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(54) Drive device for roll-up elements with universal stop unit

(57) A drive device for roll-up elements includes: a ratio-motor on which a pulley (13) integral with a hollow cylinder (8) is keyed and that presents a tubular sump (7) and a motor stop unit (9). A dragging gear (5), rigidly fixed to the hollow cylinder (8), slides on its own inside diameter in relation to a bush (6) jutting out from the tubular sump (7), and presents an internal toothing (51) meshing a pinion (4) rotating on a shaft belonging to said bush (6) by a toothing (41) meshing both said dragging gear (5), and a second toothed gear (1), freely keyed on the stop unit (9), which presents an external toothing (105) meshing the pinion and an internal toothing (102) meshing a toothed gear (80) firmly keyed on the splined shaft (90); a cover (2) presents adjustment means for the positioning of the limit stops in relation to the motor stop microswitches (100, 101). Said cover is made integral with the bush (6) and with the stop unit (9).

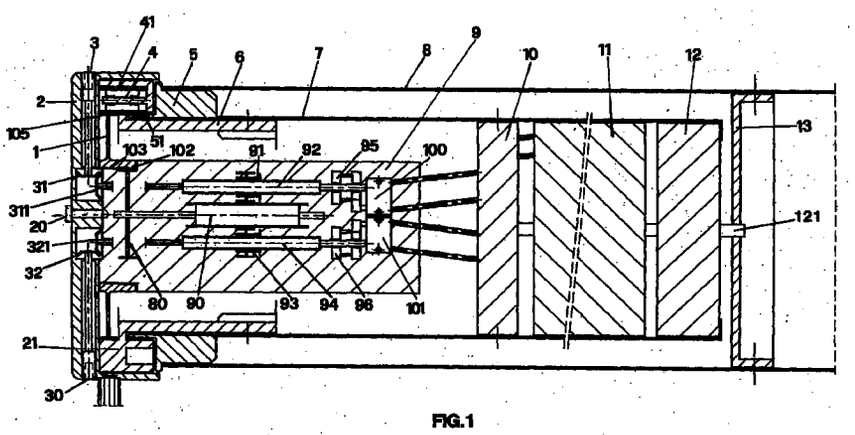

FIG.1

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Description

The invention concerns a dragging device for roll-up elements, particularly, curtains or roller shutters, provided with a universal stop unit usable independently of the device power.

It is known that the dragging devices for roll-up elements like roller shutters or curtains, are substantially composed of tubular electric motors inserted inside the hollow cylinder supporting the rolling up of the curtain or of the roller shutter if said motors are provided with reduction gear and with a stop unit which allows the stop, by suitable adjustment, always at the same point both in the rolling up and in the unrolling of the roller shutter or of the curtain. Often these devices are also provided with manual move elements for rolling up or unrolling the roll-up element in case of motor breakdown or of lack of motor stretch. The powers of the used motors of course vary according to the dimensions and weight of the roll-up elements which have to be rolled up or unrolled by the motor, as well as by the rolling up and unrolling speed of the same. Usually the motors and all the control and stop devices are inserted inside the hollow support pipe of the roll-up element. Sometimes the motor diameter being equal different powers are obtained and this as a function both of the reduction ratio and of the stator package lenght of the motor itself, lenght that can vary as a direct function of the power to be used. Since the stop units have kinematic units of toothed gears meshing the device part which is connected with the used ratio-motors, it happens that in the present technics the stop units are designed and realized with different dimensions and diameters according to the move devices powers which are associated to said stop units. It follows that substantially to every motor of a certain power a stop unit of a certain dimension is associated. Therefore for all the powers and motors range there is an equally rich stop units range. Since, as hinted before, the stop units substantially are reduced to follow the rolling up and the unrolling of the roll-up element around the support pipe by means of a kinematic connection so that at the rolling up or unrolling end the switchover of a microswitch is obtained, it is well understood that it is not necessary that the stop unit must meet dimension requirements so that they follow the events of the powers used in the motors. In other words what can be varied dimensionally will be at the most the microswitch, this one having to open or to close a more or less powerful current, but substantially all the kinematic members which arrive to operate the microswitch are not stressed by any considerable power. It follows that the release of the design of the stop unit device from the motor scaling as a function of the roll-up element rolling up and unrolling power is correctly supposable.

The main object of the present invention is therefore that of realizing a dragging device for roll-up elments in which the motor stop unit is realized in such a way that it can be independent from the motor power which the stop unit controls. In other words the realization of a stop unit of a universal type that can be indifferently assembled on a dragging device of whatever power so that such a stop unit can be used in a universal way is wanted.

Another object of the invention is that of reducing the dragging device costs on the whole, which of course can be made realizing a part of said dragging device such as the stop unit in a standard way.

A further object of the invention is that of reducing the number of the stock elements able to realize dragging devices of different powers.

All the above-mentioned objects and others that will be better pointed out during the description, are reached by a dragging device for roll-up elements on a hollow cylinder including:

- an electric motor coupled with a reduction gear on the slow shaft whereof a pulley integral with a hollow cylinder is keyed, said motor and said reduction gear presenting a tubular sump insertable in said hollow cylinder;
- a motor stop unit including a substantially cylindric support presenting in the central part a splined main shaft, meshing two toothed gears of the same diameter supported by two transmission shafts the one having a right screw thread and the other a left screw thread, so that to an advancement of a gear corresponds an equal backing of the other, each of said gears, when advancing in the motor direction, being able to stop against a microswitch able to turn off the motor feeding in the running direction in which it is going on, characterized in that it presents:
- a dragging gear firmly fixed to the hollow cylinder sliding on its inside diameter in relation to a bush jutting out from the tubular sump, said gear presenting an external toothing meshing a pinion;
- a pinion rotating on a shaft belonging to said bush and parallel to its axle, with a toothing meshing both said dragging gear, and a second toothed gear presenting the same number of teeth of the toothed dragging gear;
- a second toothed gear freely keyed on the support block of the stop unit, presenting an external toothing meshing the pinion and an internal toothing meshing a toothed gear belonging to the splined main shaft;
- a cover presenting a cables passage for the motor feeding and adjustment means for the positioning of the limit stops in relation to motor stop microswitches, said cover being made integral with the bush, with the motor stop unit, and with the wall housing the hollow cylinder for said roll-up elements by fixing means.

Advantageously according to the invention the sec-

ond toothed gear freely keyed on the support block of the stop unit has the keying inside diameter constant and independent from the motor power. So also the second toothed crown gear of said second toothed gear has a diameter always constant and independent from the motor power of the dragging gear. In this way it is understandable that a stop unit with all the kinematic motions connected to the dragging device will always have the same dimensions and the same encumbrance and therefore be assembled in dragging devices of different powers and assembled also on hollow cylinders of different diameter. The only constraint that is presented for the practical use of a universal stop unit is exactly that the internal toothing of the already mentioned second toothed gear which couples with a gear belonging to said stop unit, has a compatible and always identical diameter so that it can be coupled without difficulty to said stop unit.

The stop unit is made integral with a closing cover of the dragging device which is fixed to the wall which supports the dragging device. However such cover fixes the universal stop unit in correspondence of the central part of the dragging device and in a position coinciding with the hollow cylinder axle and the motor.

Further characteristics and details will be better pointed out in the description of two preferred execution forms of the invention given in an indicative but not imitative way and shown in the enclosed drawings where:

- fig. 1 represents in section a dragging device realizing the invention;
- fig. 2 is another example of the invention device supplied with an emergency move unit.

With reference to fig. 1 it is observed that the invention device is inserted inside a hollow cylinder 8 in which there is an electric motor 11, coupled with a reduction gear 12 on the slow shaft 121 whereof a pulley 13 which is made integral with the hollow cylinder 8 is keyed. In this way to every rotation of the reduction gear slow shaft 121 corresponds a rotation of the hollow cylinder 8.

Both the motor 11 and the reduction gear 12 are housed inside a sump 7 which extends from the opposite side of reduction gear and realizes a hollow in which all the motor stop unit is housed. It is specified that the motor 11 is supplied, in the case of the example, with an electromagnetic brake 10 the brake linings whereof lock the rotor of the motor in lack of current, while the brake linings move away from and let the rotor of the motor go free in presence of motor stretch. Inside the hollow cylinder 8 and integral with this there is a dragging gear 5 sliding on its own inside diameter in relation to the bush 6 forcedly keyed inside the sump 7. The dragging gear 5 has a crown gear 51 meshing the toothing 41 of a pinion 4. The teeth 41 of the pinion 4 mesh also the external toothing 105 of a second toothed gear 1. The pinion 4 rotates on an axle integral with the bush 6. The second toothed gear 1 is freely keyed on the stop unit support block, indicated as a whole with 9, and meshes as said the toothing 41 of the pinion 4. On the inside diameter of the gears 1 a further crown gear 102 is present meshing the gear 80 integral with the splined main shaft 90 parallel to the dragging device axle. Said shaft 90 meshes on one side a gear 91 movable on a threaded shaft 92 and on another side with another toothed gear 93 movable on a threaded shaft 94 inverted in relation to the shaft 92. It is well understood that when the ratiomotor is set in motion, so dragging the pulley 13 and therefore the hollow cylinder 8, it drags in the motion also the toothed gear 5 being integral with the hollow cylinder 8. Said toothed gear 5 through its toothing 51 transmits its motion to the pinion 4 which, rotating on its own axle integral with the bush 6, transmits the motion to the toothed gear 1. The toothed gear 1 rotates and its own crown gear 102 rotates with it which sets in motion the shaft 90 through the gear 80. Once the shaft 90 is rotating, because of the screw thread 92 also the gear 91 moves consequently going on step by step toward an end of its own shaft until it drags the spacer 95 toward the compression of the microswitch 100. Once it has been compressed, the microswitch 100 opens and since it is in series with the motor feeding push button in one direction, the motor stops.

Now the only push botton feeding the motor is the one making it rotate in opposite direction because the microswitch 101 is closed since the spacer 96 is not in contrast with the microswitch 101 the gear 93 being on the opposite side of said spacer.

In fact it must be observed that during the approach of the toothed gear 91 toward the microswitch 100, the toothed gear 93 will move away in a inverted way and so, when the motor will run inverted ,the toothed gear 93 will go on toward the microswitch 101, while the gear 91 will move away from the microswitch 100.

The stop unit 9 is fixed to the cover 2 by a central screw 20. Moreover it is pointed out that the cover 2 is also fixed to the bush 6 by screws 21. It well understood that varying the dragging device power and varying also the diameter of the cylinder 8, the same inside diameter of the second toothed gear indicated with 1 can be kept, that is to say the inside diameter 103 keyed sliding on the cylindric part of the stop unit 9, and the diameter 102 of the crown gear can be also kept. So the stop unit complete interchangeability for the different power dragging devices is obtained.

It is reminded that the dragging gear 5 connected by interference fit to the rolling up pipe 8, has the same number of teeth of the toothed gear 1, so that a pipe 8 turn corresponds to a toothed gear 1 turn.

In order that the microswitches 100 and 101 switch off the drive of the motor 11, respectively when the rolling up and the unrolling is finished, the spacers 95 and 96 will have to be positioned against the microswitches alternatively at the beginning of the rolling up and at the end of the unrolling. In order to obtain this an initial

adjustment of the positions of the gears 91 and 93 and consequently of the spacers 95 and 96 is arranged. A rotation is obtained by the adjusting screw 3 which is inserted in the cover 2 and which presents at the end a conical gear 31 meshing at 90° with another conical gear 311 belonging to the shaft 92. It is evident that operating manually the rotation of the screw 3, because of the coupling of the bevel gear pair, the shaft 92 rotation and therefore the gear 91 advancement in one direction or in the other is obtained, until the contrast with the spacer 95 and therefore the pushing of the microswitch 100 is obtained. It is operated similarly with the screw 30 that, by the toothed gears 32 and 321, makes the shaft 94 rotate and therefore makes the gear 93 move against the spacer 96 of the microswitch 101.

According to another execution form of the invention as it can be seen in fig. 2, the cover 2 is replaced by two half bearings 14 and 17 which forms a box in which a move unit composed by a worm screw 16 meshing a crown gear 15, being integral with the bush 6 is present. Since, as it will be remembered, the pinion 4 presents its own pivot integral with the bush 6, it happens that when the worm screw 16 is moved manually, this makes the crown gear 15 rotate which, being integral with the bush 6, causes also the rotation of the pivot of the pinion 4. Since the pinion 4 meshes both the dragging gear 5 and the second toothed gear 1, it happens that such gears will be set in rotation and will turn at the same speed having the same number of teeth. It is reminded that the gear 5 is keyed sliding on the bush 6 and the sump 7 and that the second toothed gear 1 is keyed sliding on the automatic stop unit 9. Since, as said the toothed gear 5 is integral with the cylinder 8, it happens that a complete turn of the cylinder 8 corresponds to a complete turn of the toothed gear 1. Since, as it is observed also in fig. 1, the toothed gear 1 has the toothing 102 meshing the gear 80 belonging to the splined main shaft 90, it will happen that, because of the kinematic motions already described and belonging to the automatic stop unit 9, both the gear 91 and 93 will be set to motion in inverted direction, gears that repectively approach and move away from the device stop microswitches. This manual movement on the worm screw 16 allows the manual handling of the cylinder 8 in case of motor breakdown or lack of current, and therefore allows the lifting and the lowering of the curtain or of the roller shutter connected to said cylinder. Because of the kinematic chain now mentioned, during this manual move the gears 91 and 93 shiftings identical to that which would have been obtained with the electric motor and its reduction gear movement are obtained.

In this way it is obtained that at the electic current return the stop units are not out of phase, or rather the manual handling did not cause any trouble to the automatic working of the stop unit.

Also in this execution the automatic stop unit 9 remains unchanged in relation to the automatic stop unit of the device of fig. 1. The only necessary change concerns the addition of a revolving connector 18 connected to the automatic stop device 9 since, the automatic device being connected to the cover 14 and the bush 6 being in this case revolving during the manual move of the worm screw 16, the electric connection between the motor 11 with the brake 10 and the automatic stop device 9 which carries inside the feeding cables of said power-brake unit, will have to be necessarily of the rotating type.

However the automatic stop unit 9 is fixed to the cover 14 which remains motionless by the same screw 20. Moreover it is observed that such stop unit 9 is connected, as in the case of the unit of fig. 1, to the dragging device kinematic motions always through the second toothed gear 1. It is therefore pointed out that if the second toothed 1 keeps unchanged the inside diameter 103 keying on the automatic stop device 9 and keeps identical the diameter and the number of teeth of the toothing meshing the gear 80, and this varying the dimensions and the power used by the dragging device, it is obtained that the automatic stop unit 9 will be able to remain unchanged as a whole becoming usable for all the dimensions and the powers used by the dragging device. The automatic stop unit 9 will be the same both in the case that it will be placed in a device as fig. 1 in which the manual move is not present, and in the case of the device of fig.2 in which the manual move is present, in this case the coupling of the revolving connector 18 to the same device being sufficent.

Claims

1. Dragging device for roll-up elements on a hollow cylinder (8) including:

   - an electric motor (11) coupled with a reduction gear (12) on the slow shaft whereof a pulley (13) integral with the hollow cylinder is keyed (8), said motor and said reduction gear presenting a tubular sump (7) insertable in said hollow cylinder;
   - a motor stop unit (9), including a substantially cylindric support presenting in the central part a splined main shaft meshing two toothed gears (91, 93) of the same diameter supported by two transmission shafts (92, 94) the one having a right screw thread and the other a left screw thread, so that to an advancement of a gear corresponds an equal backing of the other, each of said gears, when advancing in the motor direction, each being able to stop by spacers (95, 96) against a microswitch (100, 101) able to turn off the motor feeding in the running direction in which it is going on,

   characterized in that it presents:

   - a dragging gear (5), firmly fixed to the hollow cylinder (8), sliding on its own inside diameter in relation to a bush (6) jutting out from the

tubular sump (7), said gear presenting an external toothing (51) meshing a pinion (4);

- a pinion (4) rotating on a shaft belonging to said bush (6) and parallel to its axle with toothing (41) meshing both said dragging gear (5), and a second toothed gear (1), presenting the same number of teeth of the toothed dragging gear (5);
- a second toothed gear (1) freely keyed on the support block of the stop unit (9), presenting an external toothing (105) meshing said pinion and an internal toothing (102) meshing a toothed gear (80) firmly keyed on the splined main shaft (90);
- a cover (2) presenting a cables passage for the motor feeding and adjustment means for the positioning of the limit stops in relation to the motor stop microswitches (100, 101), said cover being made integral with the bush (6), with the motor stop unit (9) by fixing means and with the wall housing the hollow cylinder (8) for said roll-up elements.

2. Dragging device for roll-up elements according to claim 1) **characterized in that** the adjustment of the right position of the limit stops occurs by a bevel gear pair transmission between the adjusting screw (3, 30) and the transmission shaft gear (92, 94) belonging to the limit stops.

3. Dragging device for roll-up elements according to claim 1) **characterized in that** an electromechanical brake (10) usually closed is coupled with the electric motor (11).

4. Dragging device for roll-up elements according to claim 1) or 2) or 3) **characterized in that** the second toothed gear (1) presents an inside diameter (103) and a crown gear (102) internal as well, respectively of invariable dimensions and toothing when changing the power and the dimensions change of said device, so that they allow the coupling of said second toothed gear with a standard sizes stop unit.

5. Device according to one of the claims from 1) to 4) **characterized in that** the cover is composed of a box consisting of two half bearings (14, 17) in which a move unit composed of a worm screw (16) meshing a crown gear (15) integral with the bush (6) on which the pinion is pivoted (4) meshing both the dragging gear (5), and the second toothed gear (1) is present, the manual drive of the worm screw causing by the rotation of the second toothed gear (1) the rotation of the splined main shaft (90) and the consequent movement of the gears (91, 93) controlling the rotation stop of the motor (11) in one direction or in the other, said box including also means able to adjust the position of the gears (91,93) controlling the motor stop.

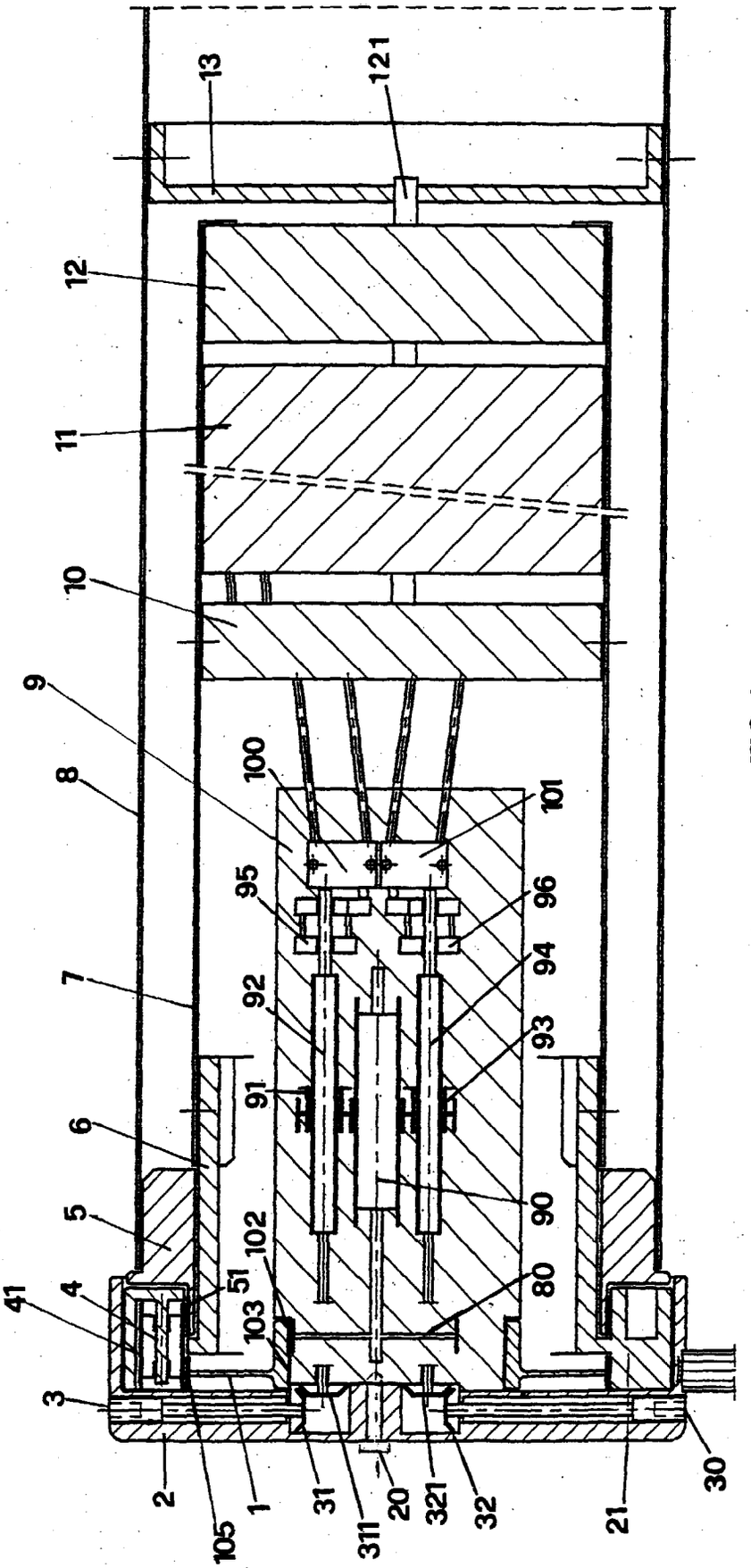
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FIG.1

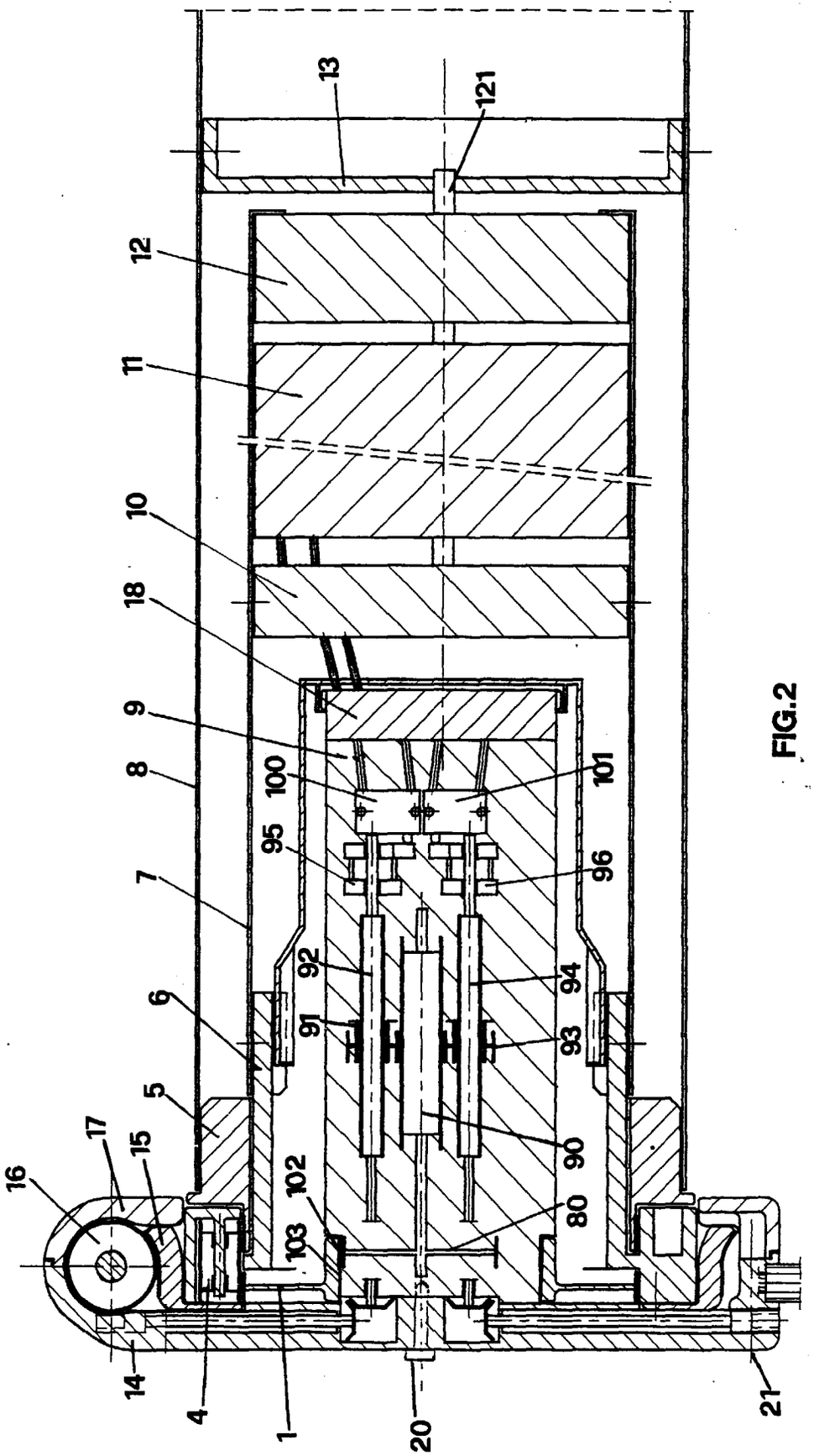
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FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 97 11 5866

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.6)
A	FR 2 599 524 A (SOMFY) 4 December 1987 * page 10, line 19 - page 13, line 21; figures 12-14 *	1	E06B9/88
A	CH 453 646 A (MARCHE) 14 June 1968 * the whole document *	1,2	
A	DE 89 09 151 U (GERHARD GEIGER) 19 October 1989 * page 4, last paragraph - page 7, last paragraph; figures *	1,2	
A	DE 86 34 796 U (SOMFY) 14 May 1987 * page 4, last paragraph - page 5, paragraph 1 *	3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 May 1998	Fordham, A

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