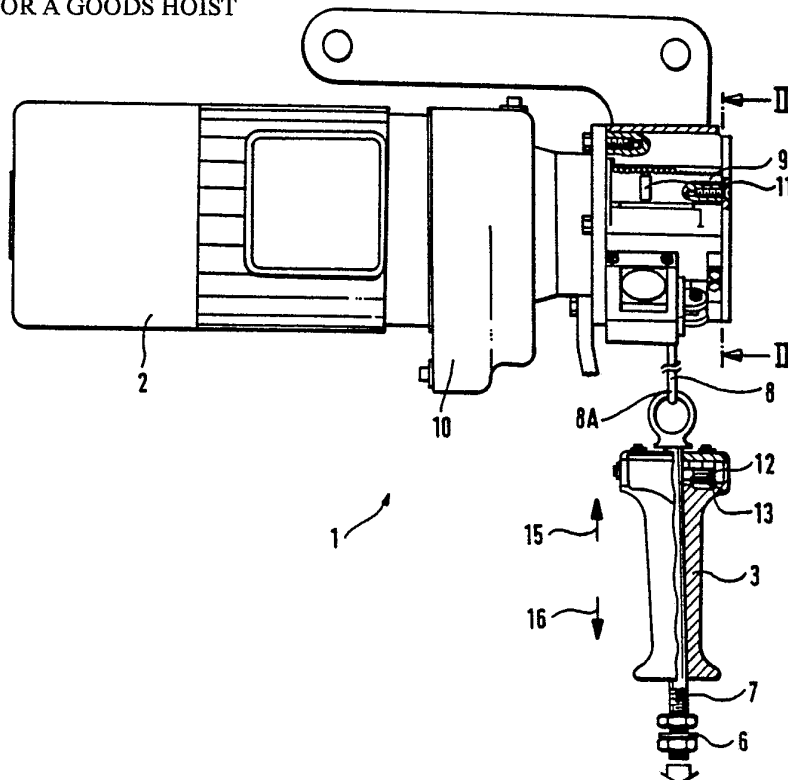




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(54) Title: ARRANGEMENT FOR A GOODS HOIST



(57) Abstract

Arrangement for a goods hoist (1) which comprises an operating control (3) capable of being actuated by a driving device (2) and situated between a load device (6) and driving devices (2). The arrangement is, amongst other things, simple and functions efficiently without the need for great muscle power on the part of the user. The driving device (2) is so arranged as to be controlled by electronics or by some other means which are capable of being connected to a transmitter (12, 13) contained in said operating control (3) capable of manual actuation.

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Arrangement for a goods hoist

The present invention relates to an arrangement for a goods hoist which comprises an operating control capable of being actuated by a driving device and situated between a load device and driving devices.

The principal object of the present invention is in the first place to make available an arrangement of the kind described above which is simple and which functions efficiently without the need for great muscle power on the part of the user.

Said object is achieved by means of an arrangement in accordance with the present invention, which is characterized essentially in that the driving device is so arranged as to be controlled by electronics or by some other means which are capable of being connected to a transmitter contained in said operating control capable of manual actuation.

The invention is described below in relation to a preferred illustrative embodiment, in conjunction with which reference is made to the accompanying drawings, in which:

Fig. 1 shows a side view of a load hoist in accordance with the invention;

Fig. 2 shows a section through the hoist along the line II-II;

Fig. 3 shows a part of the operating control included in the hoist arrangement; and

Fig. 4 shows a further design of an operating control.

An arrangement for a goods hoist 1 of a kind which is suitable for use on frequently recurring occasions for the lifting of loads rapidly and conveniently without the need for great physical effort and, for example, for positioning the load in a process machine or on a fixture or stack of pallets, etc., so that the user experiences the hoist 1 as if it were working in a so-called 'weight-less' state when working both with and without a load, which contains a solenoid motor 2 or some other suitable driving device so arranged as to be controlled by a transmitter

contained in an operating control 3 capable of manual actuation and capable of connection to it. Suitable for use as the driving device 2 are a solenoid motor, a d.c. motor, a powder magnetic coupling and an eddy-current coupling, which can be used
5 separately or in combination in an appropriate manner. The operating control 3 is situated between said motor and/or coupling which functions as a driving device 2 and a load device 6 of an appropriate kind which operates, for example, with a number of vacuum devices, electro-magnets or clamping or gripping devices,
10 etc. Said operating control 3 is executed preferably in the form of a handle fitted to a rod 7 or some other form of connection acting between the load device 6 and the driving device 2 and attached to a line 8. The line 8 is capable of being wound onto a line drum 9 so arranged, for example via a geared drive 10, as to
15 be driven by said driving device 2. The operating control 3 is suitably situated at the free end 8A of the line 8, whilst the other end 8B of the line is capable of being connected to the drum via a line locking arrangement 11 in a previously disclosed fashion.

20 A solenoid motor 2, which is a multi-pole three-phase motor with a special winding configuration, permits a 'stand still' function and a constant torque to be maintained for long periods, the characteristics of a motor of this kind being such that the torque remains essentially constant irrespective of
25 the speed of rotation.

Arranged in the handle 3, etc., are a number of force transmitters 12, 13 or other means which enable recording to take place of the movements imparted to the handle by an operator in relation to the necessarily downward movement of the load in
30 question. Said manual force which is required in order to actuate, for example, two piezoelectric sensors 12, 13 incorporated in the handle 3 in order to achieve the desired adjustment and holding of the load is small, usually of the order of 20-50 g, and this force may also be adjustable in relation to the torque of the motor.

35 The two piezoelectric crystal sensors 12, 13 situated in the handle 3, which serve as force sensors, can be

capable of connection to one another and to the handle 3 and a component 7A attached to the rod 7 by adhesive bonding, and may be capable of being activated after actuation of an actuating button 14, etc.

5 The signal from the upper sensor 12 is so arranged as to be proportional to the force imparted to the handle 3 in an upward sense 15, whilst the signal from the lower sensor 13 is similarly proportional to the force imparted to the handle 3 in a downward sense 16.

10 In order to provide the hoist with step-less sensitivity characteristics, the force applied to the handle 3 is allowed to control a ramp generator, which in turn is so arranged as to control the torque of the motor, for example, in which case, if a force is applied to the handle 3, the torque will increase at
15 a rate which is proportional to the forces concerned. This also means that, if the handle 3 is kept stationary, the ramp generator will adopt a value such that the torque will correspond precisely to the load on the hoist, which means that the handle 3 can be released when in this position without the load exhibiting any
20 tendency to move. The friction of the system thus constitutes the range of equilibrium.

A safety function, which means that the load device will be prevented from releasing the load whilst a torque is being applied to the motor 2 or to some other driving device, may be
25 pre-programmed into the electronics, etc., so that a fall arrester brake, for example of the spring-loaded electro-magnetic type, may be fitted to the hoist arrangement 1 for the purpose of arresting the rotation of the line drum in the event of failure of the power supply.

30 The arrangement 1 is preferably so arranged as to be controlled by specially developed electronics which control three triacs, whereas the motor torque is regulated automatically by means of so-called switched voltage control after actuation of said sensors 12, 13. When the handle 3 is caused to move upwards
35 the torque is increased until the drive begins to rotate, which is recorded by the sensor 12 having the load removed from it when

the operator attempts to keep the handle 3 stationary. When the operator wishes to produce a downward movement 16, he causes the handle 3 to move downwards, which is recorded by the sensor 13, causing the motor torque to reduce so that the load will fall. If
5 the load falls faster than the movement of the hand, a force will occur in the sensor 13, which will rapidly increase the torque of the motor once more via the electronics. The desired 'weight-less' function is achieved by the sensor 12, 13 constantly recording the manual force (hand movements) of the operator and attempting by
10 increasing or reducing the motor torque to bring this force to a zero value.

The variant of an operating control 103 illustrated in Fig. 4 consists of a handle which is movably accommodated on a rod 107, which, via a ball-and-socket joint 150 and a line locking
15 device 151, is attached to a line 108. Attached to the rod 107 is a handle cover 152 which supports on each inside part of the upper and lower cover components 152A, 152B a sensor 112, 113, preferably of the type described above and preferably attached by means of double-sided tape 153.

20 Projecting laterally from the handle 103 and attached to the handle 103 is a tongue-shaped component 107A, which can support rubber plugs 154, 155 or other suitable actuating devices facing towards the sensors 112, 113 and capable of interacting with same, and is so arranged as to accompany the
25 handle 103 as it is moved along the rod 107 in the intended direction, in so doing being able to actuate said sensors 112, 113 by means of said rubber plugs 154, 155, etc., so as to cause the information concerning the position of the handle and the rod relative to one another to be transmitted to the driving device in
30 question via a connection 156 attached to the sensors 112, 113, said connection in the example illustrated constituting the female component of a contact.

Upward movement of the handle 103 thus actuates the sensor 112, whereas the sensor 113 is actuated by the actuating
35 device 155 when the handle is moved downwards.

The following is the electrical specification of

the function for the control of the arrangement:

The signals from the sensors are first buffered by means of a high-impedance operational amplifier, since the sensor is capacitive. The signals are then mixed to produce a signal with
5 a polarity corresponding to the direction of the force. The polarity of this signal also controls two analogue switches in such a way that the sensor which is not active is 'short-circuited'. This prevents the sensor from 'driving'.

The signal then supplies a P-I stage which provides
10 the ramp function, and the P component is necessary in order to eliminate any self-oscillations. The output signal from the P-I stage controls three phase control circuits, one for each phase, which control the torque.

The invention is not restricted to the illustrative
15 embodiment described above and illustrated in the drawings, but may be modified without restriction within the scope of the Patent Claims without departing from the idea of invention.

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Patent Claims

1. Arrangement for a goods hoist (1) which comprises an operating control (3) capable of being actuated by a driving device (2) and situated between a load device (6) and driving devices (2), characterized in that the driving device (2) is so arranged as to be controlled by electronics or by some other means which are capable of being connected to a transmitter (12, 13) contained in said operating control (3) capable of manual actuation.
2. Arrangement according to Patent Claim 1, characterized in that means are provided for recording movement of the operating control, brought about by an operator able to actuate said operating control (3), in relation to the necessarily downward movement of the load.
3. Arrangement according to Patent Claim 2, characterized in that said means consist of a number of force transmitters (12, 13), preferably two piezoelectric crystals, so arranged as to function as force sensors.
4. Arrangement according to Patent Claim 3, characterized in that said transmitters (12, 13) are so arranged as to transfer signals which are proportional to the force applied to the operating control (3) in an upward sense (15), or to the force which acts in a downward sense (16).
5. Arrangement according to Patent Claim 4, characterized in that one of the transmitters (13) is attached to an operating control executed as a handle (3), and the other transmitter (12) is attached to a connecting link (7) along which the handle (3) is able to move and which is so arranged as to extend between the load device (6) and the driving device (2).
6. Arrangement according to any of the above Patent Claims 4-5, characterized in that a ramp generator is so arranged as to be controlled by the force which acts on the operating control (3).
7. Arrangement according to Patent Claim 6, characterized in that a driving device functioning as a motor

(2) is so arranged as to be controlled by said ramp generator.

8. Arrangement according to any of the foregoing Patent Claims, characterized in that the moment of the driving device (2) in question is so arranged as to be capable of
5 being regulated automatically by switched voltage control after actuation of said transmitter (12, 13).

9. Arrangement according to patent Claim 8, characterized in that said moment is so arranged as to be capable of being increased when the operating control (3) is
10 caused to move upwards (15), and in that said moment is so arranged as to be capable of being reduced by the movement of the operating control in a downward sense.

10. Arrangement according to any of the foregoing Patent Claims, characterized in that suitable for use as a
15 driving device (2) are a solenoid motor, a d.c. motor, a powder magnetic coupling and an eddy-current coupling, which can be so arranged as to operate separately or in combination.

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AMENDED CLAIMS

[received by the International Bureau on 13 October 1986 (13.10.86);
original claims 1-10 replaced by amended claims 1-7 (2 pages)]

1. Arrangement for a goods hoist (1) which comprises an operating control (3) capable of being
5 actuated by a driving device (2) and situated between a load device (6) and driving devices (2), with the driving device (2) so arranged as to be controlled by electronics or by some other means which are capable of being connected to a transmitter (12, 13) contained in
10 said operating control (3) capable of manual actuation, and that means are provided for recording movement of the operating control, brought about by an operator able to actuate said operating control (3), in relation to the necessarily downward movement of the load, c h a r -
15 a c t e r i z e d in that said means consist of a number of force transmitters (12, 13), preferably two piezo-electric crystals, so arranged as to function as force sensors and that the said transmitters (12, 13) are so arranged as to transfer signals which are propor-
20 tional to the force applied to the operating control (3) in an upward sense (15), or to the force which acts in a downward sense (16).
2. Arrangement according to Patent Claim 1, c h a r a c t e r i z e d in that one of the transmitters
25 (13) is attached to an operating control executed as a handle (3), and the other transmitter (12) is attached to a connecting link (7) along which the handle (3) is able to move and which is so arranged as to extend between the load device (6) and the driving device (2).
- 30 3. Arrangement according to any of the above Patent Claims 1-2, c h a r a c t e r i z e d in that a ramp generator is so arranged as to be controlled by the force which acts on the operating control (3).
4. Arrangement according to Patent Claim 3,
35 c h a r a c t e r i z e d in that a driving device func-

tioning as a motor (2) is so arranged as to be controlled by said ramp generator.

5. Arrangement according to any of the foregoing Patent Claims, characterized in that
5 the moment of the driving device (2) in question is so arranged as to be capable of being regulated automatically by switched voltage control after actuation of said transmitter (12, 13).

6. Arrangement according to patent Claim 5,
10 characterized in that said moment is so arranged as to be capable of being increased when the operating control (3) is caused to move upwards (15), and that said moment is so arranged as to be capable of
15 being reduced by the movement of the operating control in downward sense.

7. Arrangement according to any of the foregoing Patent Claims, characterized in that
suitable for use as a driving device (2) are a solenoid motor, a d.c. motor, a powder magnetic coupling and an
20 eddy-current coupling, which can be so arranged as to operate separately or in combination.

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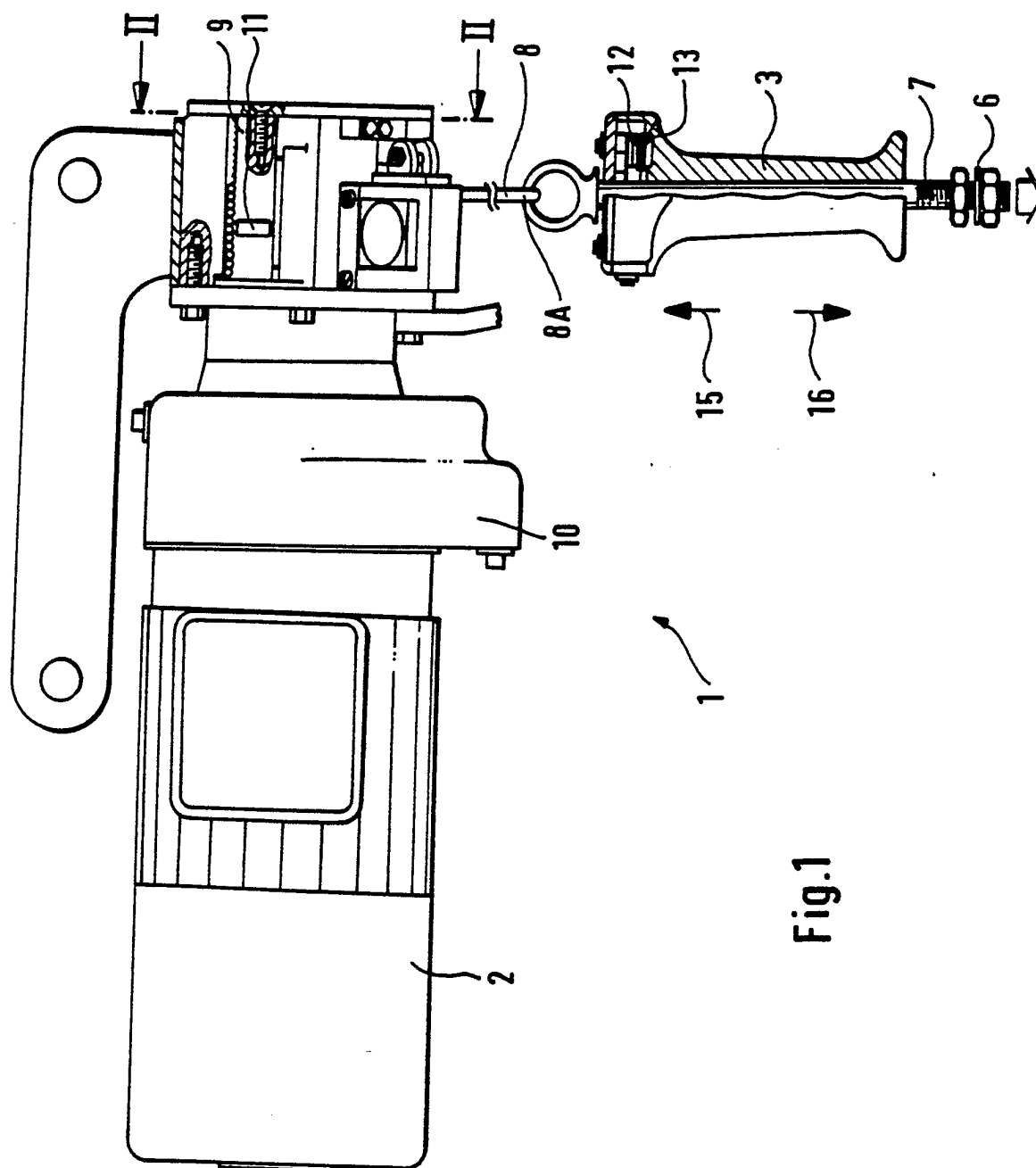


Fig.1

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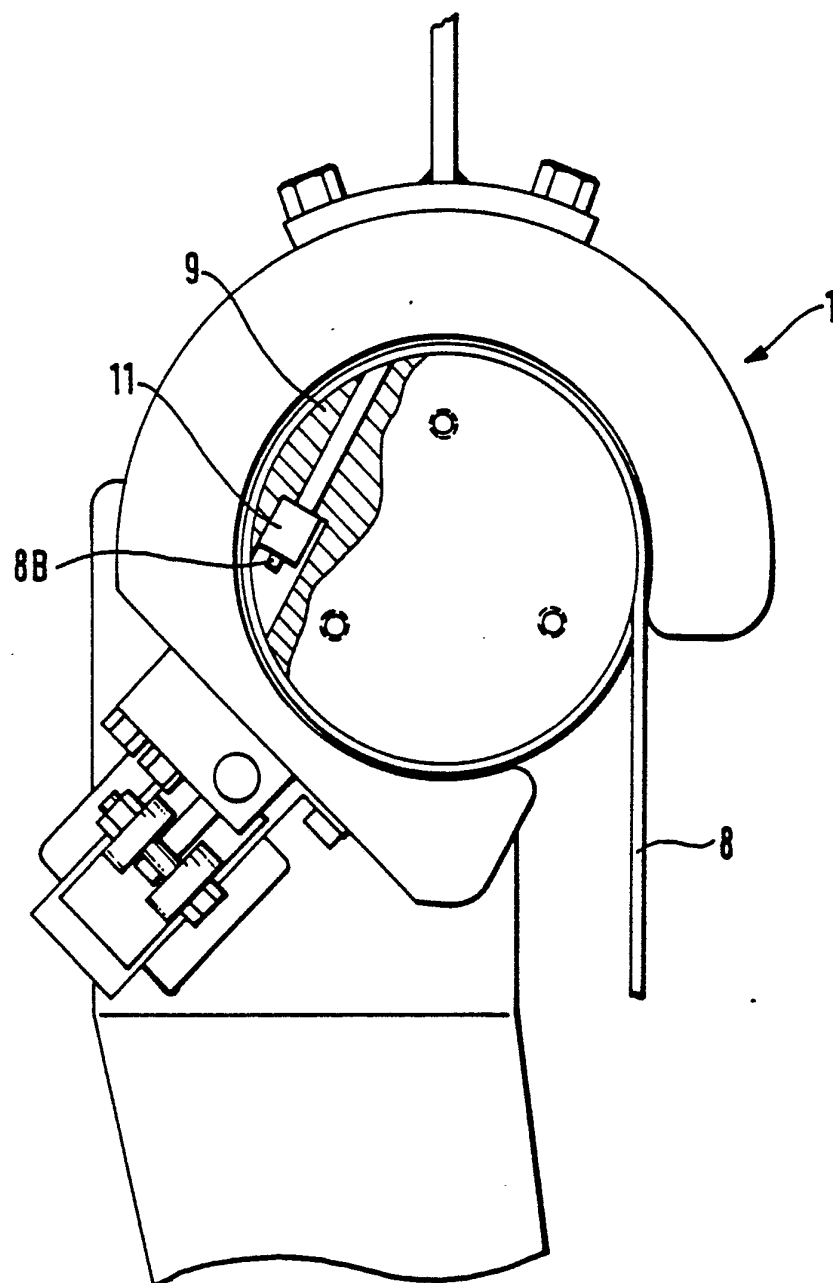


Fig.2

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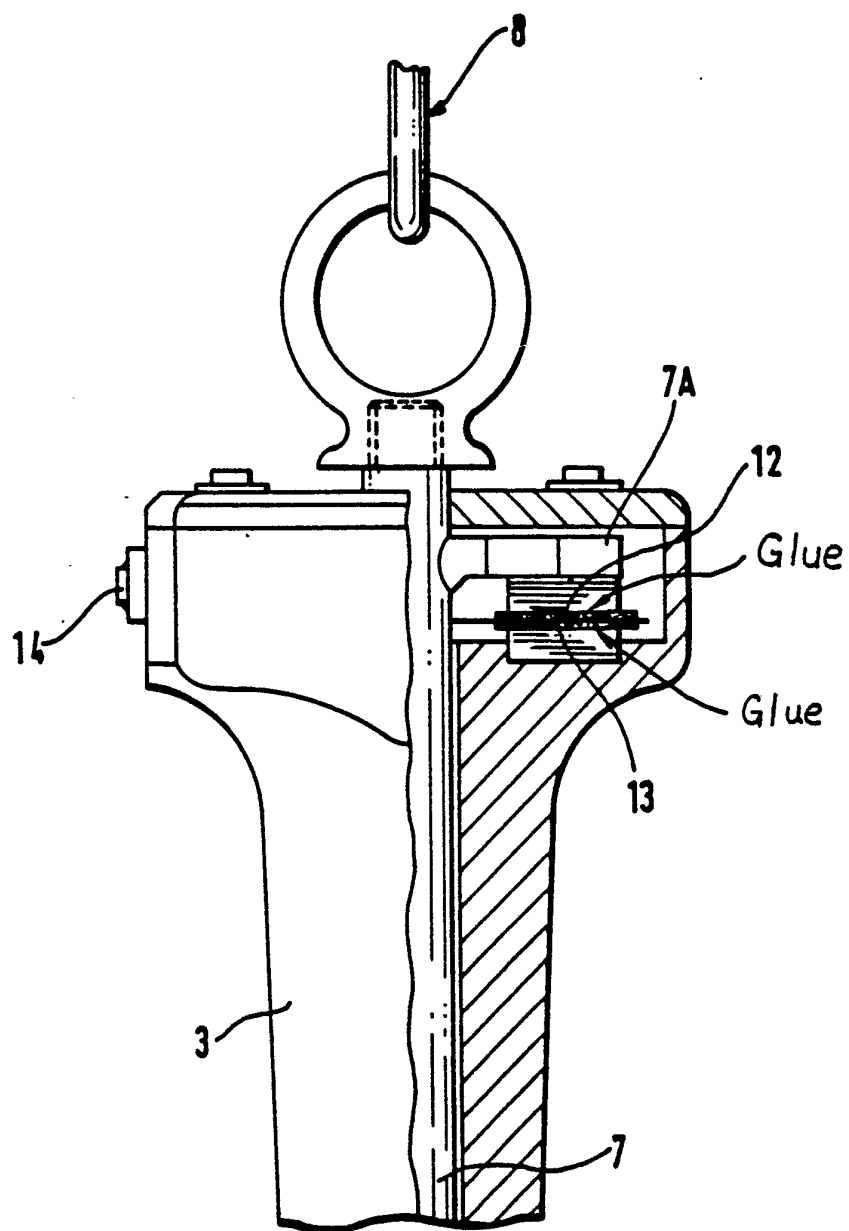
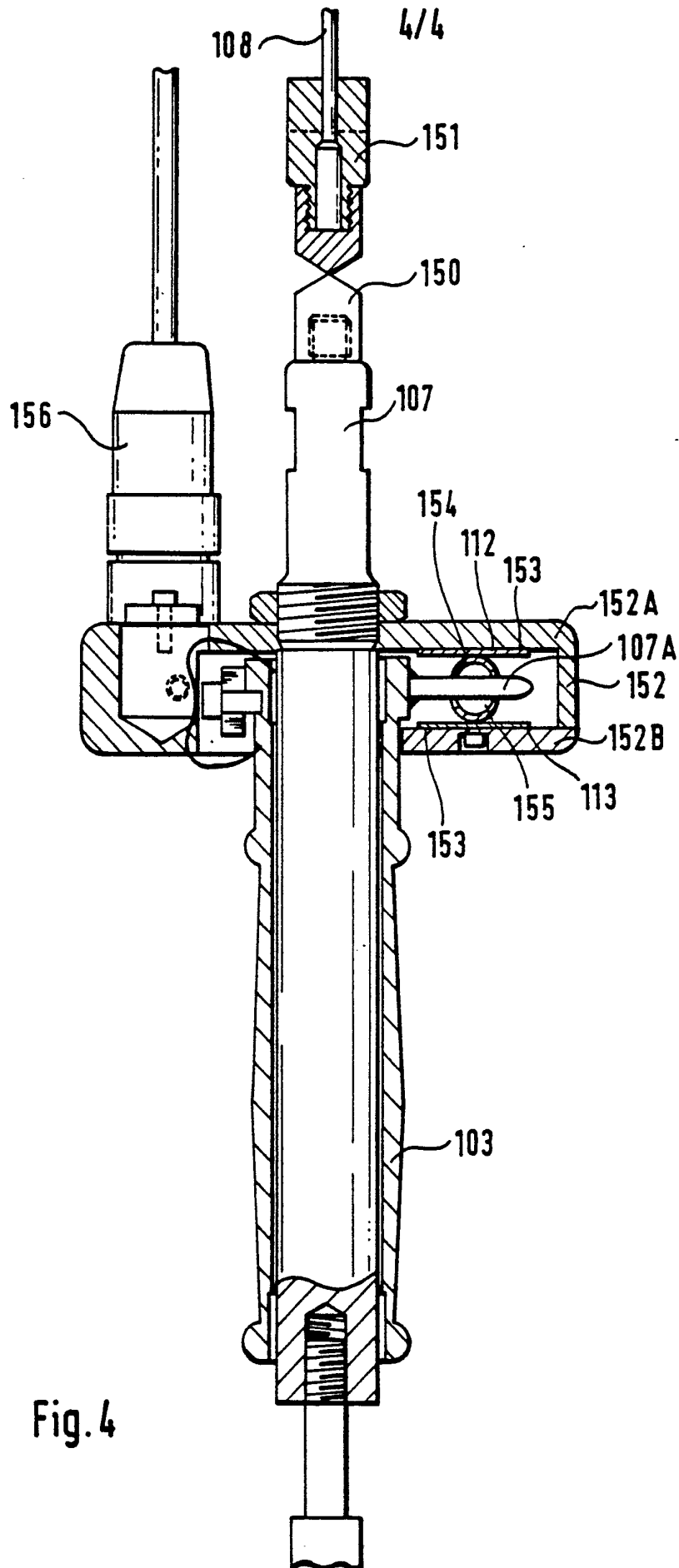


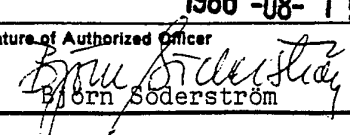
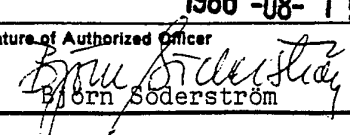
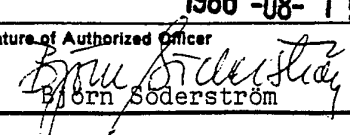
Fig. 3

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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE86/00247

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC ⁴ B 66 D 3/20																	
II. FIELDS SEARCHED Minimum Documentation Searched ⁷ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; padding: 5px;">Classification System</th> <th style="padding: 5px;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 4</td> <td style="padding: 5px;">B 66 D 3/18-/22, 1/40-/48; H 02 K 26/00</td> </tr> <tr> <td style="padding: 5px;">US C1</td> <td style="padding: 5px;"><u>254</u>: 167-172; <u>318</u>: 257</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸ SE, NO, DK, FI classes as above			Classification System	Classification Symbols	IPC 4	B 66 D 3/18-/22, 1/40-/48; H 02 K 26/00	US C1	<u>254</u> : 167-172; <u>318</u> : 257									
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; padding: 5px;">Category ^a</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">SE, B, 364 692 (FÄGERSKIÖLD J E) 4 March 1974 Fig 2</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-2</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 3 921 959 (ULBING OTMAR M) 25 November 1975 Fig 5, col 6, line 34-59</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-2</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">SE, B, 328 107 (FELCO HOISTS LTD) 7 September 1970</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-2</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">US, A, 3 998 432 (ULDRICKS CHARLES D ET AL) 21 December 1976</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-2</td> </tr> </table>			Category ^a	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	SE, B, 364 692 (FÄGERSKIÖLD J E) 4 March 1974 Fig 2	1-2	X	US, A, 3 921 959 (ULBING OTMAR M) 25 November 1975 Fig 5, col 6, line 34-59	1-2	X	SE, B, 328 107 (FELCO HOISTS LTD) 7 September 1970	1-2	X	US, A, 3 998 432 (ULDRICKS CHARLES D ET AL) 21 December 1976	1-2
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^a Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family																	
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search 1986-08-13 </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report 1986-08-15 </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority Swedish Patent Office </td> <td style="padding: 5px;"> Signature of Authorized Officer  Björn Söderström </td> </tr> </table>			Date of the Actual Completion of the International Search 1986-08-13	Date of Mailing of this International Search Report 1986-08-15	International Searching Authority Swedish Patent Office	Signature of Authorized Officer  Björn Söderström											
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