the electric motor 16, which comprise low voltage current generators. These low voltage current generating members include preferably at least one rechargeable battery 17.

It is advantageously provided that the body 7 includes a connection 18 electrically connected to the rechargeable battery 17 and such as to be engageable by a suitable battery charger, known per se and not illustrated in the drawings. This battery charger may be located entirely on the outside of and separated from the body 7.

The device 6 further comprises control elements 19 for controlling the electric motor 16, which are connected to controls located adjacent said handgrip 8 and allow an operator to select the direction of rotation of the motor 16. As shown in Figures 2 and 3, said controls comprise two pushbuttons 20 which are biased to their home positions; each pushbutton 20 controls the motor 16 for a respective direction of rotation when held depressed by an operator.

It should be also noted that the body 7 may be formed from a synthetic resin, e.g. polyamide resin. The body 7 may, accordingly, be formed by an injection molding process and be directly molded to provide suitable housings for all of the cited elements

mounted therein. As shown in Figure 3, two substantially identical half-shells may be provided, which when joined together will stably engage with the elements described hereinabove.

Figures 4 to 6 illustrate, in a very schematic fashion, a second embodiment of the inventive device.

According to the latter embodiment, a device 6a is provided, in a quite similar fashion to the first preferred embodiment just described, with a body or enclosure 7a, bushings 12a, and bearing 13 for supporting one end of the rod 2, as well as with a DC electric motor 16a operative to rotatively drive, at a high rpm number, a pinion gear 15a connected to the rod 2 through a reduction gear 14a providing a high step-down ratio, a battery 17a, and control elements 19a for controlling the motor 16a. It should be noted that the control elements 19a include controls in the form of a reversing switch having a toggle 21a adapted to change the polarity to the electric motor 16a.

A peculiar feature of the control device 6a resides, in this embodiment, in a series of technical solutions tending to facilitate in a special way a possible manual type of emergency operation of the rod 2 drive.

It is in fact contemplated that the body or enclosure 7a be divided into a first portion 22a of substantially tubular configuration and adapted to accommodate the motor 16a and reduction gear 14a, and second portion 23a laying across the former and

defining a handgrip which contains at least one battery 17a, as well as at least a part of the cited reversing switch. The second portion 23a engages, through a swivel joint 24a, an auxiliary handgrip 25a defining a crank arm. The latter is movable from a position transverse to the second portion 23a shown in full lines, and a position of close contact with the second portion 23a, as shown in dash lines. To facilitate accommodation of the auxiliary grip 25a, the second portion 23a is provided with a groove 26a wherein the auxiliary handgrip 25a may be partly embedded.

Also advantageously provided is a second auxiliary handgrip 27a, which can be used jointly with the auxiliary handgrip 25a. This second auxiliary handgrip 27a is substantially defined by a cylindrical band mounted rotatably on the rod 2 and being an extension of the first portion 22a of the body or enclosure 7a. This cylindrical band extends along the rod 2 for a sufficient distance to provide full support of an operator's hand.

Lastly, a locking member 28a, shown separately in Figures 5 and 6, is provided to inhibit backlash or partial rotation of the rod 2 relatively to the body or enclosure 7a while the rod 2 is being rotated manually.

More specifically, the locking member 28a comprises a clamp effective to clamp one end of the rod 2 between two jaws: a base jaw 29a fixedly located adjacent the rod 2, and a movable jaw 30a,

located oppositely to the base jaw 29a. The movements of the movable jaw 30a are controlled by brace 31a, in turn driven by a slider 32a arranged to slide along the first portion 22a of the body or enclosure 7a. The slider 32a has, at its area facing the brace 31a, an incline 33a ending in a receptacle 34a adapted to receive one end of the brace 31a. The latter is guided by a small plate 35a, which is arranged to be stationary and perforated, in engagement with one end of a tension spring 36a the other end whereof engages with the movable jaw 30a. The tension spring 36a practically holds the movable jaw 30a away from the rod 2 with the brace 31a disengaged in the receptacle 34a.

The drive device according to the invention operates as follows.

An operator is, first of all, to make the body 7,7a rigid with the rod 2. This is accomplished by fastening the sleeve 11, supplied with the body 7,7a, already attached to the second section 10 projecting from the body. Thereafter, the operator inserts the hook 3 of the rod 2 into the ring 5 of the rolling/unrolling member 4, to then turn the rod 2 in either direction depending on whether the awning 1 is to be rolled up or unrolled.

The rotational drive is imparted by handling the device 6,6a and acting on the pushbutton controls 20 with the first embodiment shown in Figures 1 to 3, and on the operating toggle 21a with the second embodiment shown in Figures 4 to 6.

In this way, the electric motor 16a is operated to rotatively drive the rod 2 through the reduction gear 14.

Thanks to the provision of an electric motor 16 featuring a high rotational speed and of a reduction gear 14 providing a high step-down ratio, the inventive device can provide the initial pick-up to complete the operation. It should be considered, in fact, that the device operates under load from the very start, and that no no-load revolutions can take place prior to the rod being rotated, the inclusion of a clutch device being impossible or at least inconvenient. A clutch device would in fact increase significantly the cost and complexity of the device, as well as the wear-ability and weight thereof.

In practice, the deliberately omitted clutch, such as is usually provided with any electric devices of some importance to ensure progressive starting and prevent excessive starting loads on electric motors, is replaced herein by the cited high step-down ratio of the motor 16 rpm, which stepping down on the one side relieves the motor, and on the other side takes full advantage of any backlash existing, as an example, in the connection between the hook 3 and ring 5.

The arrangement of controls in the form of push-buttons 20 which are biased to their home positions enables the device to be stopped at once as the travel end positions are reached: as soon as the operator perceives that the rod 2 has stopped because it has reached the end of its rotation, and that tends to turn

the body 7, under the action of the electric motor 16, he is to only release the pressure on the push-buttons 20 to stop the device. In any case, a sudden propensity of the body 7 to rotate would result in the pushbuttons 20 being directly released. This, however, does not result in the device being dropped out of hand, since it can be firmly held through the pair of handgrips 8, which are preset to enable an operator to spontaneously oppose the rotation of the body or enclosure 7.

Upon exhausting the charge of the battery 17,17a, the same may be recharged quite simply by means of a suitable device connected to the connector 18. This expedient allows on the one side the utmost efficiency and economy of utilization, and on the other, a substantial lightening of the control device 6,6a, given that the same is not loaded with the various elements which make up the battery charger.

In the embodiment shown in Figures 4 to 6, provision is made for manual control in the event of the drive device being out of operation for a reason whatever; in this condition, it will be sufficient to handle the auxiliary handgrip 25a and the second auxiliary handgrip 27a, which is free to turn on the rod 2, thus providing a structure which is quite similar to the conventional means used for manually rotating the rod 2. Accurate control of this manual rotation, that is such as to permit no backlash or oscillation of the device 6a relatively to the rod 2, is accomplished by actuating the locking member 28a,

which clamps onto the rod 2 under control by a simple slider 32a.

The invention is susceptible to many modifications and variations without departing from the scope of the instant inventive concept. As an example, the specific teachings of the two embodiments herein described and illustrated may be variously combined together.

Moreover, all of the details may be replaced with other technically equivalent elements, and the materials and dimensions may be any selected ones to meet individual requirements.

CLAIMS

1. A device for rotatively driving an awning control rod, characterized in that it comprises a substantially closed body (7,7a) rotatably engageable with one end of said rod (2) and having at least one handgrip (8,19a) adapted to allow an operator to handle said body (7,7a), and an internally mounted electric motor (16,16a), a reduction gear (14,14a) interconnecting said electric motor (16,16a) to said rod (2) and including a number of gear pairs defining a high step-down drive ratio, members (17,17a) for supplying said electric motor (16,16a) with an electric current, and control elements (19,19a) extending to the outside of said body (7,7a) and adapted to enable an operator to select the direction of rotation of said electric motor (16,16a).

2. A drive device according to Claim 1, characterized in that said electric motor (16,16a) is of the DC type, and in that said members (17,17a) adapted to supply it with an electric current are elements generating a low voltage current.

3. A drive device according to Claim 2, characterized in that said low voltage generating elements are rechargeable batteries (17), and in that said body (7) is provided with a connector (18) for connecting said rechargeable batteries (17) to a device for recharging them located externally to and separated from said body (7).

4. A drive device according to Claim 1, characterized in that said control elements (19)

comprise a pair of pushbuttons (20) biased toward their home positions, each pushbutton controlling said electric motor (16) to rotate in one direction upon depression thereof.

5. A drive device according to Claim 1, characterized in that said control elements (19a) comprise a reversing switch having an operating toggle (21a) and being effective to change the polarity to said electric motor (16a).

6. A drive device according to Claim 1, characterized in that said body (7) has a pair of handgrips (8) located on opposed sides with respect to the axis of said rod (2).

7. A drive device according to Claim 1, characterized in that said body (7a) comprises a first portion (22a) of substantially tubular configuration and being adapted to accommodate said electric motor (16a) and said reduction gear (14a), and a second portion (23a) extending crosswise to the first and defining a handgrip containing said members (17a) supplying electric current, and in that articulated to said second portion (23a) is an auxiliary handgrip (25a) defined substantially by a crank arm movable from a transverse position to a position close against said second portion (23a).

8. A drive device according to Claim 7, characterized in that a second auxiliary handgrip (27a) mounted rotatably on said rod (2) coaxially therewith as an extension of said first portion (22a) of said body (7a).

9. A drive device according to Claim 1, characterized in that inserted in said body (7a) is provided a locking member (28a) preventing said rod (2) from rotating and being defined by a clamp (29a,30a) adapted for clamping said rod (2) and controlled by a movable brace (31a) against an incline (33a) defined by a slider (32a) engaging with said body (7a).

10. A drive device according to Claim 1, characterized in that said rod (2) is divided in at least two sections, a first section (9) being located wholly on the outside of said body (7,7a) and a second section (10) being partly and rotatably embedded in said body (7,7a) and engaged with the first through a sleeve (11).

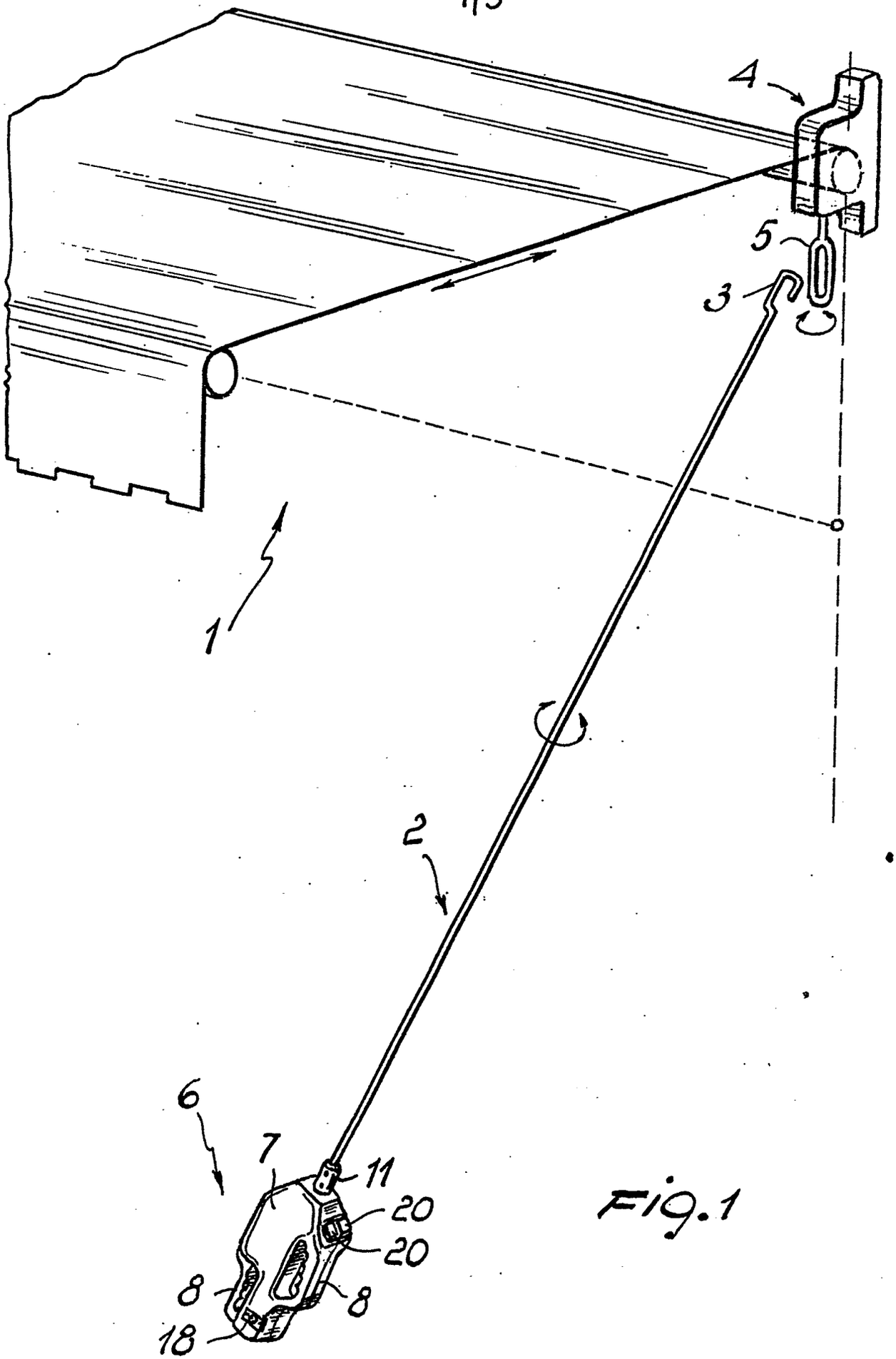

Fig.1

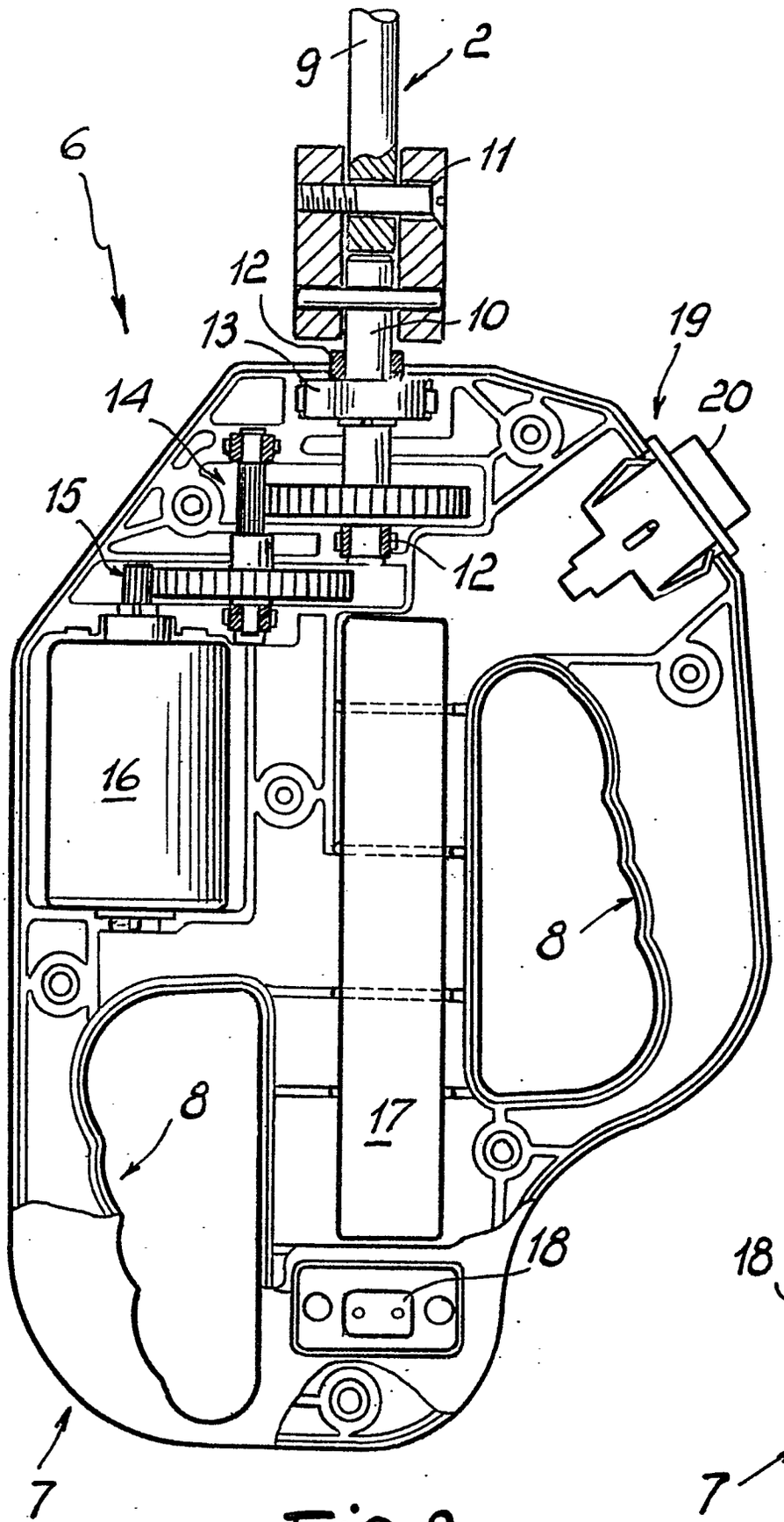

Fig. 2

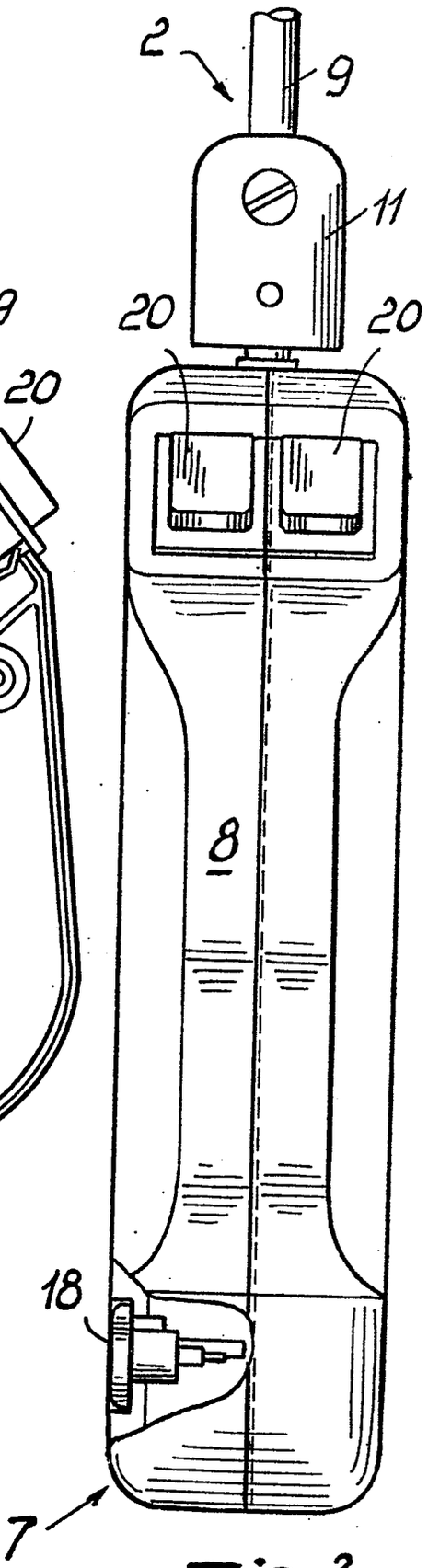

Fig. 3

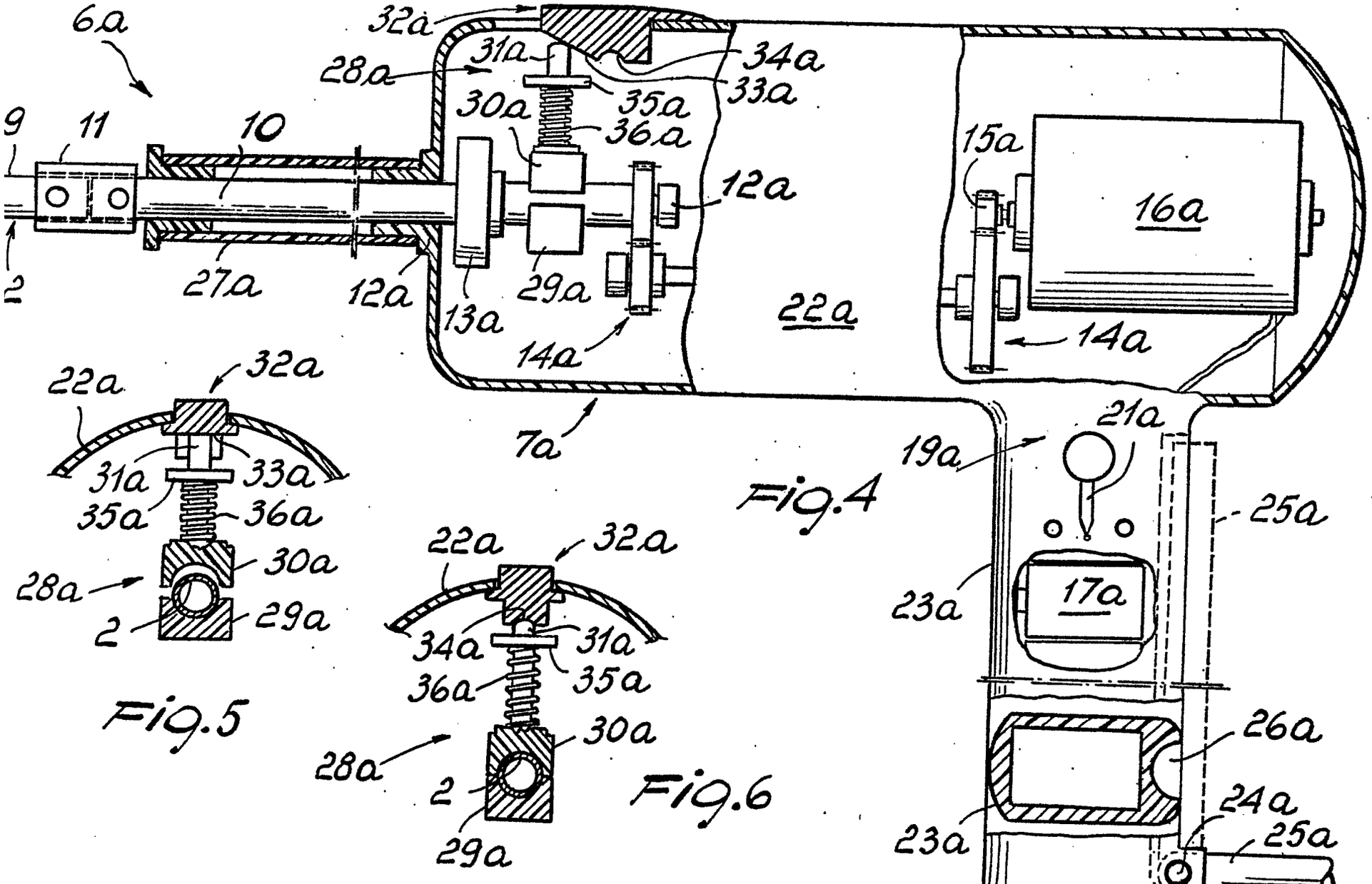

Fig.4

Fig.5

Fig.6