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(54) **CABLE GUIDING DEVICE**

(57) A cable guiding device (11) for guiding a lifting cable and configured for attachment to an outer end of a crane boom. The cable guiding device comprises:
- a housing (12) comprising a first side wall (14) and an opposite second side wall (15);
- a cable pulley (13) rotatably mounted to the housing (12);
- a first mounting stud (16) fixed to the first side wall (14);
- a second mounting stud fixed to the second side wall (15), wherein the cable guiding device (11) is pivotally connectable to an outer end of a crane boom through the first and second mounting studs (16, 17); and
- a sensor unit (21) which is mounted in a cavity (22) in the first mounting stud (16) and which comprises at least one sensor (23) configured to sense the rotation of the cable pulley (13).

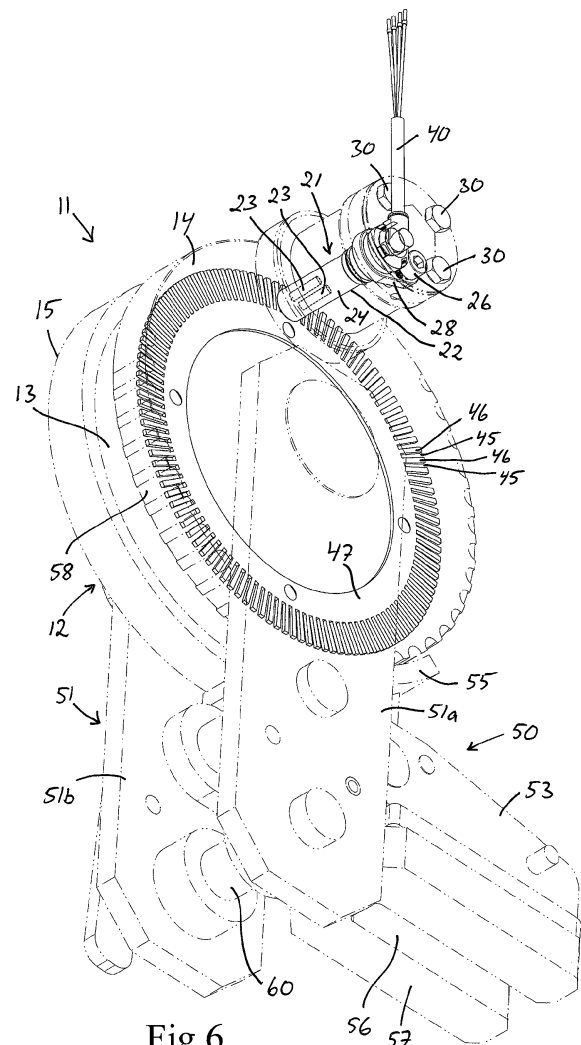


Fig 6

Description

FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a cable guiding device according to the preamble of claim 1 for guiding a lifting cable of a crane and configured for attachment to an outer end of a crane boom.

[0002] A load handling crane, for instance in the form of a conventional lorry crane, comprises a crane boom system which is intended to carry a load via a lifting hook or other type of load handling tool. The load handling tool may be suspended directly at the boom tip of the crane boom system, i.e. at the outer end of the outermost crane boom of the crane boom system. As an alternative, the load handling tool may be suspended at the boom tip by a lifting cable, which at one end is connected to a cable winch and at the other end is connected to the load handling tool. The winch may be mounted to the outermost crane boom of the crane boom system or to any other part of the crane boom system. At the boom tip, the lifting cable runs over a direction-changing cable pulley, from which the lifting cable extends in a vertical direction downwards. The cable pulley may form part of a cable guiding device which is detachably and pivotally mounted to the boom tip. Such a cable guiding device is previously known from DE 9420088 U1. The cable pulley of this previously known cable guiding device is rotatably mounted to a housing, which in its turn is pivotally mountable to the outer end of a crane boom through two cylindrical mounting studs which extend in opposite directions from the housing at the upper part thereof. The cable guiding device disclosed in DE 9420088 U1 also comprises a stopping mechanism which is configured to act as a mechanical end stop for the lifting cable.

[0003] It is previously known to control the cable winch of a load handling crane automatically in such a manner that the distance between the outer end of the outermost crane boom and the load handling tool at the leading end of the lifting cable remains essentially unchanged when the outermost crane boom is telescopically retracted or extended, wherein the rotary movement of the cable winch is synchronized with the telescopic movement of the crane boom. This may for instance be achieved in the manner disclosed in US 2005/0035077 A1. With the solution described in US 2005/0035077 A1, the rotation of a direction-changing cable pulley arranged at the boom tip of a load handling crane is sensed by means of two inductive sensors in order to establish the rotary position or rotational speed of the cable pulley.

SUMMARY OF THE INVENTION

[0004] The object of the present invention is to provide a cable guiding device of the above-mentioned type with a new and favourable design and capable of emitting measuring signals related to the rotation of the cable pulley included in the cable guiding device.

[0005] According to the invention, this object is achieved by means of a cable guiding device having the features defined in claim 1.

[0006] The cable guiding device of the present invention comprises:

- a housing comprising a first side wall and an opposite second side wall arranged in parallel with and at a distance from each other;
- a cable pulley for guiding a lifting cable, wherein the cable pulley is rotatably mounted to the housing and arranged in a space formed between the first and second side walls;
- a first mounting stud fixed to the first side wall and projecting from the first side wall on the side thereof facing away from the second side wall;
- a second mounting stud fixed to the second side wall and projecting from the second side wall on the side thereof facing away from the first side wall, the second mounting stud being concentric with the first mounting stud, wherein the cable guiding device is pivotally connectable to an outer end of a crane boom through the first and second mounting studs; and
- a sensor unit which is mounted in a cavity in the first mounting stud and which comprises at least one sensor configured to sense the rotation of the cable pulley.

[0007] Measuring signals from said at least one sensor related to the rotation of the cable pulley may be used by an electronic control unit of a load handling crane in order to establish the rotary position and/or rotational speed of the cable pulley, wherein the electronic control unit may be configured to control a cable winch of the load handling crane in dependence on the rotary position and/or rotational speed of the cable pulley. By having the sensor unit arranged in a cavity in one of the mounting studs of the cable guiding device, the sensor unit is well-protected from the surroundings. The parts of the mounting stud surrounding the sensor unit shelters the sensor unit from wind and weather and protects the sensor unit against damaging impacts from objects in the surroundings. Furthermore, the mounting studs define the pivot axis of the cable guiding device in relation to the crane boom, and the arrangement of the sensor unit in one of the mounting studs consequently implies that the sensor unit will be arranged close to said pivot axis, which in its turn implies that the sensor unit will be subjected to very limited movements in relation to the boom tip when the cable guiding device pivots in relation to the boom tip. The limited movements of the sensor unit in relation to the boom tip are favourable with respect to the measuring accuracy of the sensor or sensors included in the sensor unit and with respect to the possible cable connection between the sensor unit and the boom tip.

[0008] Further advantageous features of the cable guiding device according to the present invention will appear from the description following below and the de-

pendent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] With reference to the appended drawings, a specific description of embodiments of the invention cited as examples follows below. In the drawings:

- Fig 1 is a schematic lateral view of a part of a load handling crane provided with a cable guiding device,
- Fig 2 is a lateral view of a cable guiding device according to an embodiment of the invention pivotally connected to the outer end of a crane boom included in a load handling crane,
- Fig 3 is a perspective view of the components shown in Fig 2,
- Fig 4 is a perspective view from a first side of the cable guiding device of Fig 2,
- Fig 5 is a perspective view from an opposite second side of the cable guiding device of Fig 2,
- Fig 6 is a perspective view of components included in the cable guiding device of Fig 2,
- Fig 7 is an exploded view of components included in the cable guiding device of Fig 2,
- Fig 8 is a schematic perspective view of components included in the cable guiding device of Fig 2, as seen from a first side,
- Fig 9 is a schematic perspective view of the components shown in Fig 8, as seen from an opposite second side,
- Fig 10 is a schematic perspective view corresponding to Fig 9, and
- Fig 11 is a lateral view of a cable guiding device according to another embodiment of the invention pivotally connected to the outer end of a crane boom included in a load handling crane.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0010] A part of a load handling crane 1 is schematically illustrated in Fig 1. The load handling crane 1 comprises a liftable and lowerable first crane boom 2, in the following denominated outer boom, which is articulately connected to a second crane boom 3 in such a manner that it is pivotable in relation to the second crane boom 3 about an essentially horizontal axis of rotation A1. Only

an outer part of the second crane boom 3 is shown in Fig 1. At its inner end, the second crane boom 3 may be articulately connected to a column (not shown) in such a manner that it is pivotable in relation to the column about an essentially horizontal axis of rotation. The column may in its turn be rotatably mounted to a crane base (not shown) so as to be rotatable in relation to the crane base about an essentially vertical axis of rotation by means of an actuating device. The load handling crane 1 comprises a first hydraulic cylinder 4 for lifting and lowering of the outer boom 2 in relation to the second crane boom 3 and a second hydraulic cylinder (not shown) for lifting and lowering of the second crane boom 3 in relation to the column.

[0011] The outer boom 2 is telescopically extensible to enable an adjustment of the extension length thereof. The outer boom 2 comprises a base section 2a, through which the outer boom 2 is articulately connected to the second crane boom 3, and at least one telescopic crane boom section 2b carried by the base section 2a and displaceable in the longitudinal direction of the base section by means of a hydraulic cylinder 5 for adjustment of the extension length of the outer boom 2.

[0012] A winch 6 for a lifting cable 7 is mounted to the base section 2a of the outer boom 2. As an alternative, the winch 6 could be mounted to the second crane boom 3 or to the column of the load handling crane. A tool holder 8 for a load handling tool 9 is fixed to the lifting cable 7 at the outer end thereof. In the illustrated example, the load handling tool 9 has the form of a lifting hook, but any other suitable type of load handling tool may be fixed to the tool holder 8 as an alternative to a lifting hook.

[0013] At the boom tip, i.e. at the outer end 10 of the outer boom 2, the lifting cable 7 is guided by a cable guiding device 11, which is detachably attached to the outer boom 2 at the outer end 10 thereof. The cable guiding device 11 is pivotally connected to the outer boom 2 and it may have the design illustrated in closer detail in Figs 2-10.

[0014] The cable guiding device 11 comprises a housing 12 and a direction-changing cable pulley 13 for guiding the lifting cable 7, wherein the cable pulley 13 is rotatably mounted to the housing 12. The housing 12 comprises a first side wall 14 and an opposite second side wall 15 arranged in parallel with and at a distance from the first side wall. The cable pulley 13 is arranged in a space formed between the first and second side walls 14, 15. A first mounting stud 16 is fixed to the first side wall 14 so as to project from the first side wall on the side thereof facing away from the second side wall 15. A second mounting stud 17 is fixed to the second side wall 15 so as to project from the second side wall on the side thereof facing away from the first side wall 14, wherein the second mounting stud 17 is concentric with the first mounting stud 16. The first and second mounting studs 16, 17 extend in opposite directions from the housing 12 at the upper part thereof. The cable guiding device 11 is pivotally connected to the outer end 10 of the outer boom

2 through the first and second mounting studs 16, 17, wherein the housing 12 is pivotable in relation to the outer boom 2 about a pivot axis 18 (see Fig 2) coinciding with the centre axis of the first and second mounting studs 16, 17.

[0015] The cable guiding device 11 may be attached directly to the outer end 10 of the outer boom 2, as illustrated in Fig 1, wherein the housing 12 of the cable guiding device 11 is pivotally mounted directly to the outer end 10 of the outer boom 2 through the first and second mounting studs 16, 17. As an alternative, the cable guiding device 11 may be connected to the outer end 10 of the outer boom 2 through an intermediate piece 19 which is detachably mounted to the outer end of the outer boom, as illustrated in Figs 2 and 3, wherein the housing 12 of the cable guiding device 11 is pivotally mounted to the intermediate piece 19 through the first and second mounting studs 16, 17. Each mounting stud 16, 17 has a cylindrical external contact surface 20 configured for rotary engagement with a corresponding internal contact surface on the outer boom 2 or on the intermediate piece 19.

[0016] The cable guiding device 11 is provided with a sensor unit 21 (see Figs 6 and 7), which is mounted in a cavity 22 in the first mounting stud 16 and which comprises at least one sensor 23 (schematically illustrated with broken lines in Fig 6) configured to sense the rotation of the cable pulley 13. In the illustrated example, the sensor unit 21 comprises a cylindrical outer casing 24, which accommodates the sensor or sensors 23 of the sensor unit.

[0017] The above-mentioned cavity 22 is preferably centrally arranged in the first mounting stud 16. In the illustrated embodiment, the cavity 22 has the form of an axial through hole in the first mounting stud 16. The cavity 22 is aligned with and connected to a through hole 25 (see Figs 9 and 10) in the first side wall 14, wherein the sensor unit 21 has an inner end 21a which faces the cable pulley 13 and which is received in the through hole 25 in the first side wall. Fig 9 shows the inner side of the first side wall 14 in a situation when no sensor unit 21 is mounted to the first mounting stud 16, and Fig 10 shows the inner side of the first side wall 14 in a situation when the sensor unit 21 has been mounted to the first mounting stud 16 with the inner end 21a of the sensor unit received in the through hole 25 in the first side wall 14. In the illustrated embodiment, the sensor unit 21 is configured to be releasably fixed to the first mounting stud 16 by means of a fastening element 26 in the form of a screw (see Fig 7), which is configured to extend through an associated through hole 27 in a mounting lug 28 on the sensor unit 21 and which is configured for engagement with a threaded hole 29 (see Fig 8) in the first mounting stud 16.

[0018] The first mounting stud 16 is configured to be detachably fixed to the first side wall 14 by means of two or more elongated fastening elements 30 in the form of bolts or screws, wherein the fastening elements 30 are

configured to be received in associated through holes 31 (see Figs 7 and 8) which are axially arranged in the first mounting stud 16 and distributed about the cavity 22. In the illustrated example, there are four such fastening elements 30. An inner end 16a (see Fig 7) of the first mounting stud 16 is configured to be received in an associated recess 32 in a socket member 33, which in its turn is fixed to the first side wall 14. Each fastening element 30 is configured for engagement with a threaded hole 35 in the socket member 33. An axial through hole 36 in the socket member 33 is aligned with the through hole 25 in the first side wall 14 and with the cavity 22 in the first mounting stud 16. When the sensor unit 21 is properly mounted to the first mounting stud 16, the outer casing 24 of the sensor unit 21 extends through the cavity 22 in the first mounting stud, through the through hole 36 in the socket member 33 and through the through hole 25 in the first side wall 14.

[0019] In the illustrated embodiment, the end surface 37 at the outer end of the first mounting stud 16 and the outer end 21b of the sensor unit 21 are covered by a cover disc 38, which is provided with through holes 39 for the fastening elements 30 and which is configured to be fixed to the end surface 37 of the first mounting stud by means of these fastening elements 30.

[0020] In the illustrated embodiment, the sensor unit 21 is configured to be connected to an electronic control unit of the load handling crane 1 through a cable connection, wherein measuring signals from the sensor or sensors 23 of the sensor unit are transmitted to the electronic control unit through this cable connection. In the illustrated example, the sensor unit 21 is connected to a cable 40, which is configured to be received in a radial recess 41 provided in the end surface 37 of the first mounting stud 16.

[0021] As an alternative to a cable connection, the sensor unit 21 may be provided with means for wireless transmission of the measuring signals from the sensor or sensors 23.

[0022] The second mounting stud 17 is configured to be detachably fixed to the second side wall 15 by means of an elongated fastening element 42 (see Fig 5) in the form of a bolt or screw, wherein this fastening element 42 is configured to be received in an axial trough hole in the second mounting stud 17. An inner end of the second mounting stud 17 is received in an associated recess (not shown) in a socket member 43, which is fixed to the second side wall 15.

[0023] Each sensor 23 is with advantage an inductive sensor, which is configured to sense the rotation of the cable pulley 13 by sensing the passage of a series of alternating recesses 45 (see Fig 6) and metallic parts 46 on the cable pulley 13 or, in case the cable pulley 13 is made of non-metallic material, on a disc 47 of metallic material fixed to the cable pulley 13. In the illustrated embodiment, the cable pulley 13 is of non-metallic material, preferably of plastic material, wherein a ring-shaped disc 47 of metallic material is fixed to the cable

pulley 13 on the side thereof facing the first side wall 14. The disc 47 is rotatable together with the cable pulley 13 about the centre axis of the cable pulley. The disc 47 is concentric with the cable pulley 13 and provided with a series of recesses 45 arranged at regular spacings from each other on a circular path about the centre axis of the disc 47. Each recess 45 and each intermediate metallic part 46 located between two recesses 45 preferably extend in a radial direction on the disc 47 from a starting point at or close to the periphery of the disc. Each sensor 23 is configured to sense the passage of said recesses 45 and said intermediate metallic parts 46 when the disc 47 rotates together with the cable pulley 13 to thereby emit measuring signals related to the rotation of the cable pulley 13.

[0024] The sensor unit 21 preferably comprises at least two sensors 23, wherein these sensors 23 are offset in relation to each other in the rotational direction of the cable pulley 13, i.e. arranged at a certain distance from each other in the rotational direction of the cable pulley 13, to thereby allow these sensors 23 to emit measuring signals from which the rotational direction of the cable pulley 13 may be established. The distance between the two sensors 23 has to be different from the distance between two recesses 45 on the disc 47, as seen in the rotational direction of the disc.

[0025] As an alternative to inductive sensors, any other suitable type or sensors may be used for sensing the rotation of the cable pulley 13, such as for instance optic sensors.

[0026] The cable guiding device 11 illustrated in Figs 1-6 is provided with a stopping mechanism 50 of a previously known type, which is configured to act as a mechanical end stop for the lifting cable 7. The stopping mechanism 50 comprises:

- a first pivot arm 51, which is pivotally connected to the housing 12 of the cable guiding device 11 so as to be pivotable about a first pivot axis 52 (see Fig 2) coinciding with the centre axis of the cable pulley 13;
- a second pivot arm 53, which is pivotally connected to the first pivot arm 51 so as to be pivotable about a second pivot axis 54 extending in parallel with the first pivot axis 52; and
- an arresting member 55 which is fixed to the second pivot arm 53.

[0027] The second pivot arm 53 is provided with a passage 56 (see Fig 5) for the lifting cable 7 and a contact surface 57 configured to co-operate with the tool holder 8 that is fixed to the lifting cable 7 at the leading end thereof. The tool holder 8 acts as a stop member and is configured to come into contact with the contact surface 57 on the second pivot arm 53 and thereby force the second pivot arm 53 to pivot upwards towards the periphery of the first and second side walls 14, 15 when the tool holder 8 reaches the second pivot arm 53 during a retraction of the lifting cable 7. The arresting member 55

acts as a brake member and is configured to come into contact with a peripheral edge 58 on at least one of the side walls 14, 15 when the second pivot arm 53 is pivoted upwards under the effect of the tool holder 8 and thereby stop the pivotal movement of the second pivot arm 53 in relation to the first and second side walls 14, 15. Said peripheral edge 58 is preferably toothed, as illustrated in Figs 3-6, wherein the arresting member 55 is provided with a corresponding toothing (not shown) which is configured to come into locking engagement with the toothing on the peripheral edge 58 on the side wall 14 when the second pivot arm 53 is pivoted upwards under the effect of the tool holder 8. The toothing on the peripheral edge 58 of the first side wall 14 has been omitted in Figs 7-9.

[0028] In the illustrated example, the first pivot arm 51 comprises two mutually parallel shanks 51a, 51b arranged on opposite sides of the housing 12 formed by the first and second side walls 14, 15. The pivotal movement of the second pivot arm 53 downwards in relation to the first pivot arm 51 is limited by a stop member 60 (see Fig 4) arranged at the lower end of the first pivot arm 51. This stop member 60 is fixed to and extends between the two shanks 51a, 51b of the first pivot arm 51.

[0029] If so desired, the cable guiding device 11 of the present invention may lack a stopping mechanism 50 of the type described above. Fig 11 illustrates a cable guiding device 11 according to an embodiment of the present invention lacking such a stopping mechanism 50. As to the rest, the cable guiding device 11 illustrated in Fig 11 has the same design as the cable guiding device which is illustrated in Figs 2-9 and described above.

[0030] The invention is of course not in any way restricted to the embodiments described above. On the contrary, many possibilities to modifications thereof will be apparent to a person with ordinary skill in the art without departing from the basic idea of the invention such as defined in the appended claims.

Claims

1. A cable guiding device for guiding a lifting cable of a crane and configured for attachment to an outer end of a crane boom (2), the cable guiding device (11) comprising:

- a housing (12) comprising a first side wall (14) and an opposite second side wall (15) arranged in parallel with and at a distance from each other;
- a cable pulley (13) for guiding a lifting cable (7), wherein the cable pulley (13) is rotatably mounted to the housing (12) and arranged in a space formed between the first and second side walls (14, 15);
- a first mounting stud (16) fixed to the first side wall (14) and projecting from the first side wall on the side thereof facing away from the second

side wall (15); and

- a second mounting stud (17) fixed to the second side wall (15) and projecting from the second side wall on the side thereof facing away from the first side wall (14), the second mounting stud (17) being concentric with the first mounting stud (16),

wherein the cable guiding device (11) is pivotally connectable to an outer end of a crane boom (2) through the first and second mounting studs (16, 17), **characterized in that** the cable guiding device (11) is provided with a sensor unit (21) which is mounted in a cavity (22) in the first mounting stud (16) and which comprises at least one sensor (23) configured to sense the rotation of the cable pulley (13).

2. A cable guiding device according to claim 1, **characterized in that** said at least one sensor (23) is an inductive sensor.

3. A cable guiding device according to claim 2, **characterized in:**

- **that** a ring-shaped disc (47) of metallic material is fixed to the cable pulley (13) on the side thereof facing the first side wall (14) so as to be rotatable together with the cable pulley (13), wherein the disc (47) is concentric with the cable pulley (13) and provided with a series of recesses (45) arranged at regular spacings from each other on a circular path about the centre axis of the disc (47); and

- **that** said at least one sensor (23) is configured to sense the passage of said recesses (45) when the cable pulley (13) rotates to thereby emit measuring signals related to the rotation of the cable pulley (13).

4. A cable guiding device according to claim 3, **characterized in that** each recess (45) extends in a radial direction on the disc (47) from a starting point at or close to the periphery of the disc (47).

5. A cable guiding device according to claim 1, **characterized in that** said at least one sensor (23) is an optic sensor.

6. A cable guiding device according to any of claims 1-5, **characterized in that** the sensor unit (21) comprises at least two such sensors (23), wherein these sensors (23) are offset in relation to each other in the rotational direction of the cable pulley (13) to thereby allow these sensors (23) to emit measuring signals from which the rotational direction of the cable pulley (13) may be established.

7. A cable guiding device according to any of claims

1-6, **characterized in that** said cavity (22) has the form of an axial through hole in the first mounting stud (16).

8. A cable guiding device according to any of claims 1-7, **characterized in that** said cavity (22) is aligned with and connected to a through hole (25) in the first side wall (14), wherein the sensor unit (21) has an inner end (21a) which faces the cable pulley (13) and which is received in said through hole (25) in the first side wall.

9. A cable guiding device according to any of claims 1-8, **characterized in that** the first mounting stud (16) is detachably fixed to the first side wall (14) by means of two or more elongated fastening elements (30) in the form of bolts or screws, wherein these fastening elements (30) are received in associated through holes (31) which are axially arranged in the first mounting stud (16) and distributed about said cavity (22).

10. A cable guiding device according to claim 9, **characterized in that** an inner end (16a) of the first mounting stud (16) is received in an associated recess (32) in a socket member (33), which is fixed to the first side wall (14).

11. A cable guiding device according to any of claims 1-10, **characterized in that** the cable guiding device (11) is provided with a stopping mechanism (50) which is configured to act as a mechanical end stop for the lifting cable (7).

12. A cable guiding device according to claim 11, **characterized in that** the stopping mechanism (50) comprises:

- a first pivot arm (51), which is pivotally connected to the housing (12) so as to be pivotable about a first pivot axis (52) coinciding with the centre axis of the cable pulley (13);

- a second pivot arm (53), which is pivotally connected to the first pivot arm (51) so as to be pivotable about a second pivot axis (54) extending in parallel with the first pivot axis (52), the second pivot arm (53) being provided with a passage (56) for the lifting cable (7) and a contact surface (57) configured to co-operate with a stop member (8) that is fixed to the lifting cable (7) at the leading end thereof, wherein this stop member (8) is configured to come into contact with the contact surface (57) on the second pivot arm (53) and thereby force the second pivot arm (53) to pivot upwards towards the first and second side walls (14, 15) when the stop member (8) reaches the second pivot arm (53) during a retraction of the lifting cable (7); and

- an arresting member (55) which is fixed to the second pivot arm (53), wherein the arresting member (55) is configured to come into contact with a peripheral edge (58) on at least one of the first and second side walls (14, 15) when the second pivot arm (53) is pivoted upwards under the effect of the stop member (8) and thereby stop the pivotal movement of the second pivot arm (53) in relation to the first and second side walls (14, 15).

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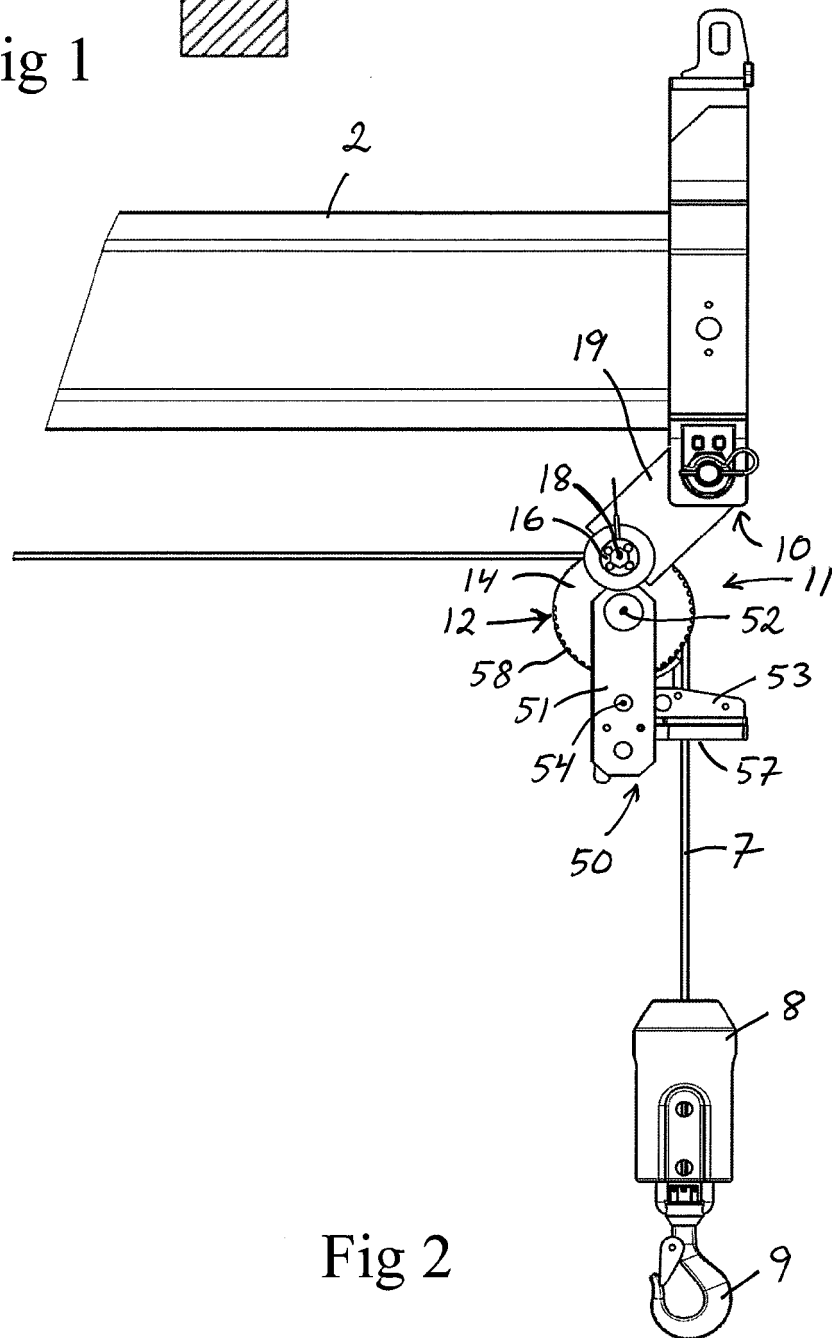
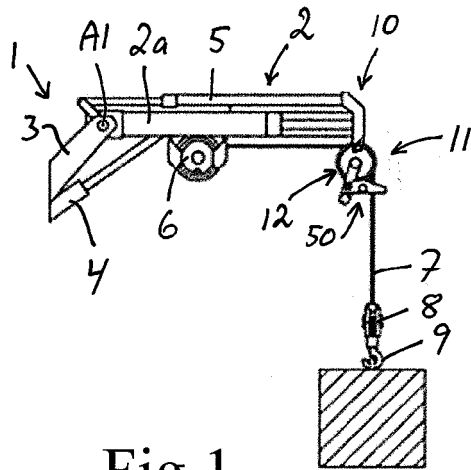
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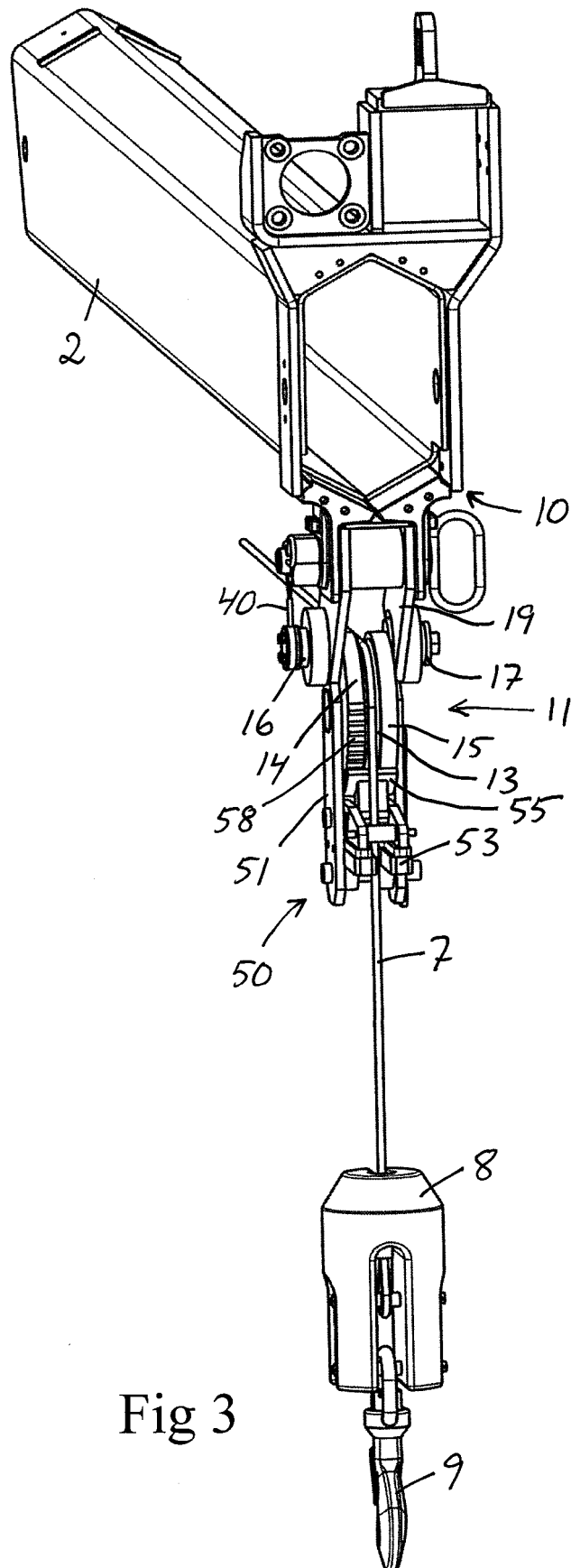
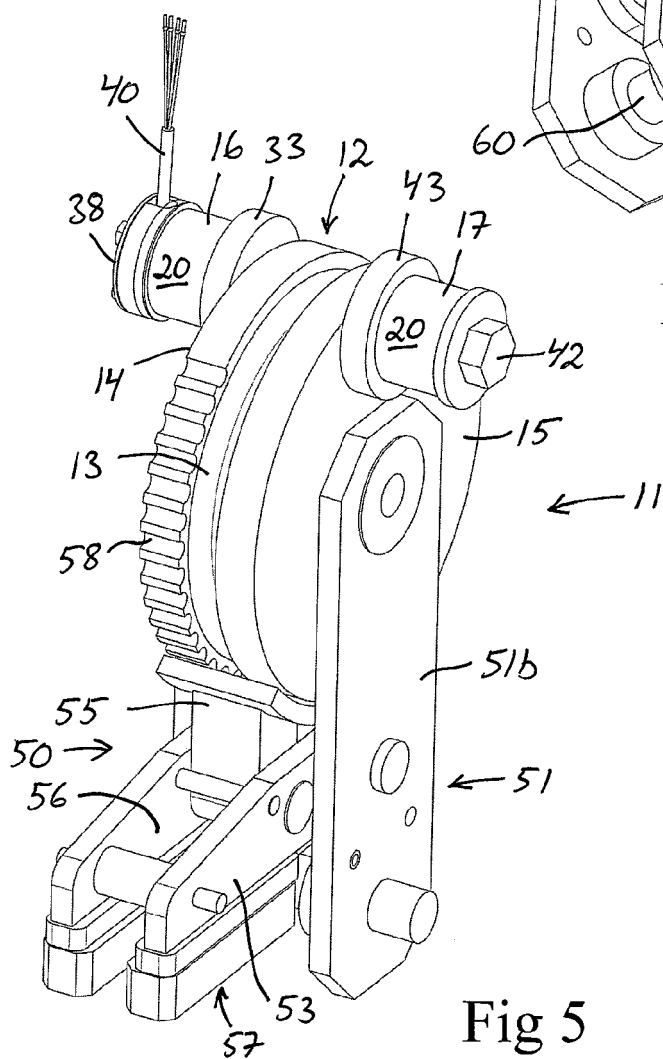
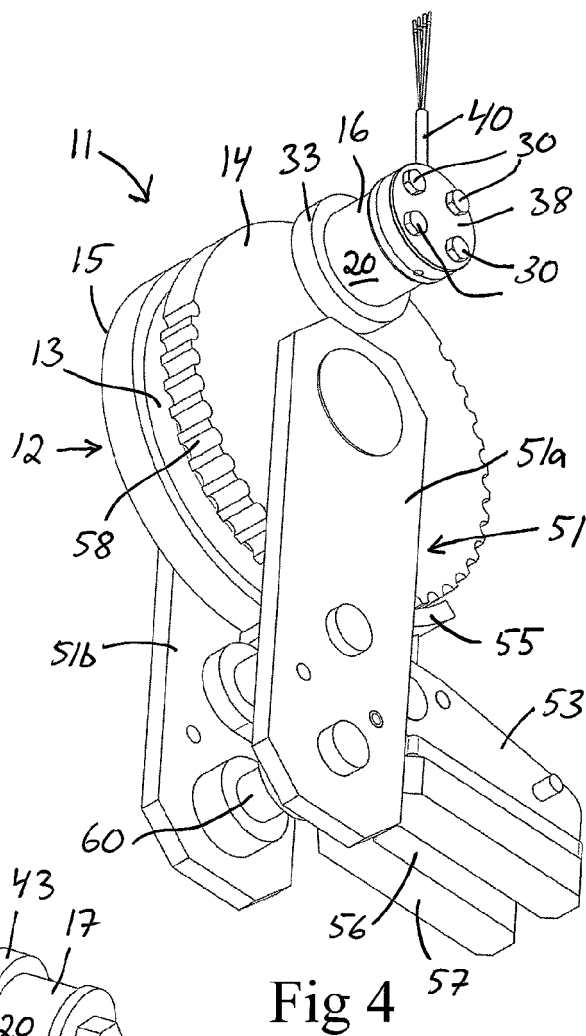


Fig 3



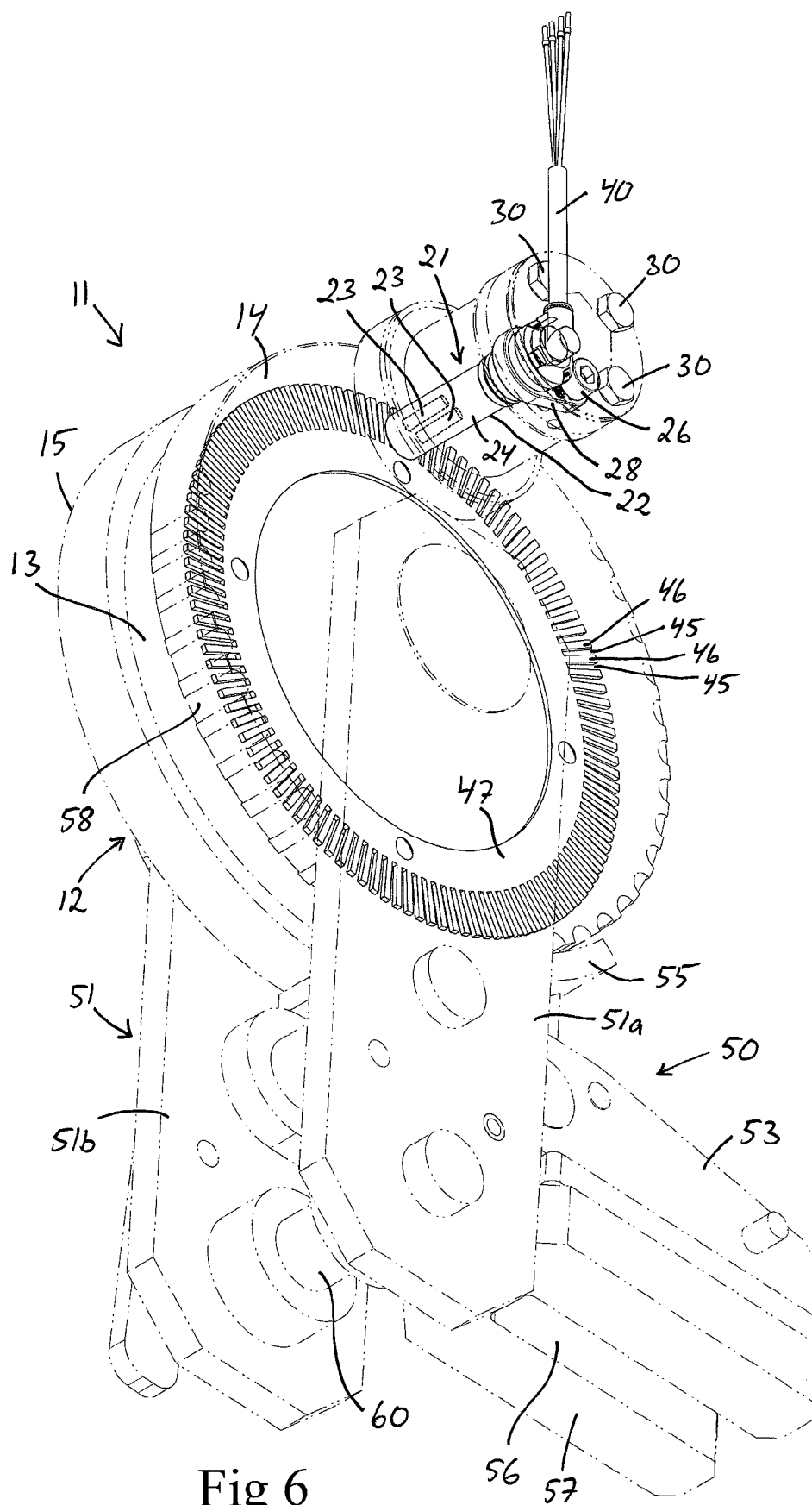


Fig 6

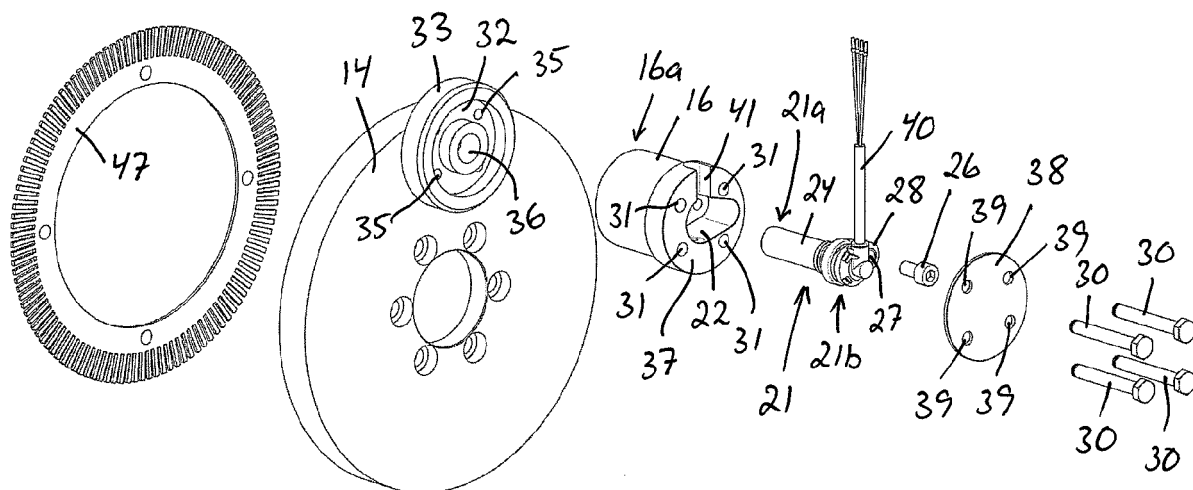


Fig 7

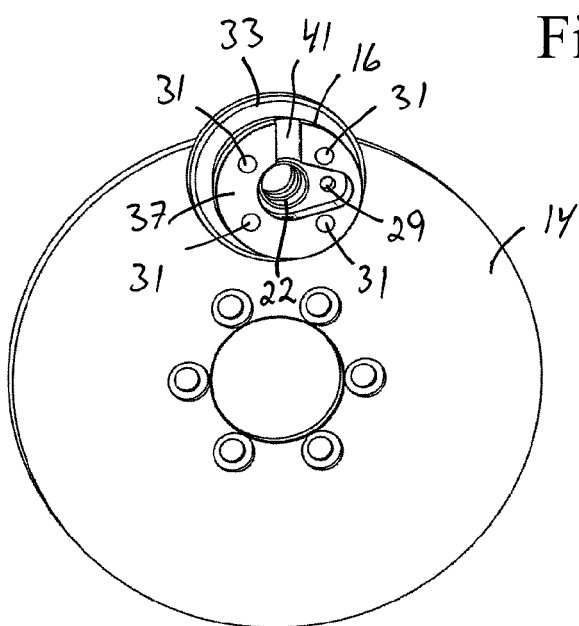


Fig 8

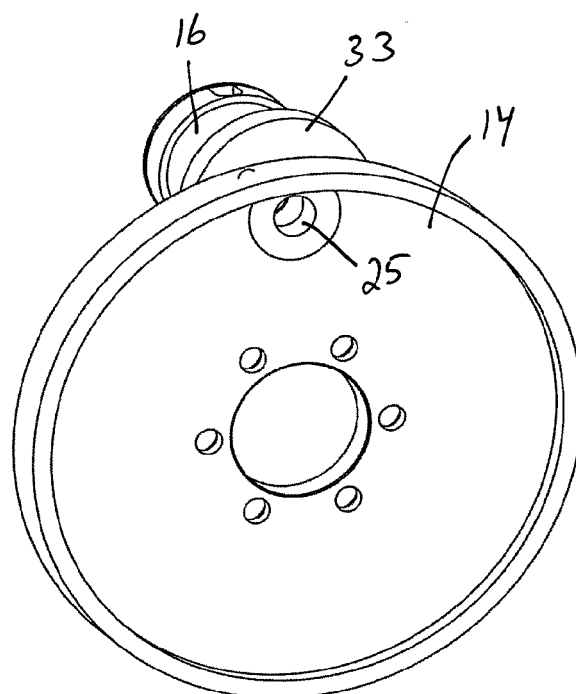


Fig 9

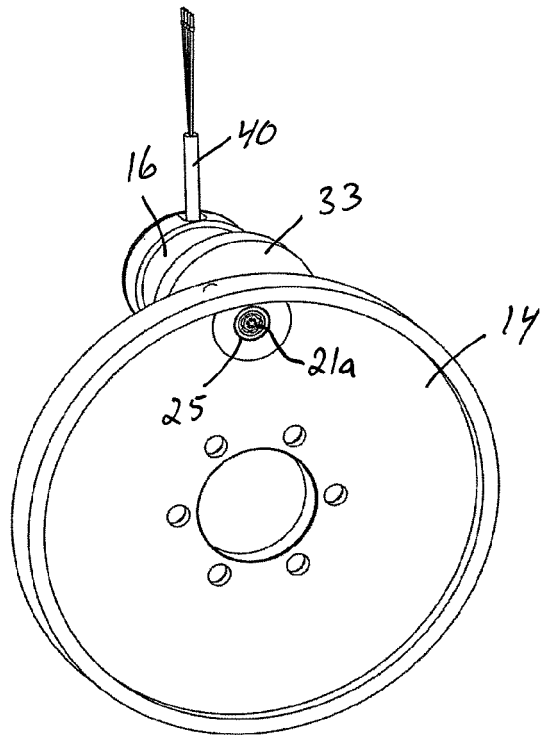


Fig 10

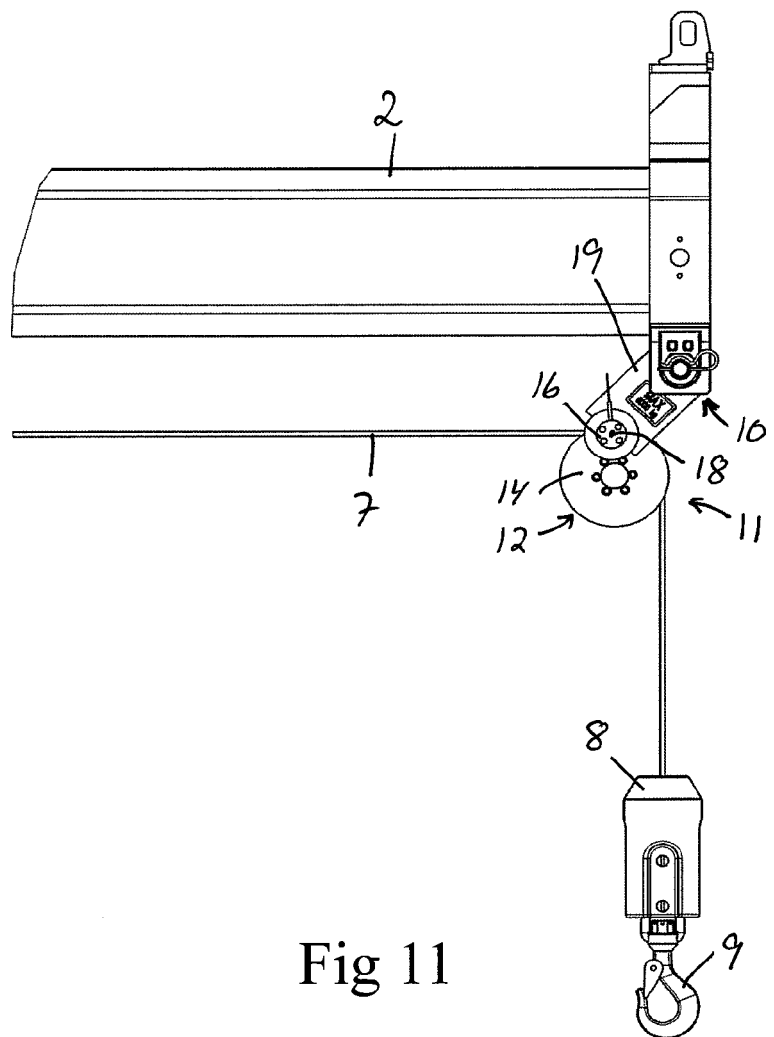


Fig 11



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 20 9008

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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	DE 94 20 088 U1 (ROTZLER GMBH CO [DE]) 16 February 1995 (1995-02-16) * page 4 - page 8 * * abstract * * figures *	1	INV. B66C13/50 B66C23/66 B66C23/70 B66D1/36
A	EP 1 491 485 A1 (FASSI GRU IDRAULICHE S P A [IT]) 29 December 2004 (2004-12-29) * abstract * * figures *	1	
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			TECHNICAL FIELDS SEARCHED (IPC)
			B66C B66D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 May 2018	Examiner Colletti, Roberta
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