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54 Motor-driven sliding device for a water nozzle support.

57 A motor-driven sliding device for a support (13) for nozzles delivering water under pressure, in particular in shower compartments, comprises a guide (10) along which slides a guide shoe (12) carrying the support (13).

The guide shoe (12) is made to move along the guide (10) by means of a cable (14) drawn by means of a pulley (17) keyed onto a ratiomotor (25). The ratiomotor (25) is controlled by a control circuit (26) which receives a signal emitted by an optoelectronic sensor (23) each time one of the holes (24) made in the pulley (17) passes in front of it.

The signals emitted by the sensor (23) are used by the controller (26) to obtain the position of the guide shoe (12) along the guide (10). The controller then moves the guide shoe continuously to and fro between two position previously memorized by means of a control keyboard (27). Moreover, in the event of excessive absorption of power by the motor, indicating an obstacle along the path of the support (13), the controller (26) reverses the direction of movement of the guide shoe (12).

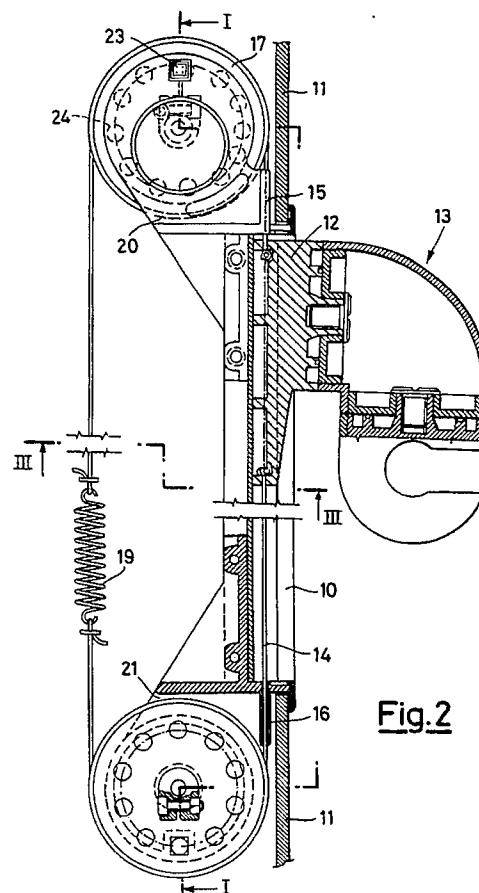


Fig.2

MOTOR-DRIVEN SLIDING DEVICE FOR A WATER NOZZLE SUPPORT

There are known devices designed to move a guide shoe, extending along a water nozzle support, continuously backwards and forwards along a guide by means of a ratiomotor, in particular inside a shower compartment, in order to carry out a massaging action up and down the body of the user. In such devices the distance covered by the guide shoe along the guide before changing direction is either fixed or can be changed by positioning movable mechanical limit stops, generally consisting of limit switches which can be shifted to the desired extreme positions so as to be operated by contact with the moving guide shoe. In the first case, the user has the obvious disadvantage of not being able to adjust the amplitude and the position of the movement of the shoe along the guide according to taste, requirements and height and, in the final analysis, the area of the body to be massaged. In the second case, having to position the limit switches by hand is troublesome and moreover obliges the manufacturer to study relatively complicated mechanical systems for supporting and operating the limit switches, which also involve the use of electrical connections made by means of flexible or spiral conductors to enable them to move along the guide.

The general scope of this invention is to obviate the aforementioned problems by providing a motor-driven device for moving a guide shoe along a guide, said shoe comprising a support for nozzles delivering jets of water under pressure, in particular inside a shower compartment, with electronic adjustment of the ends of the stroke of the guide shoe along the guide, without the need to use movable limit switches or other mechanical devices. A further scope of this invention is to provide protection against accidental interference between the body of the user and the end of the sliding support protruding into the shower compartment.

This scope is achieved, according to the invention, by providing a device for sliding a guide shoe along a guide, by means of a control ratiomotor, comprising an orientable support for nozzles delivering water under pressure, in particular in a shower compartment, characterized by the fact of comprising, in combination, detecting means for detecting the position of the guide shoe along the guide which give numerical data of the position and comparing means for comparing said numerical data with a first numerical value memorized previously in first storage means and a second numerical value memorized in second storage means, said comparing means functioning in order to reverse the rotation of the ratiomotor when the nu-

merical output data from the detecting means is identical to one of the two numerical values memorized previously.

The innovatory principles of this invention and its advantages with respect to the known technique will be more clearly evident from the following description of a possible exemplificative embodiment applying such principles, with reference to the accompanying drawings, in which:

- figure 1 shows a schematic partial front elevation cutaway view along the line I-I of figure 2, of a motor-driven sliding device for showers made according to the invention;
- figure 2 shows a schematic partial cutaway view along the line II-II of figure 1;
- figure 3 shows a schematic partial cutaway view along the line III-III of figure 2;
- figure 4 shows a block diagram of an electronic controller of the device of figure 1.

With reference to the figures, a device according to the invention comprises a guide rail 10, fitting tightly into a housing made in one wall 11 of a shower compartment, along which slides a shoe 12 carrying an articulated support 13 for nozzles delivering jets of water under pressure (for example of the type in which air and water are mixed to obtain jets with a massaging action) connected to a source of water through a flexible hose, neither of which are shown since they can be of any known type and are therefore easily imaginable by any technician.

The shoe 12 is pulled along the guide 10 by means of a cable 14 which, after passing through passages 15, 16 at the ends of the guide, winds around two pulleys 17, 18, respectively. In order to keep it taut, the cable 14 is fitted with an extension spring 19.

The pulleys 17 and 18 are supported, respectively, by supports 20, 21 secured to the structure of the guide. The upper support 20 comprises a housing for a sensor 23 (for example of the optoelectronic type) which detects the passage of holes 24 disposed equally spaced apart around a circumference of the pulley 17. The pulley 17 is driven by means of an electric ratiomotor 25.

The passages 15 and 16 are advantageously made watertight so as to prevent the water in the shower compartment from seeping behind the wall 11.

The ratiomotor 25 and the sensor 23 are electrically connected to a controller 26 having a control keyboard 27. As shown schematically in figure 4, a preferred embodiment of the controller 26 comprises a to-and-fro counting unit 28 which counts the pulses emitted by the sensor 23 when

the holes 24 on the pulley 17 pass in front of it. The counter counts either forward or backward depending upon the status of the signal line 30 which indicates the direction of rotation of the ratiomotor 25. In this way, as can be easily imagined by the technician, the output 29 gives (for example as a binary representation) a numerical datum proportional to the position of the shoe 12 along the guide 10. In practice, the perforated pulley 17, the sensor 23 and the counter 28 constitute means for detecting the absolute position of the shoe.

The output 29 is connected to the inputs of two storage units 31 and 32 and to one input of a comparator 33 whose other input is connected, by means of an electronic switch 34, to the outputs of the storage units 31 and 32.

The output of the comparator 33 is connected by means of an OR 35 to a control unit 36 which controls the direction of rotation of the motor 25 and whose output gives the signal 30 for the direction of rotation of the motor, which pilots the motor through a piloting unit 37 with an overcurrent detecting unit 38 disposed, in series with the motor, at its output.

The storage units 31 and 32 have storage enabling inputs 41, 42, respectively, which are connected by means of a second electronic switch 39 to a storage control button 40. The storage units also have clearing inputs connected to a button 43.

The electronic switches 34 and 39 are controlled by the signal 30 for direction of rotation of the motor.

The device described above operates in the following way. When the device is turned on, for example by pressing the appropriate start button on the keyboard 27, the ratiomotor 25 receives signal from the circuit 26 and begins to move the shoe 12 along the guide 10. The pulses generated when the holes in the pulley (17) pass in front of the sensor 23 change the number in the counter 28 so that its output gives a number proportional to the momentary position of the shoe.

If, during the movement, the memorizing button 40 is pressed, the number corresponding to the position reached by the shoe at that moment is stored in the memory (for example, number 32 if the electronic switch 39 is disposed as shown in the figure).

The output of memory 32 reaches the comparator 33 through the electronic switch 34. Since the numbers arriving at the two inputs of the comparator are the same it emits a pulse at its output which, through the OR circuit, instructs the direction circuit 36 to reverse the direction of rotation of the motor. Thus the shoe 12 reverses its direction of movement along the guide.

In addition to reversing the direction of rotation

of the motor, the signal 30 shifts the switches to their other position and reverses the counting direction of the counter 28.

If the button 40 is pressed again, the number corresponding to the position reached at that moment by the shoe is stored in the other memory (memory 31) since the switch 39 has been shifted.

The output of memory 31 reaches the comparator 23 through the electronic switch 34. Since the numbers arriving at the two outputs of the comparator are the same it emits a pulse at its output which, through the OR circuit, instructs the direction circuit 36 to reverse the direction of rotation of the motor again. Thus the shoe 12 again reverses its direction of movement along the guide and the switches 34 and 39 return to their original position while the counter 28 reverses its counting direction again.

If the device is now left to operate, it will be found that when the shoe has reached the position corresponding to the first time the button 40 was pressed the comparator will have inputs, connected to the counter and to the memory 32, with the same number and will consequently reverse the direction of movement of the shoe which, on reaching the position corresponding to the second time the button 40 was pressed, will again reverse direction (since the comparator has inputs, connected to the counter and to the memory, which are identical) and so on, with the shoe continuing to move to and fro between the two memorized points.

In this way, the jet of water emitted by a nozzle disposed on the support 13 moves between two pre-established areas of the user's body.

The direction of movement of the shoe is controlled by the comparator 33 as well as by the overcurrent detector 38. This detector 38 emits a pulse, to reverse the direction of rotation of the motor, which reaches the control unit 36, through the OR 35, whenever the current absorbed by the motor exceeds a threshold value advantageously set slightly above the rated value of current normally absorbed by the motor when it draws the shoe along the guide. In this way, if the shoe is prevented from sliding (either because it has reached one end of the guide, or because a foreign body has been placed along its path) the shoe reverses its direction of movement, thus achieving the dual purpose of making end of stroke sensors at the ends of the guide superfluous and of providing protection in the event, for example, of the user's body inadvertently coming into contact with the path of the support 13.

Once the two points between which the shoe must move to and fro have been set, they can be changed, if the new end of stroke point chosen is inside the present stroke, by pressing the button 40 when the position corresponding to the new point is

reached.

If, on the contrary, the new end of stroke point is outside the present stroke, it is necessary to press the button 43 on the keyboard 27 which erases the contents of the memories 31, 32 so that the shoe extends its stroke to the ends of the guide and then reverses direction at each end when a signal from the overcurrent detector 38 is received.

To ensure that the controller 26 is ready to operate when the power is switched on it is designed in such a way that as soon as it is powered it clears the memories and shifts the shoe 12 to one end thereby also clearing the counter 27.

The foregoing description of a device applying the innovatory principles of this invention is obviously given merely by way of example in order to illustrate such principles and should not therefore be understood as a limitation to the sphere of the invention claimed herein. For example, the shape of the shoe and the guide can be changed according to particular requirements, including aesthetic requirements, as can be easily imagined by the technician. Moreover, the circuit schematically represented in figure 4 can be made either with discrete components with wired logic or by means of a suitably programmed microprocessor, and other operative sequences besides those described can easily be imagined. For example, buttons could be used for controlling the upward or downward movement of the support 13 which serve to shift said support to a pre-established position along the guide; the support could then be maintained in this position indefinitely until shifted to another position or until the continuous reciprocating movement between two points is activated, as described above.

Numerous different materials can be used for making the mechanical part of the device described herein. The sliding parts can be advantageously made of, or covered with, teflon in order to reduce friction.

Claims

1. A device for sliding a guide shoe along a guide, by means of a control ratiomotor, comprising an orientable support for nozzles delivering water under pressure, in particular in a shower compartment, characterized by the fact of comprising, in combination, detecting means for detecting the position of the guide shoe along the guide which give numerical data of the position and comparing means for comparing said numerical data with a first numerical value memorized previously in first storage means and a second numerical value memorized in second storage means, said comparing means functioning in order to reverse the rota-

tion of the ratiomotor when the numerical output data from the detecting means is identical to one of the two numerical values memorized previously.

2. Device as claimed in Claim 1, characterized by the fact that the first and second storage means are connected to the output of said detecting means in order to memorize, upon actuation of storage control means, said first and second numerical values consisting of numerical data output from said detecting means.

3. Device as claimed in Claim 2, characterized by the fact that the first numerical value is memorized in the first storage means upon actuation of said storage control means during rotation of the ratiomotor in a first direction, and that the second numerical value is memorized in the second storage means upon actuation of the storage control means during rotation of the ratiomotor in a second direction.

4. Device as claimed in Claim 1, characterized by the fact that the detecting means comprise a sensor disposed in correspondence with a wheel mechanically connected to the ratiomotor and having holes at regular intervals around a circumference, said sensor being connected to a forward/backward counter in order to send it a counting pulse each time a hole passes in front of the sensor, the output of the counter thus giving said numerical position data and constituting the output of the detecting means, the counting direction of the forward/backward counter being controlled by the direction of rotation of the ratiomotor.

5. Device as claimed in Claim 3, characterized by the fact that the storage control means are made in the form of a button selectively connected, according to the direction of rotation of the ratiomotor, to a storage enabling input of the first or second storage means.

6. Device as claimed in Claim 1, characterized by the fact of also comprising detecting means for detecting the current absorbed by the ratiomotor which cause it to reverse its direction of rotation when said current exceeds a pre-established threshold value.

7. Device as claimed in Claim 1, characterized by the fact that the guide shoe is mechanically connected to the ratiomotor by means of a drive cable which winds round two pulleys at the ends of the guide, the ratiomotor having a drive shaft keyed onto one of said pulleys to enable it to rotate.

8. Device as claimed in Claims 4 and 7, characterized by the fact that the perforated wheel consists of one of said pulleys.

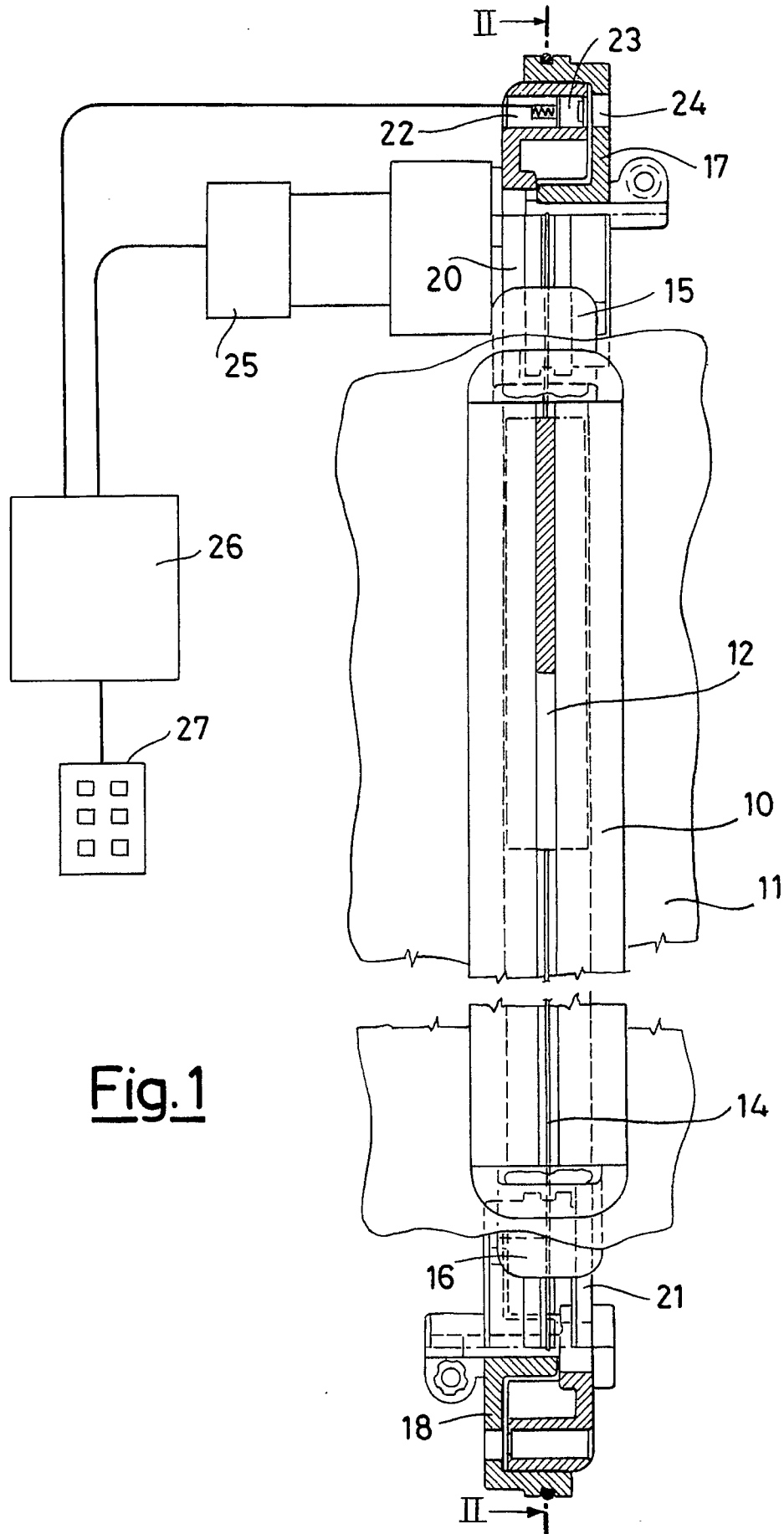


Fig.1

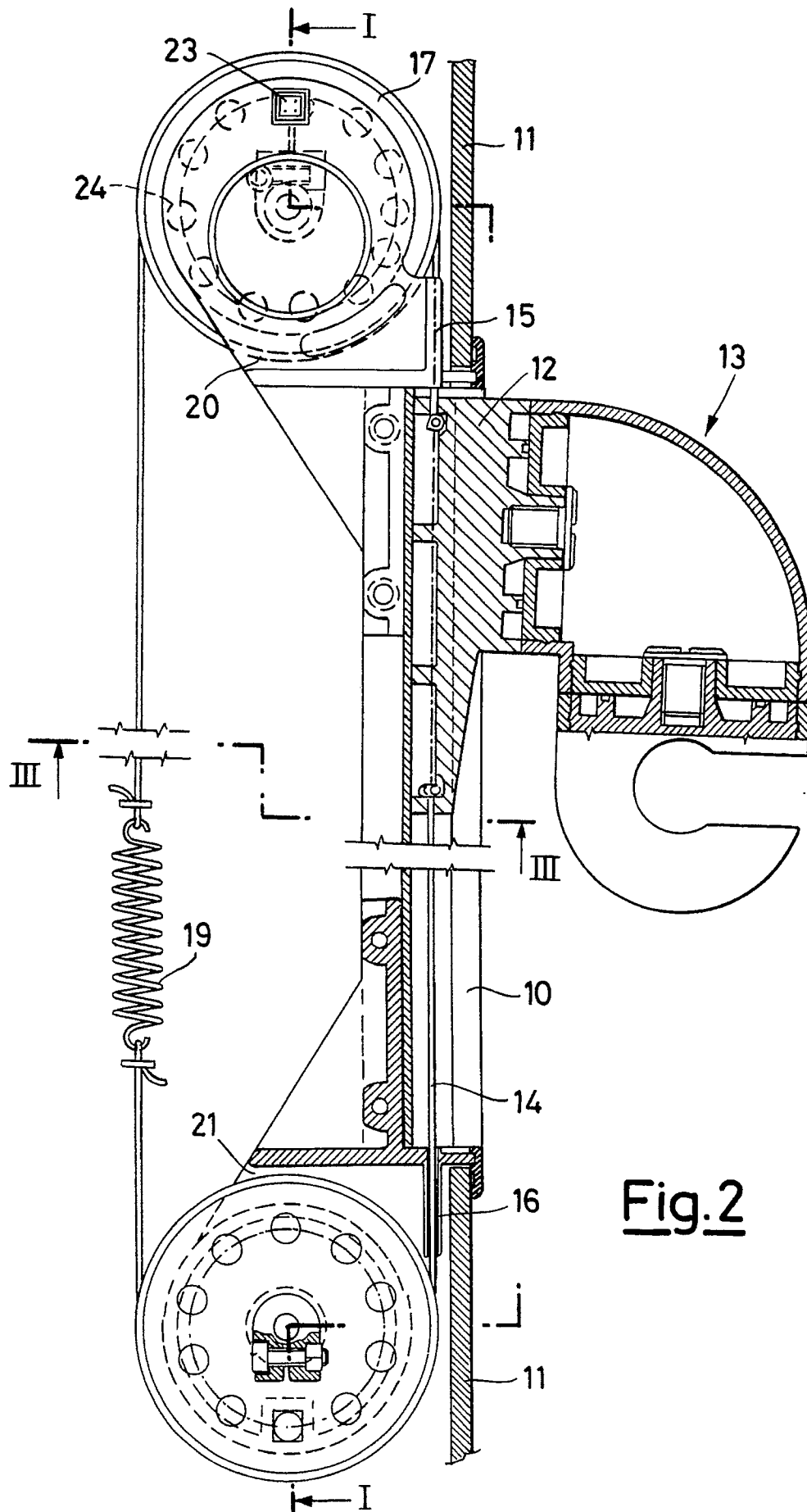


Fig.3

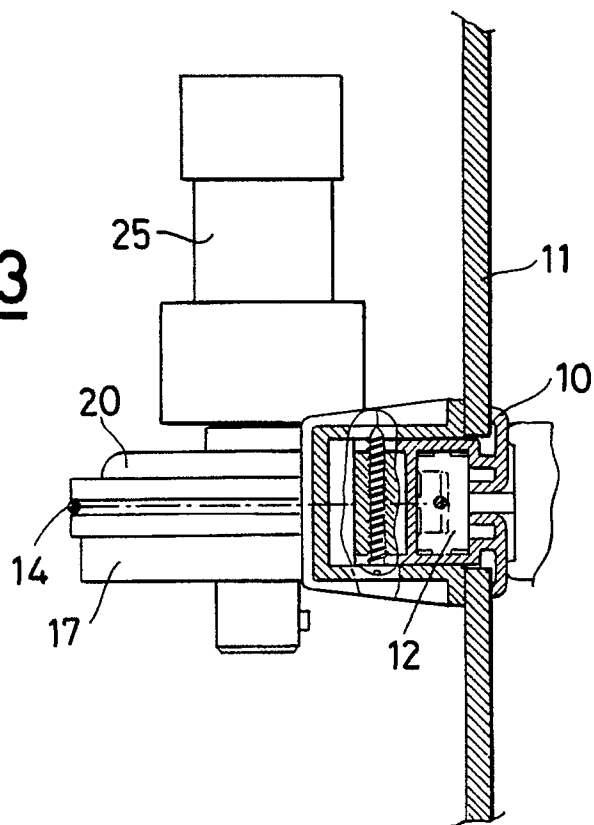
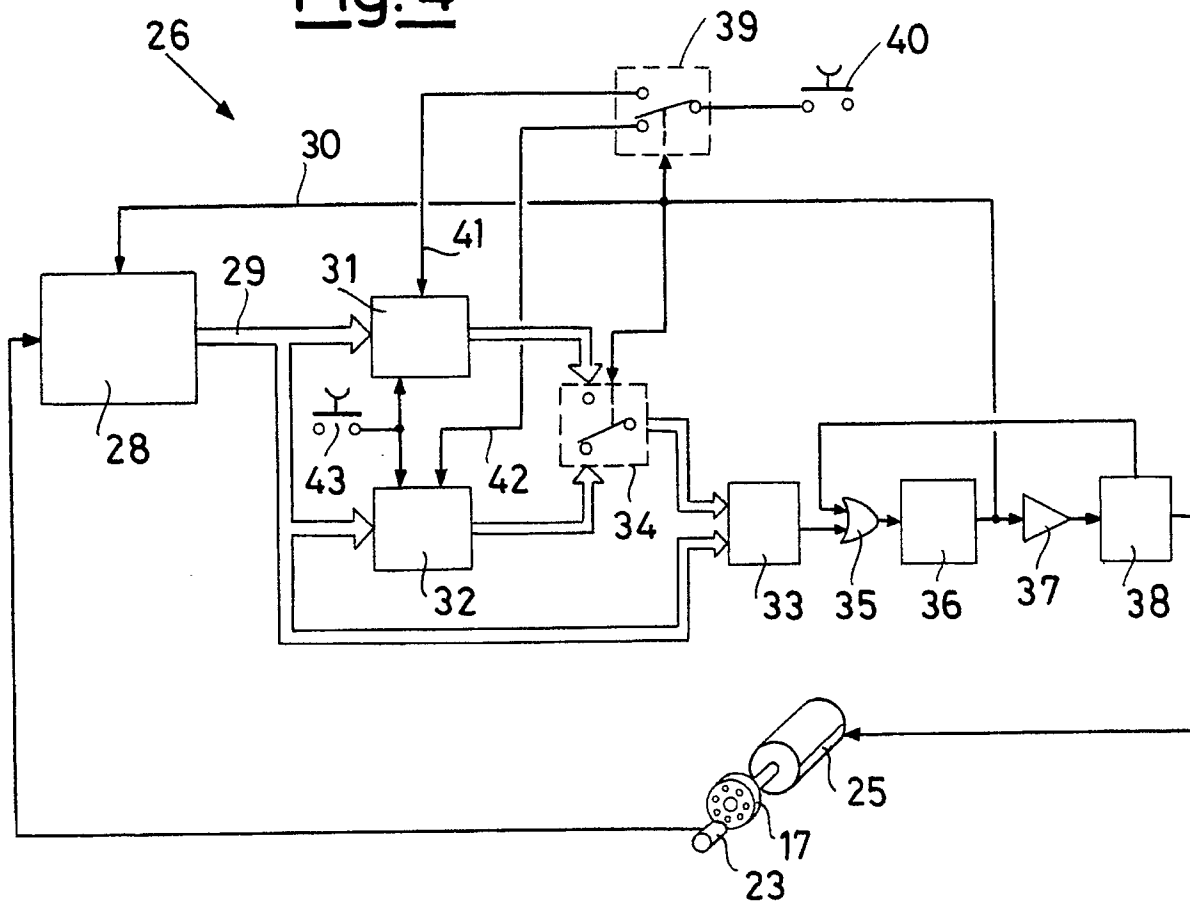


Fig.4





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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90202555.0		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)		
A	<u>AT - B - 132 839</u> (FRANK) * Page 2, line 39 - page 3, lines 3-9; fig. 1,6 *	1,7	A 61 H 9/00 A 47 K 3/22		
A	<u>DE - A1 - 3 633 449</u> (LAVE) * Abstract; column 3, lines 3-29; fig. 1,6 *	1,7			
A	<u>DE - A1 - 3 212 298</u> (BAUS) * Abstract; claims 1,7,17; fig. 1 *	1,7			
A	<u>DE - A1 - 2 746 705</u> (HALFEN) * Claims 1,2; fig. 1,4,6 *	1,7			
A	<u>EP - A1 - 0 011 825</u> (BAUS) * Abstract; page 7, line 18 - page 8, line 6; fig. 1,8 *	1,7	TECHNICAL FIELDS SEARCHED (Int. Cl.5)		
A	<u>US - A - 1 982 509</u> (FRANK) * Page 1, line 106 - page 2, line 22; page 2, lines 55-82; page 3, lines 13-48 *	1,7	A 61 H A 47 K		
A	<u>CH - A5 - 648 502</u> (TRAUB) * Abstract; claim; page 3, lefthand column, lines 44-63; righthand column, lines 45-68; fig. *	1-4			
A	<u>DE - A1 - 3 243 244</u> (OLYMPIA) * Abstract; page 4, lines 8-	1-4,8			
The present search report has been drawn up for all claims					
Place of search VIENNA		Date of completion of the search 31-01-1991	Examiner NEGWER		
<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</td><td>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</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 reasons & : member of the same patent family, corresponding document
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-2-

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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	23; fig. 1 * -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 31-01-1991	Examiner NEGWER
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 reasons & : member of the same patent family, corresponding document			