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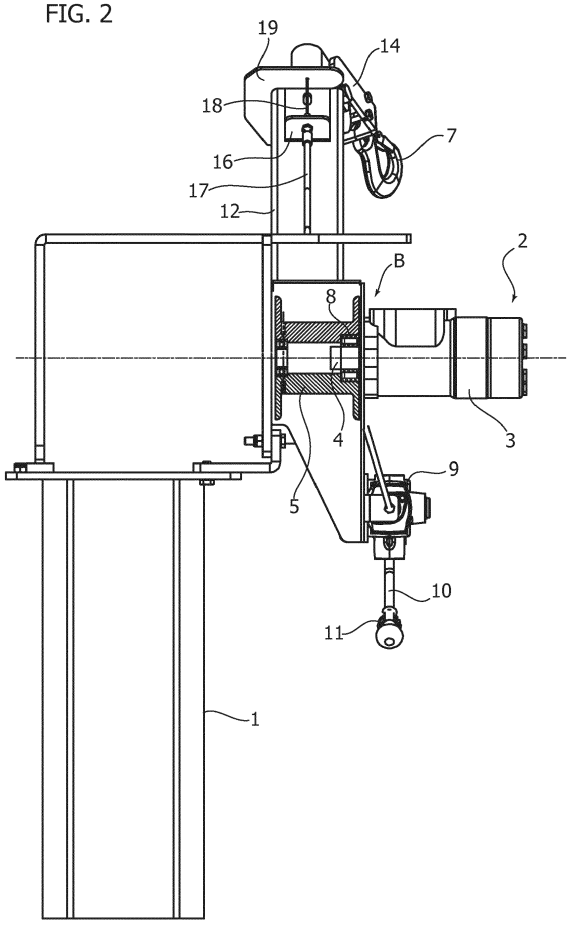
(54) **WINCH FOR FORESTRY, AGRICULTURAL AND THE LIKE MACHINES**

(57) Winch for forestry machines, agricultural machines and the like comprising a drum (5) for winding and unwinding and unwinding a rope (6) which can be connected to a load, and a rotary hydraulic motor (3) whose shaft (4) actuates the drum (5) through a hydraulic distributor (9) with manual control lever (10). The shaft (4) of the hydraulic motor (3) is coupled to the drum (5) through a one-way engagement means (8) which makes the shaft (4) and drum (5) mutually joined in rotation only in the set direction and corresponding to the winding of the rope (6) on the drum (5).

FIG. 2



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Description

Field of the invention

[0001] The present invention regards a winch for forestry machines, agricultural machines and the like, particularly for vertical and horizontal wood cutting machines.

State of the prior art

[0002] The winches applied to machines thus made have the function of being able to move heavy loads such as for example trunks or stumps to be cut, to machine the operating area. For this purpose, these winches typically comprise a drum for winding and unwinding a rope that can be connected to the load. A rotary hydraulic motor actuates - with the shaft thereof - the drum, through a hydraulic distributor in turn actuated by a manual control lever or a remote control displaceable to a position for unwinding or winding the rope from opposite sides with respect to a central hydraulic motor stop position.

[0003] The known winches of this type, currently available in the market for the aforementioned applications, use electrical contacts for stopping the rotation of the drum both in the step of unwinding and winding the rope, or sophisticated stop mechanisms that usually act in a single direction of displacement of the rope. In addition, the known winches are prone to erroneous manoeuvre on the hydraulic distributor control lever by the operator, with the risk of entanglement of the rope during the unrolling step or even the snapping of the rope at the point of fixing to the drum.

Summary of the invention

[0004] The object of the present invention is to overcome the aforementioned drawbacks simultaneously attaining the advantages in terms of small overall dimensions, low costs as well as ease and reliability of use even due to the absence electrical components of any kind.

[0005] According to the invention, this object is attained due to the fact that the shaft of the hydraulic motor is coupled to the drum through a one-way engagement means which makes said shaft and said drum mutually joined in rotation only in the set direction, or correct direction and corresponding to the winding of the rope. The controlled unwinding of the rope (without possibility of entanglement) is also ensured in case of use of a remote control or electrical control for the unwinding operation, or even the rewinding operation due to the one direction of traction of the driving shaft.

[0006] Thanks to this solution idea, the winding of the rope by the winch is allowed in only one direction of rotation of the drum, without the possibility of erroneous manoeuvre by the operator. The unwinding of the rope i.e. the unrolling thereof from the drum can be exclusively carried out by pulling the rope manually: according to another distinctive characteristic of the invention, the hydraulic distributor control lever is configured to be displaced to the aforementioned unwinding position by the rope. For this purpose, the lever is provided with a sliding engagement member in which the rope can be engaged in a releasable fashion when the latter is pulled manually to be unwound from the drum, so as to control the positioning of the hydraulic distributor in the aforementioned unwinding position.

[0007] According to a further characteristic of the invention, the hydraulic distributor is positioned automatically in the hydraulic motor stop position at the end of the rewinding of the rope on the drum, without requiring the actuation of the relative control lever.

Brief description of the drawings

[0008] The invention will now be described in detail, purely by way of non-limiting example, with reference to the attached drawings, wherein:

- Figure **1** is a side elevational schematic view showing the winch according to the invention applied to a wood cutting machine,
- figure **2** is a dorsal and partly sectional view according to arrow II of figure 1,
- figure **3** shows, in larger scale, the detail indicated by arrow A in figure 1,
- figure **4** shows, in larger scale, the detail indicated by arrow B n figure 2,
- figure **5** is an exploded perspective view of figure 1,
- figure **6** shows, in larger scale, the detail indicated by arrow C in figure 1,
- figure **7** is a view analogous to figure 1 exemplifying an operating step of the winch according to the invention,
- figure **8** is a view analogous to figure 7 exemplifying another operating step of the winch according to the invention, and
- figure **9** shows, in larger scale, the detail indicated by arrow D in figure 8.

Detailed description of the invention:

[0009] With reference to the drawings, a support structure of the upright type of a wood cutting machine to which a winch according to the invention is applied, generally indicated with 2, is indicated with 1. It should be observed that the illustrated arrangement is provided purely by way of example, in that the winch according to the invention could be applied to machines of any kind, for example forestry machines, agricultural machines and industrial machines.

[0010] The winch 2 comprises a rotary hydraulic motor 3 whose shaft 4 actuates a drum 5 for the winding and unwinding of a rope or cable 6, for example provided with a hook 7 at an end thereof.

[0011] According to a peculiar characteristic of the invention and as illustrated in detail in figures 2, 4 and 5, the shaft 4 of the hydraulic motor 3 is coupled to the drum 5 through a one-way engagement means for example constituted by a free wheel 8 which makes them mutually joined in rotation only in the direction corresponding to the winding of the rope 6 on the drum 5.

[0012] The hydraulic motor 3 is actuated through a hydraulic distributor generally indicated with 9, also fixed to the support structure 1, or fixed on a different point. The hydraulic distributor 9 consists, in a generally conventional manner, in a spool valve displaceable, from opposite sides with respect to a central stop position of the hydraulic motor 3, respectively in a position for unwinding or winding the rope 6 relatively to the drum 5.

[0013] A lever for controlling the hydraulic distributor 9, which is displaceable from opposite sides with respect to the central neutral position represented in figure 1, towards the right in the position indicated with A or towards the left in the position indicated with B in the same figure, is indicated with 10. According to another distinctive characteristic of the invention, the control lever 10 is provided with an engagement member 11, in form of an open ring, in which the rope 6 is slidably engaged in a releasable fashion during the unwinding thereof 5, according to the methods described hereinafter.

[0014] The rope 6 extends into an inclined tubular arm 12 of the support structure 1 bearing - at the end thereof - a return pulley 13 to which there is articulated a guide member 14 of the rope 6. Such guide member 14 is freely rotatable between the lowered position represented in figures 1 and 2 and the raised position in figure 8, corresponding to the complete winding of the rope 6 on the drum 5, in which the guide member 14 is aligned with the section of the rope 6 extending into the tubular arm 12.

[0015] The pulley 13 is carried by the tubular arm 12 by interposing a calibrated resilience group 15, for example constituted by disc springs, and it bears a bracket 16 to which there is connected the sheath 17 of a flexible cable transmission 18 whose one end is anchored in 19 to the end of the tubular arm 12, as better observable in figure 3. The other end of the cable 18, indicated with 20, is anchored to a side of the spool of the hydraulic distributor 9 to execute the function to be outlined hereinafter.

[0016] The winch according to the invention operates as follows.

[0017] Assuming to start from the condition represented in figures 1 and 2, for engaging and transferring a load (for example a trunk or stump to be cut) towards the support structure 1 of the machine, the hook 7 shall be firstly pulled manually and the control lever 10 of the hydraulic distributor 9 shall be simultaneously moved from the central neutral position or towards the right, i.e. in position A, so as to unwind the rope 6 from the drum 5 initially for a short section, so as to insert such rope 6 into the sliding engagement member 11 of the control lever 10 of the distributor 9, as represented in figure 7. In this step, the free wheel 8 decouples the drum 5 from the hydraulic motor 2 thus, were the operator to simply actuate the lever 10 in the direction corresponding to the unwinding of the rope 6 (towards the right with respect to the central position) the drum 5 would remain stationary, thus avoiding the risk of entanglement of the rope 6 in the tubular arm 12.

[0018] After engaging the rope 6 to the to the sliding engagement member 11 the operator may continue unrolling the rope 6, by pulling the hook 7: due to the traction thus exerted, the control lever 10 is then displaced from the central position towards the unwinding position A, thus the drum 5 is left free to rotate by the hydraulic motor compulsorily in the unwinding direction.

[0019] After unrolling the rope 6 for the required length and after anchoring it through the hook 7 to the load to be transferred, the rope 6 is removed from the engagement member 11 of the lever 10 and thus the latter may be displaced manually by the operator towards the left with respect to the central position, to be positioned in the rewinding position indicated with B in figure 1. The drum 5 thus controlled in rotation by the hydraulic motor 2 rewinds the rope 6 up to positioning the load at the operating position of the machine. Thus, after controlling the stop of hydraulic motor 2 through the lever 10 and after releasing the load, if necessary the operator may once again actuate the control lever 10 by moving it towards the left in the winding position B, to complete the total recovery of the rope 6. At the end of this step, the hook 7 intercepts the guide member 14, thus causing the rotation thereof from the lowered position of figures 1 and 2 to the raised position of figure 8 in which, as mentioned, the guide member 14 is aligned with the tubular arm 12. Once this position is attained, the pull pressure applied to the rope 6 causes the compression of the resilient group 15, as represented in figure 9, and the ensuing lowering of the bracket 17 due to which the cable transmission 17 automatically returns, i.e. without requiring the actuation of the control lever 10, the hydraulic distributor 9 in the central position for stopping the hydraulic motor 2.

[0020] Obviously, the construction details and the embodiments may widely vary with respect to what has been described and illustrated, without departing from the scope of protection of the present invention as described in the claims that follow. Thus, the invention is equally advantageously applicable to in cases where the hydraulic distributor of the winch is controlled by means of a remote control or electrical control instead of being controlled manually: the controlled unwinding of the rope (without the possibility of entanglement) is actually also ensured in this case due to the one direction of traction of the driving shaft obtained by the one-way engagement means.

Claims

1. Winch for forestry machines, agricultural machines

and the like, comprising a drum (5) for the winding and unwinding of a rope (6) intended to be connected to a load, and a rotary hydraulic motor (3) whose shaft (4) drives the drum (5) through a hydraulic distributor (9) having a manual control lever, or remote control or electrical control (10), displaceable to an unwinding position or to a winding position on opposite sides with respect to a central stop position of the hydraulic motor (3), **characterized in that** the shaft (4) of the hydraulic motor (3) is coupled to said drum (5) through a one-way engagement means (8) making said shaft (4) and said drum (5) fixed in rotation to each other only in the direction corresponding to winding of the rope (6) onto the drum (5).

2. Winch according to claim 1, **characterized in that** said one-way engagement means consists in a free wheel (8).

3. Winch according to claim 1 or 2, **characterized in that** it comprises a support structure (1, 12) bearing a return pulley (13) and a member (14) for guiding the rope (6) which is oscillating, at the end of the winding of said rope (6) onto the drum (5), from a lowered position to a raised position so as to control, by means of a flexible cable transmission (17, 18) operatively connected to said distributor (9), the stopping of hydraulic motor (3) without having to actuate said control lever (10).

4. Winch according to claim 3, **characterized in that** said guide member (14) in said raised position actuates said cable transmission (17, 18), as a result of pulling the rope (6), through calibrated resilient means (15).

5. Winch according to any one of the preceding claims, **characterized in that** said control lever (10) is configured to be displaced by the rope (6) to said unwinding position.

6. Winch according to claim 5, **characterized in that** said control lever (10) is provided with a releasable engagement slide member (11) of the rope (6) when the latter is manually pulled to unwind from the drum (5), so as to displace the control lever (10) to said unwinding position.

FIG. 1

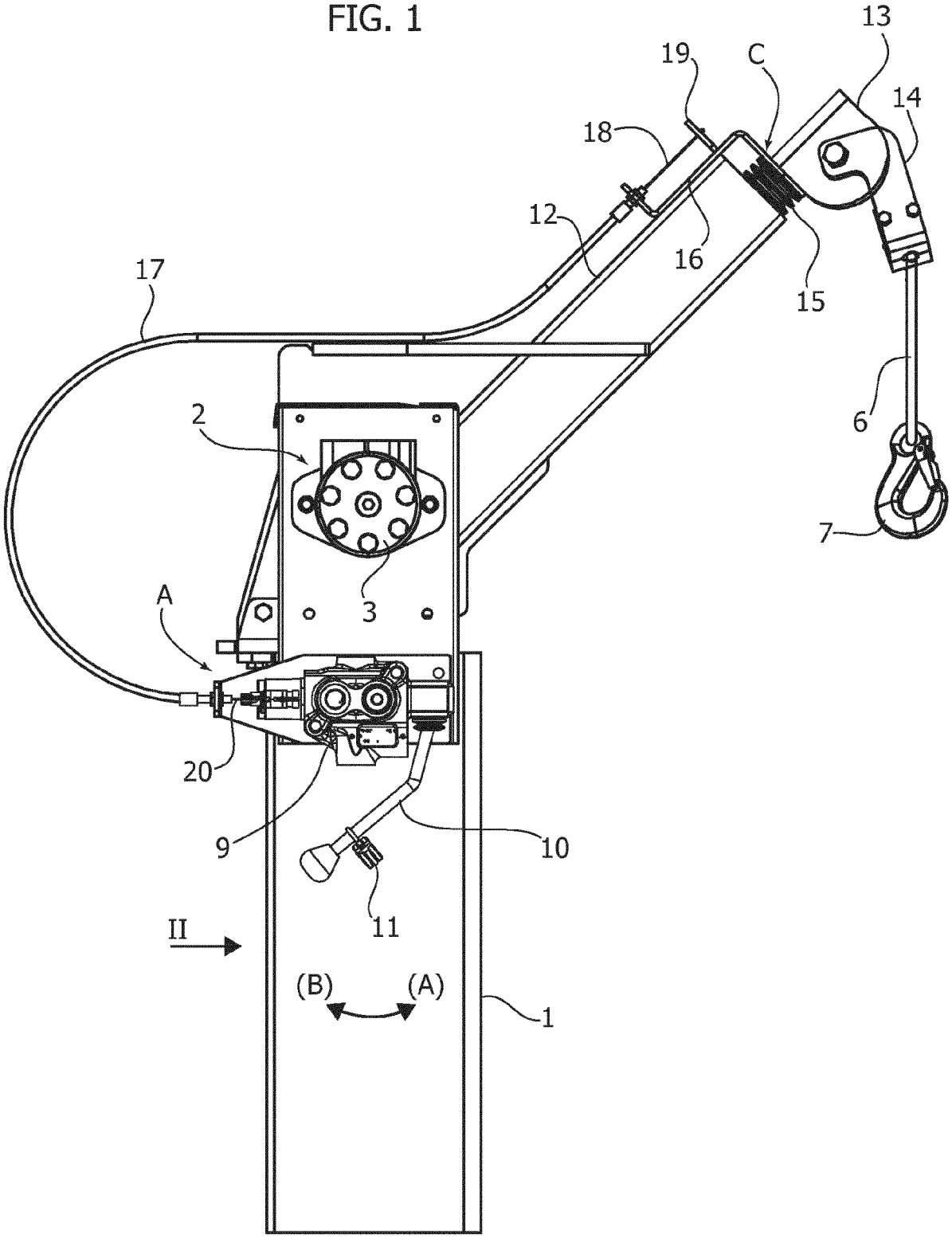


FIG. 2

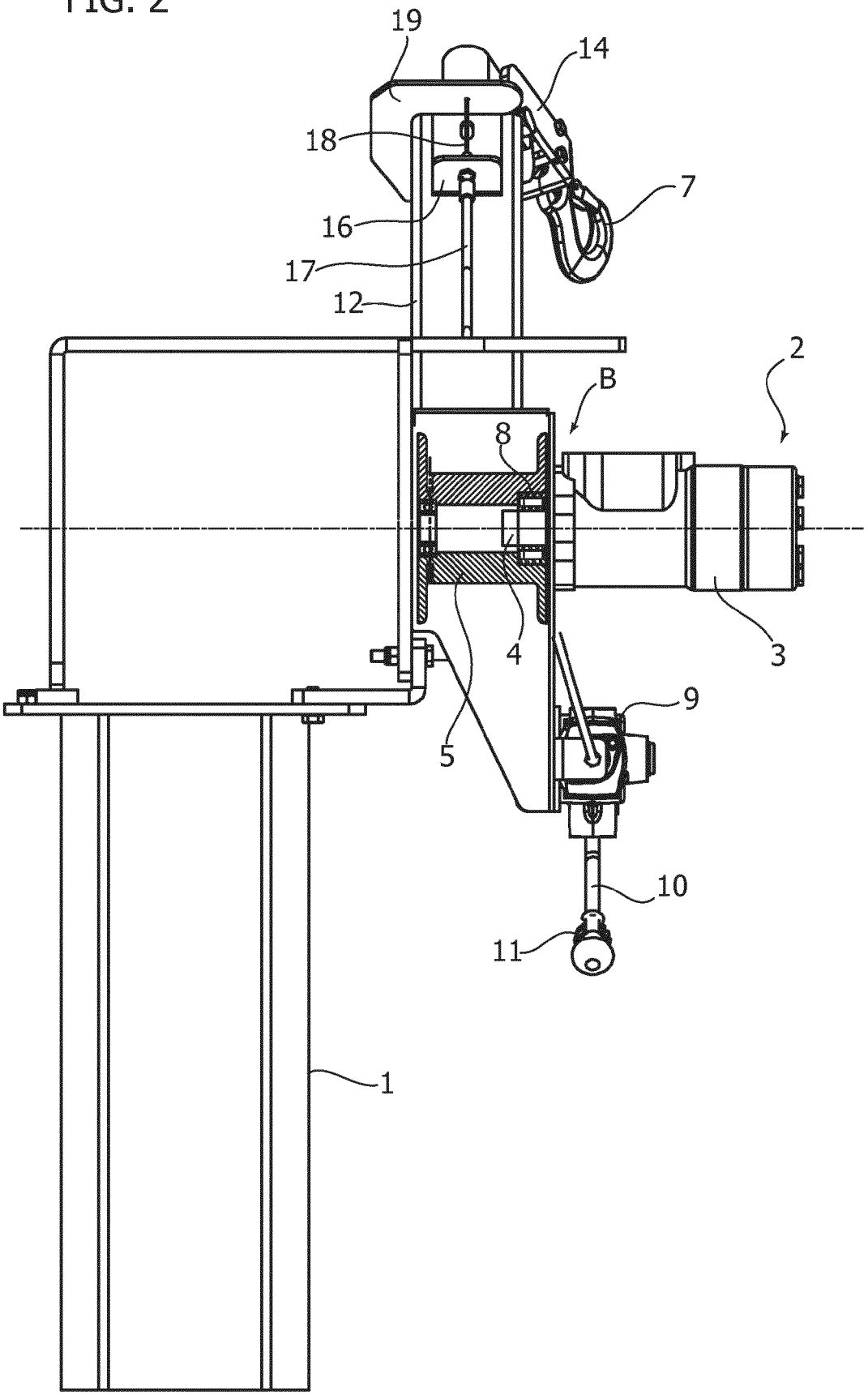


FIG. 3

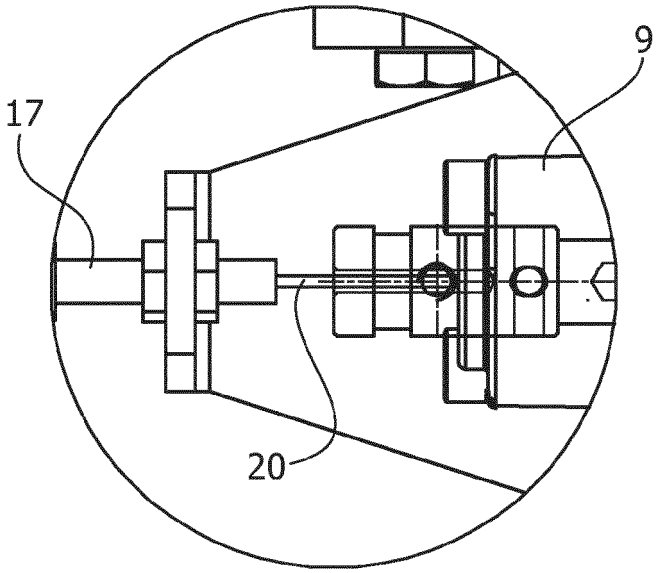


FIG. 4

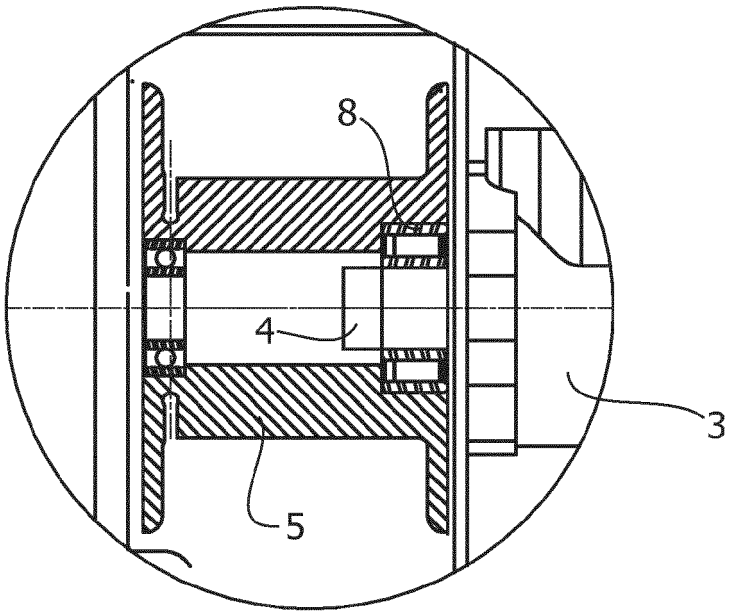


FIG. 5

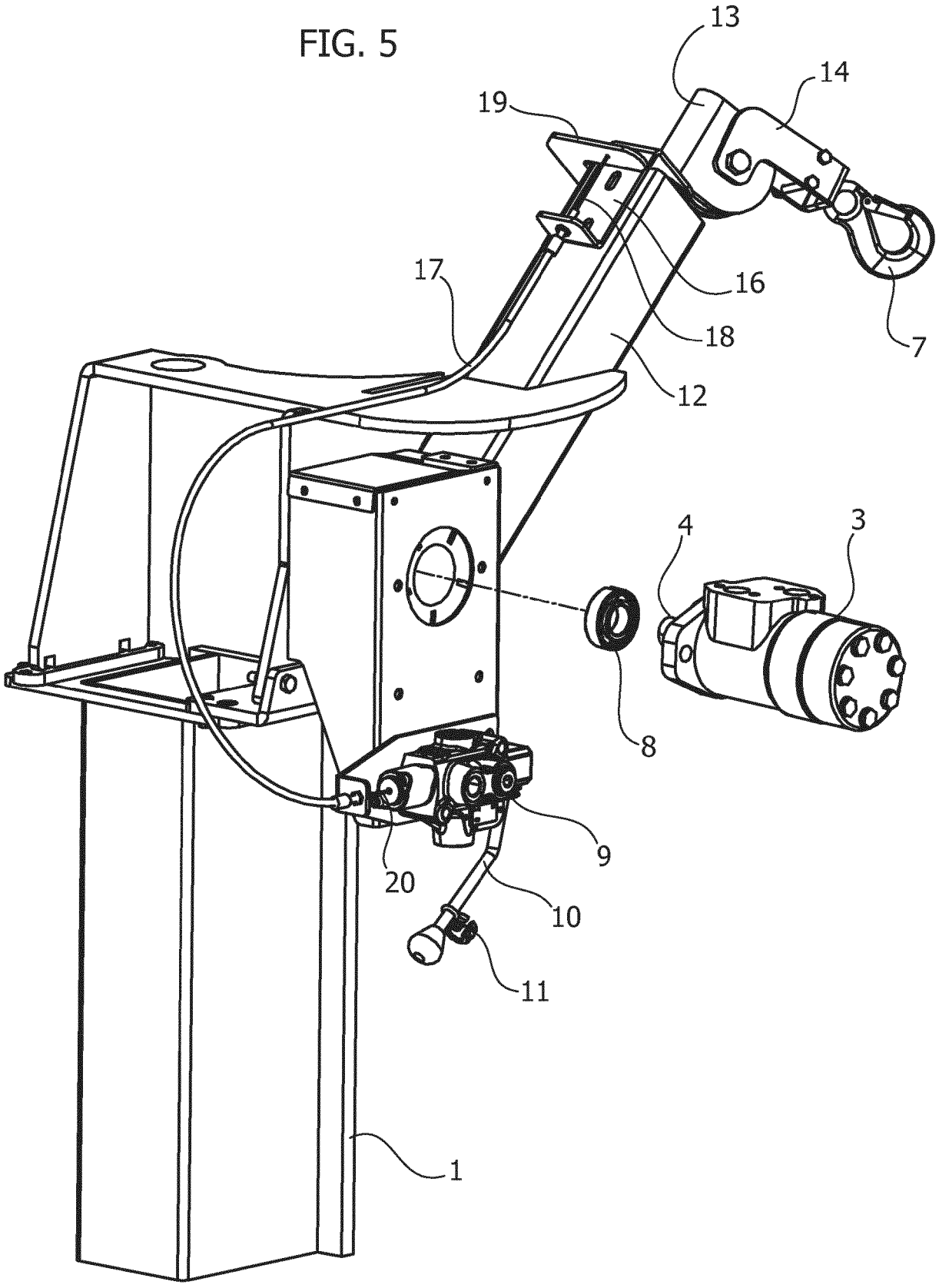


FIG. 6

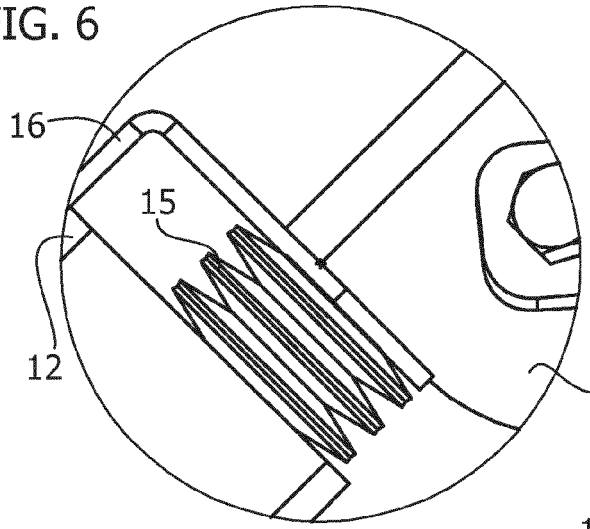


FIG. 7

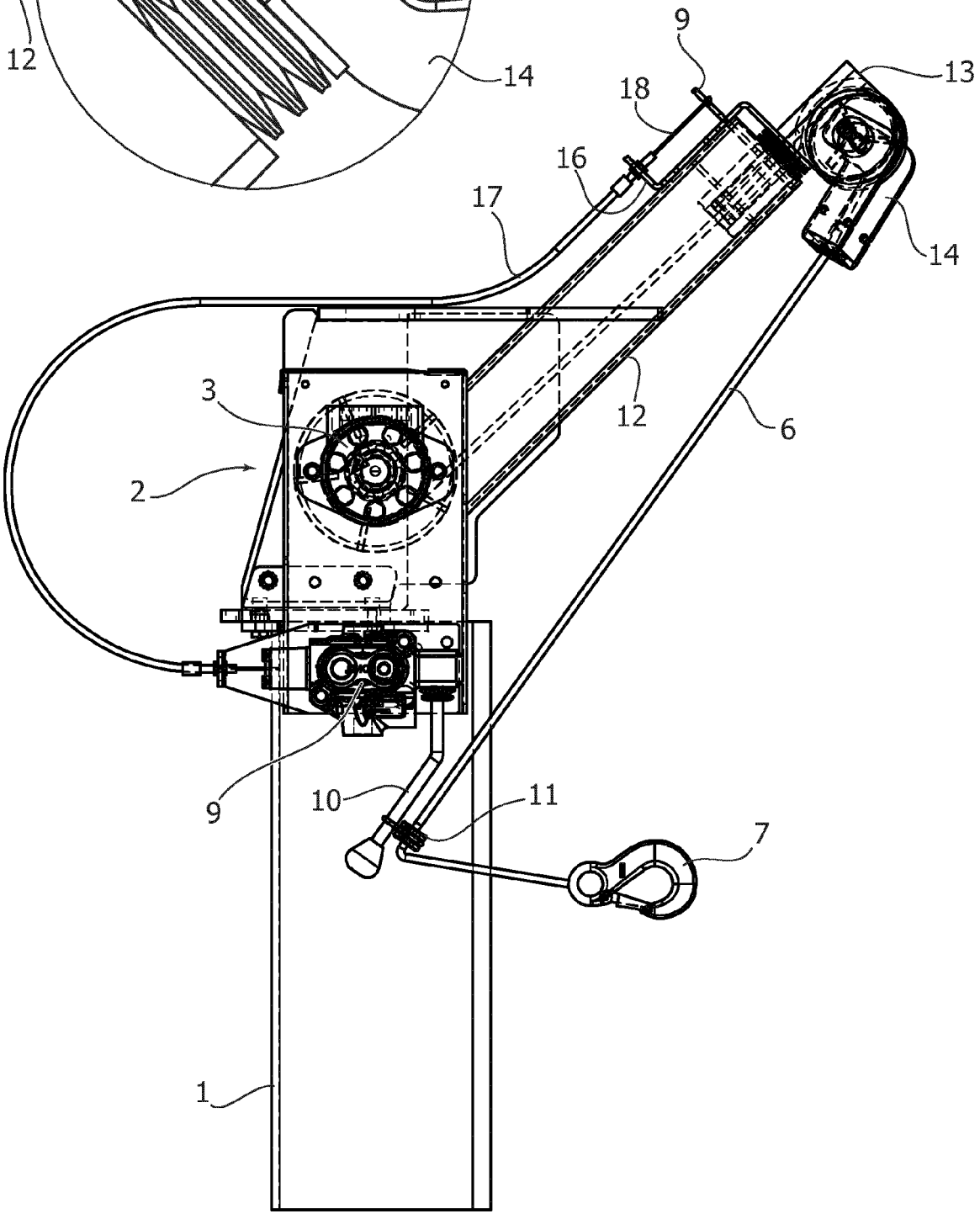


FIG. 8

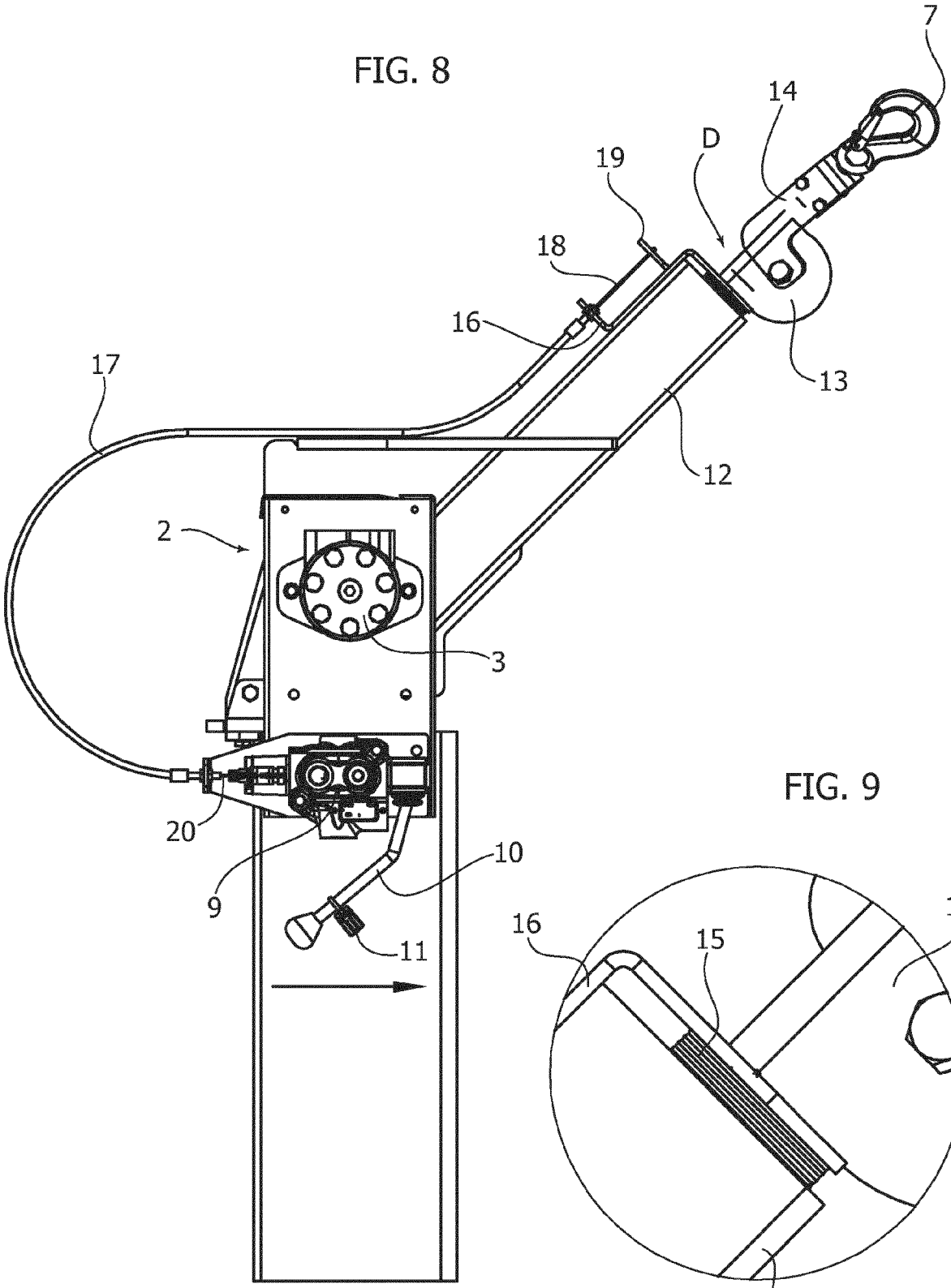
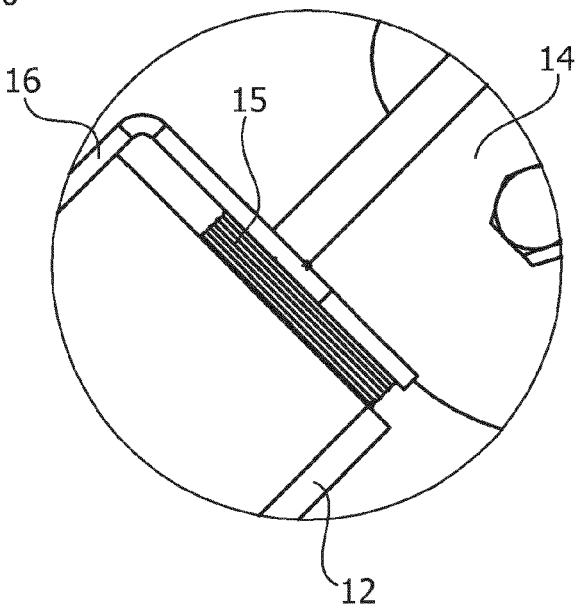


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 16 15 0677

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B66D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 April 2016	Verheul, Omiros

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