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(54) **A MECHANISM OF A GUIDING ARM FOR A WIRE ROPE IN A WINCH**

(57) The present invention concerns a mechanism for precise leading of a rope during its winding and/or unwinding onto a drum of a forest winch. The mechanism comprises a guiding arm (1) for a wire rope, chain or strap (15) in a winch is in that the rope or a chain (15) together with two sheaves (14a in 14b) forms a loop, which connects the guiding arm (1) on one side and a weight (13) on the other side, wherein the guiding arm and the weight are due to the loop connection always at the same distance, while their position with regard to the drum depends on the position of the rope on the drum (3). The guiding arm (1) is rotatably mounted into the winch housing or the drum housing perpendicularly to the drum axis and oscillates along the longitudinal axis of the drum, wherein the wire rope (2) is guided with directing discs (8) towards an outlet opening at a part of the winch, where the wire rope has its ending intended for attachment of a load intended for towing.

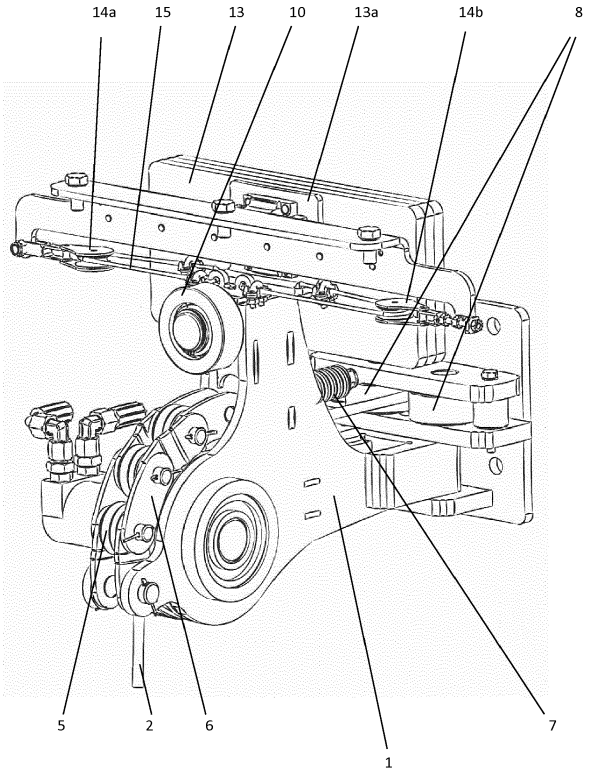

Figure 2

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Description

Field of the invention

[0001] The present invention belongs to the field of constructional details in forest winches, more precisely to the field of guiding mechanisms for precise leading of a rope during its winding and/or unwinding onto a drum of a winch.

Technical problem

[0002] The technical problem is constructional solution of a guiding arm for a wire rope, which will enable controlled winding of a rope onto a drum in a winch. The rope must be wound so that coils on the drum will be placed one next to another (side by side) without any crossings or overlaps. During use a winch almost never stands on a horizontal surface, but is rather inclined to one side with regard to the longitudinal direction or backwards/forwards with regard to the transverse direction of the winch. Weight of the guiding arm has a lever arm with regard to the rotation axis, therefore the arm can spin-stagger, which results in momentum of gravity force around the rotation axis. The force in the rope is not always sufficient to overcome the momentum, therefore the arm does not move along the longitudinal axis of the drum, which results in the rope being unequally wound along the whole width of the drum, so that it is wound in a pile or one coil on top of the others. The task and objective of the invention is to eliminate the fundamental problem of winding a rope onto a drum.

State of the art

[0003] Slovene patent no. 24108 discloses a solution »Forestry winch with controlled winding of traction rope and protection thereof overload«. Rope winding in this winch is performed in a controlled manner, which means that each disposable windings of said cable on the surface of a winding drum should be arranged side by side relatively to each other and without any transpositioning or overlapping, and that each overloading of said towing cable and other components of a driving assembly due to towing of too heavy load should be excluded. To this aim, the winch is furnished-with-a-directing assembly, which is arranged between an upper pulley block and said winding drum and is freely rotatable or least pivotable at certain angle around the vertical geometric axis, wherein said winch moreover includes a dynamometer suitable for measuring of tensioning force within said towing cable, so that also the winding drum can be controlled depending on each measured loading of the towing cable.

[0004] Utility design DE202014105161U1 discloses a directing assembly, which is mounted on the vertical axis and can freely turn left and right along the drum axis. This system works flawlessly if the winch operates on a flat-horizontal ground. If the winch is during its operation inclined left or right or backwards or forwards or in any possible combination of these inclinations, the weight of the assembly inclines the intermediate assembly between the outlet part with the rope and the drum in the direction of the dynamic force to one side or becomes stuck for a specified period of time in one place. Consequently the rope starts to wind in a pile, which is not desired.

Description of the invention

[0005] The essence of a mechanism of a guiding arm for a wire rope in a winch is in that the rope or a chain together with two sheaves forms a loop, which connects on one side the guiding arm and on the other side a weight. The guiding arm and the weight are due to the loop connection always at the same distance, while their position with regard to the drum depends on the position of the rope on the drum, which is independent of the terrain on which the winch stands. The guiding arm is rotatably mounted into the winch housing or the drum housing perpendicularly to the drum axis and oscillates along the longitudinal axis of the drum, wherein the wire rope is guided with directing discs towards an outlet opening at a part of the winch, where the wire rope has its ending intended for attachment of a load intended for towing.

[0006] The mechanism of the guiding arm for a winch wire rope will be described in further detail by reference to the accompanying figures, which show:

Figure 1	scheme of the guiding arm and the drum - longitudinal plane,
Figure 2	the mechanism of the guiding arm,
Figure 3a	the winch on a flat surface - transverse plane,
Figure 3b	the winch inclined around its longitudinal axis to the left - transverse plane,
Figure 4a	the guiding arm when the winch is inclined forwards with regard to its transverse axis,
Figure 4b	the guiding arm when the winch is inclined backwards with regard to its transverse axis.

[0007] The role of the guiding arm 1 installed on the winch is to guide the wire rope 2 along the longitudinal axis of the drum 3 during winding/unwinding of the rope 2 onto the drum 3, so that the rope 2 is wound onto the drum 3 in layers in the shape of a helix. The guiding arm 1 is with a bearing 10 rotatably mounted into the winch housing or into the drum housing perpendicularly to the drum axis and oscillates along the longitudinal axis of the drum 3. The guiding arm 1 is moved left-right along the longitudinal axis of the drum 3 by the wire rope 2, if the latter is sufficiently strained. The wire rope 2 is led from the drum 3 with a sheave 4 on the guiding arm 1 and directing discs 8 through an outlet opening on the rear

side of the winch, where the said wire rope 2 has its ending enabling attachment of a load. The sheave 4 on the guiding arm 1 can be driven with a hydraulic motor, which enables unwinding the rope from the drum 3. In order to ensure that the rope 2 does not slide on the sheave 4 during unwinding, the rope 2 is pushed against a groove in the sheave 4 with one or more pressing cylinders 5, which are connected into a chain with connecting elements 6. The pressure intensity of pressing cylinders 5 on the rope 2 is adjusted with a spring 7.

[0008] The bearing 10 is installed in a supporting console 11, the bearing 10 being rigidly mounted on the guiding arm 1. Onto the supporting console 11 a guide 12 is mounted, to which a weight 13 is attached. The weight 13 is composed from one or more parts of any shape. The weight 13 has an accessory 13a for attachment to the guide 12 and enables movement in the transverse direction in relation to the winch or in the longitudinal direction in relation to the drum axis. A connecting rope or chain 15 connects the weight 13 and the guiding arm 1 with a left sheave 14a and a right sheave 14b, so that the weight 13 moves in the opposite transverse direction in relation to the guiding arm 1. This prevents movement of the arm 1 to the side due to inclining of the winch as shown in figure 3b. Consequently the guiding arm 1 of the rope 2 remains at the same position during use of the winch regardless of the winch being inclined to one or the other side due to the configuration of the terrain. The rope or chain 15 may have any shape and may be made of any material and can be any other possible connecting element intended for transmission of movement via sheaves 14a and 14b, preferably a strap.

[0009] Figure 3a shows the position of the winch on a horizontal surface, while figure 3b shows the winch in case when the winch is inclined around its longitudinal axis to the left side. In figure 3b a dynamic component Fu is directed into the left side, while the weight of the weight 13 causes a tension force Fr in the rope 15, which via the sheave 14b pulls the guiding arm to the right. If the weight 13 has a sufficient mass, then the weight 13 and the guiding arm 1, connected by the rope 15, are in balance or are still as Fu is equal to Fr. Friction in guides of the weight 13 can be adjusted with additional screws on an accessory for placing the weight 13 onto the guide 12. This additionally stabilizes the mechanism so that eventual thrusts of burdening onto the winch in the transverse direction do not cause unneeded oscillation of the guiding arm 1 or the weight 13.

[0010] If the winch is inclined forwards as shown in figure 4b, the guiding arm 1 always falls to the side and is in an unstable position. The weight 13 on the guide 12, which is with the rope 15 connected to the guiding arm 1, disables or holds the guiding arm 1 at the wire's current position on the drum 3. When the winch is inclined backwards as shown in figure 4a, the guiding arm might return towards the middle of the drum 3. This can be prevented with the present invention in the way that the ends of the guiding arm 1 are connected with the wire 15, which is mounted between sheaves 14a and 14b and weight 13 on the other side, the said weight 13 moves along the guide 12 in the opposite transverse direction with regard to the guiding arm 1. The guiding arm 1 is rotatably mounted in the winch housing, wherein the wire rope 2 is guided via directing discs 8 towards an outlet opening at a part of the winch, where the wire rope has its ending intended for attachment of a load intended for towing.

[0011] The present invention enables controlled winding of a rope onto a drum, when a winch is used on different uneven terrains.

Claims

1. A mechanism of a guiding arm for a winch wire rope **characterized in that** a rope or a chain together with two sheaves forms a loop, which connects on one side the guiding arm and on the other side a weight; that the guiding arm and the weight are due to the loop connection always at the same distance, while their position with regard to the drum depends on the position of the rope on the drum; that the guiding arm is rotatably mounted into the winch housing or the drum housing perpendicularly to the drum axis and oscillates along the longitudinal axis of the drum, wherein the wire rope is guided with directing discs towards an outlet opening at a part of the winch, where the wire rope has its ending intended for attachment of a load intended for towing.

2. The mechanism of the guiding arm for a winch wire rope according to claim 1, **characterized in that** the ends of the guiding arm (1) are connected with a rope or a chain (15), which is mounted between sheaves (14a and 14b) and a weight (13) on the other side, which together with its accessory (13a) moves along a guide (12) in the opposite transverse direction in relation to the guiding arm (1); that the guiding arm (1) is rotatably mounted in the winch housing or in the drum (3) housing perpendicularly to the drum (3) axis and oscillates along the longitudinal axis of the drum (3), wherein the wire rope (2) is guided with directing discs (8) towards an outlet opening on the part of the winch where the wire rope (2) has its ending for attachment of a load; that in a supporting console (11) a bearing (10) is installed, which is rigidly attached to the guiding arm (1); that on the supporting console (11) the guide (12) is installed, to which the weight (13) is attached; that the weight (13) has the accessory (13a) for mounting onto the guide (12) and enables movement in the transverse direction in relation to the winch or in the longitudinal direction in relation to the axis of the drum (3); that the friction in guides of the weight (13) can be adjusted with additional screws on the accessory (13a) for mounting the weight (13) onto the guide (12).

3. The mechanism of the guiding arm for a winch wire rope according to claim 2, **characterized in that** the weight (13) consists of one or more parts of any shape.

4. The mechanism of the guiding arm for a winch wire rope according to claims 2 and 3, **characterized in that** the rope or the chain (15) may have any shape and may be made of any material; that the rope or the chain (15) can be any other possible connecting element intended for transmission of movement via sheaves (14a and 14b), preferably a strap.

5. The mechanism of the guiding arm for a winch wire rope according to any of the preceding claims, **characterized in that** the rope (2) is pushed against a groove in a sheave (4) with one or more pressing cylinders (5), which are connected into a chain with connecting elements (6); that the pressure intensity of the pressing cylinders (5) on the rope (2) is adjusted with a spring (7).

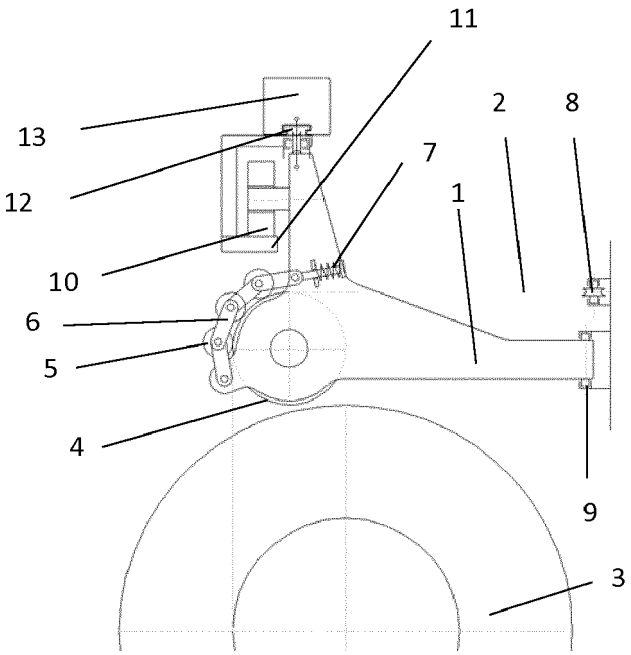

Figure 1

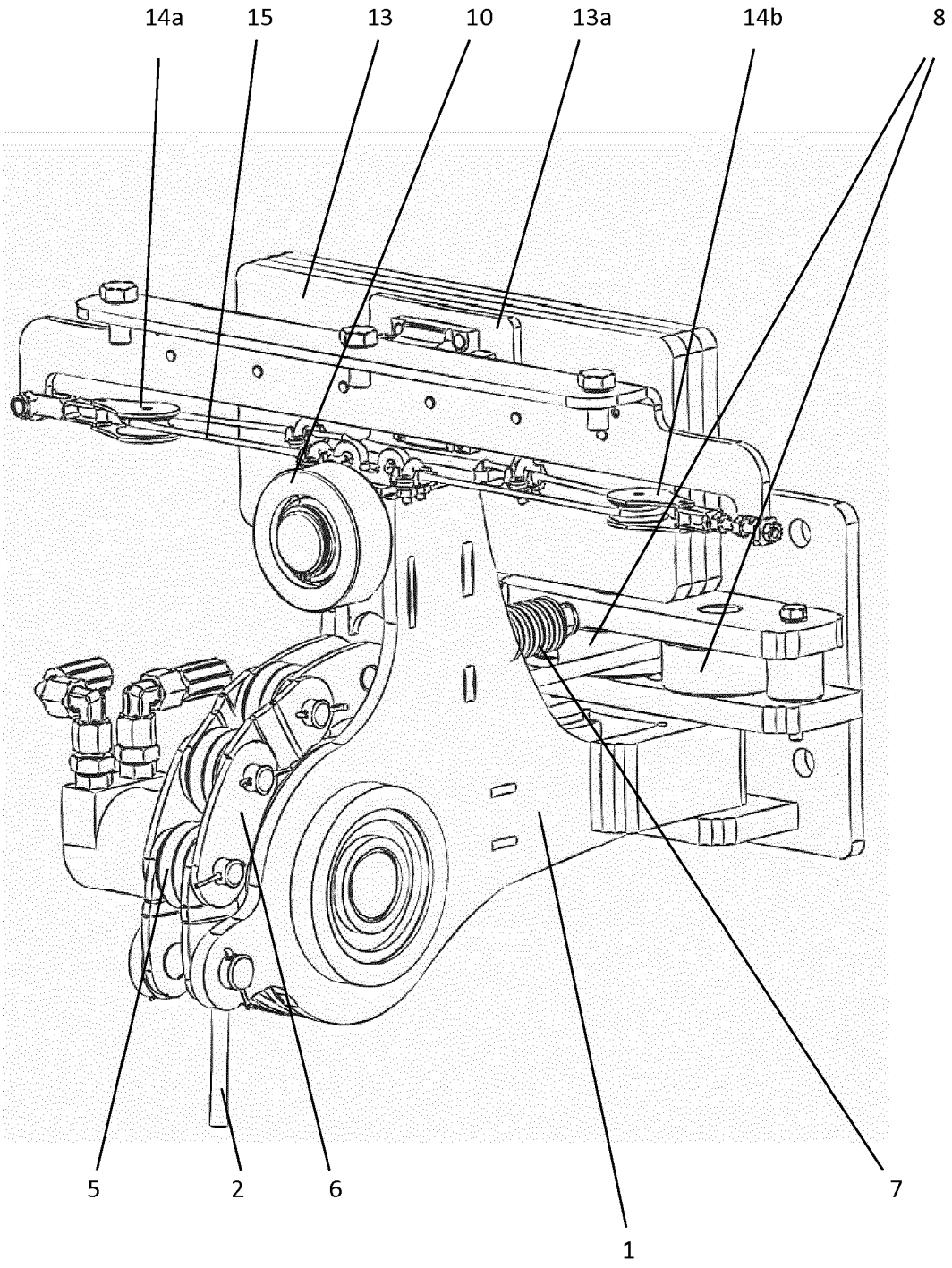

Figure 2

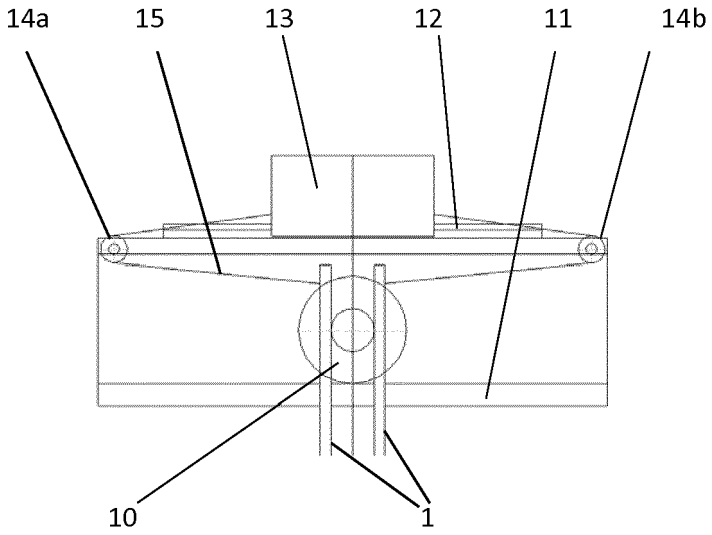

Figure 3a

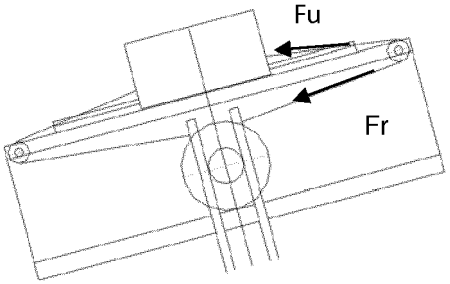

Figure 3b

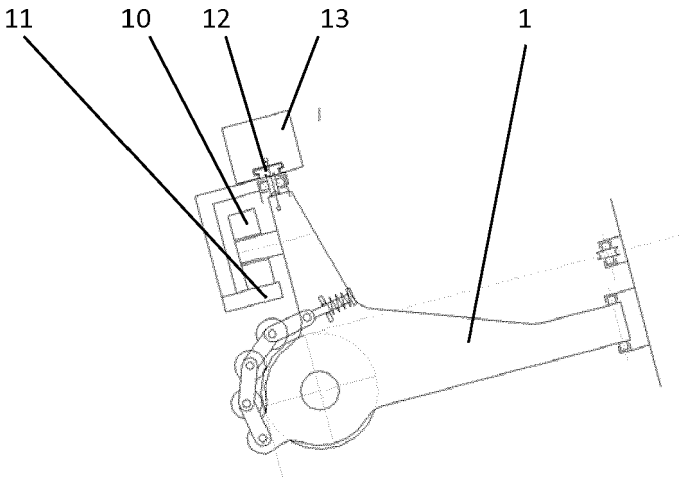

Figure 4a

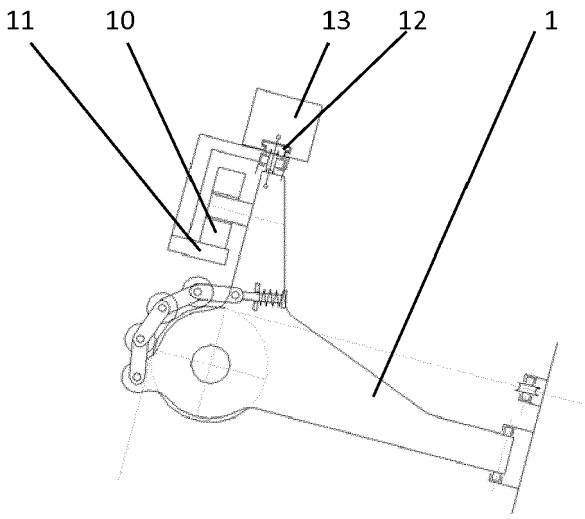

Figure 4b

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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 3144

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 1 202 090 A (MITSUBISHI HEAVY IND LTD [JP]) 12 August 1970 (1970-08-12) * the whole document *	1	INV. B66D1/38
A	AT 11 687 U1 (WILLE FRANK [AT]) 15 March 2011 (2011-03-15) * abstract *	1	
A,D	WO 2013/180665 A1 (TAJFUN PLANINA PROIZV STROJEV D O O [SI]) 5 December 2013 (2013-12-05) * abstract * * figures *	1	

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	12 September 2016	Sheppard, Bruce

CATEGORY OF CITED DOCUMENTS

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12-09-2016

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GB 1202090 A	12-08-1970	NONE	
AT 11687 U1	15-03-2011	NONE	
WO 2013180665 A1	05-12-2013	EP 2855337 A1	08-04-2015
		SI 24108 A	31-12-2013
		WO 2013180665 A1	05-12-2013

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- SI 24108 **[0003]**
- DE 202014105161 U1 **[0004]**