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(54) **A SUPPORT ARRANGEMENT AND A CRANE ARRANGEMENT PROVIDED THEREWITH**

(57) A support arrangement (2) comprising a hollow beam (3), a pair of pivotable stabilizer legs (4, 5) at opposite ends of the beam (3), and, for each leg (4, 5), hoses extending inside the beam (3) from a first hose connector at the beam (3) to a second connector at an end of the leg (4, 5). There is provided a holder arrangement (15) configured to prevent a predetermined motion of the hoses (11, 12) in a direction perpendicular to the longitudinal direction of the hollow beam (3) from the region of the second connector (14) to a first point (p1) at a first predetermined distance from the second hose connector (14), and configured to allow internal twisting of a pair of hoses (11, 12) from the region of the second connector (14) up to a second point (p2) at a second predetermined distance from the second connector (14), said twisting being the result of a pivotation of the stabilizer leg (4, 5).

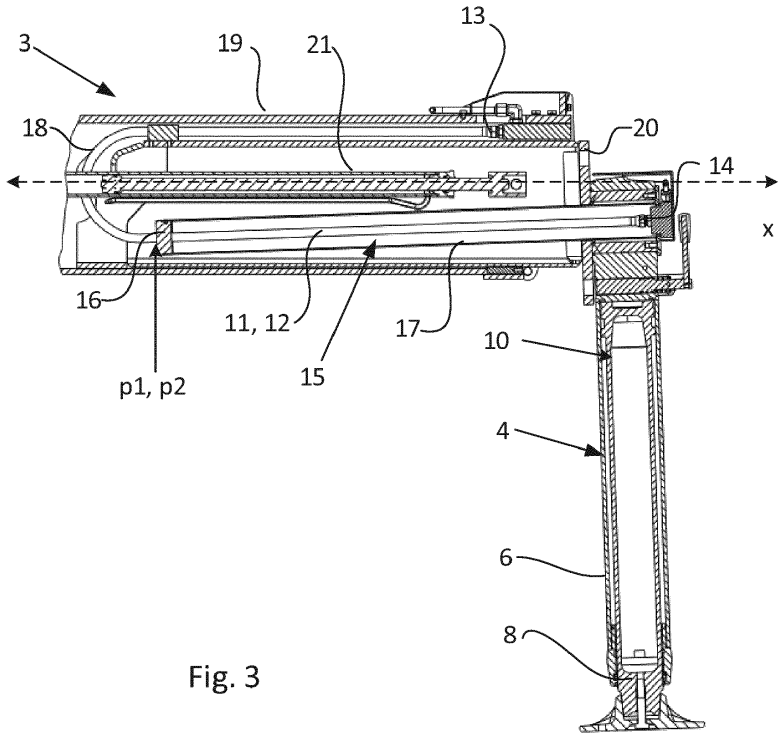

Fig. 3

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Description

TECHNICAL FIELD

[0001] The present invention relates to a support arrangement for supporting a truck-mounted crane, said arrangement comprising a support structure comprising a telescopically extendable hollow beam, a first stabilizer leg arranged at a first end of the hollow beam, and second stabilizer leg arranged at a second end of the hollow beam, wherein each stabilizer leg comprises a first part and a second part that are displaceable in relation to each other in a longitudinal direction of the stabilizer leg, and wherein there is provided a hydraulic piston-cylinder arrangement in each stabilizer leg, which hydraulic piston-cylinder arrangement is configured to execute said displacement, each stabilizer leg is pivotally connected to the hollow beam around an axis generally parallel with a longitudinal axis of the hollow beam, and, for each stabilizer leg, at least two hoses configured for the supply and return of hydraulic liquid to and from the hydraulic piston-cylinder arrangement of the stabilizer leg, wherein, for each stabilizer leg, said hoses extend inside the hollow beam and are fixedly connected to a first hose connector provided at the hollow beam and a second hose connector provided at an end of the respective stabilizer leg adjacent the hollow beam, and wherein said hoses extend from the second hose connector in the longitudinal direction of the hollow beam.

[0002] The invention also relates to a crane arrangement provided with such a support arrangement.

BACKGROUND

[0003] Support arrangements for supporting truck-mounted cranes are well known.

[0004] There is a demand for placing the hydraulic hoses for stabilizer legs inside the beams of a support arrangement for the purpose of protecting the hoses from external disturbance factors (such as hits by load or wearing due to road dirt) as well as achieving a smoother visual outlook of the arrangement.

[0005] Inside the beam, there is normally provided structural elements such a hydraulic pistons-cylinder arrangement which are responsible for the telescopic motions of the beam. Hoses positioned inside the beams should be in as little direct contact with such structures as possible in order avoid unwanted wear of the hoses.

[0006] In support arrangements using pivotable stabilizer legs, where the hoses are connected to connectors provided at an end of a pivotable stabilizer leg, and wherein a rotation of the leg induces a corresponding motion of the connectors, the pivoting of the leg will induce a twisting of the hoses connected thereto. Twisting of the hoses must be allowed, but movements of the hoses caused by the twisting should yet be avoided in order to avoid unwanted contact with further structural members, as mentioned above. It is therefore an object of the present invention to suggest a solution that enables twisting of the hoses but yet prevents unwanted motions of the hoses that may affect their lifetime and functionality negatively.

SUMMARY

[0007] The object of the present invention is achieved by means of a support arrangement for supporting a truck-mounted crane, the arrangement comprising:

- a support structure comprising:
  - a telescopically extendable hollow beam,
  - a first stabilizer leg arranged at a first end of the hollow beam, and
  - a second stabilizer leg arranged at a second end of the hollow beam, wherein
  - each stabilizer leg comprises a first part and a second part that are displaceable in relation to each other in a longitudinal direction of the stabilizer leg, and wherein there is provided a hydraulic piston-cylinder arrangement in each stabilizer leg, which hydraulic piston-cylinder arrangement is configured to execute the displacement,
  - each stabilizer leg is pivotally connected to the hollow beam around an axis generally parallel with a longitudinal axis of the hollow beam, and, for each stabilizer leg,
  - at least two hoses configured for the supply and return of hydraulic liquid to and from the hydraulic piston-cylinder arrangement of the stabilizer leg, wherein, for each stabilizer leg,
  - the hoses extend inside the hollow beam and are fixedly connected to a first hose connector provided at the hollow beam and a second hose connector provided at an end of the respective stabilizer leg adjacent the hollow beam, and wherein
  - the hoses extend from the second hose connector in the longitudinal direction of the hollow beam, and the support arrangement being **characterized in** that, for the hoses of each respective stabilizer leg, it comprises
  - a holder arrangement configured to prevent a predetermined motion of the hoses in a direction perpendicular to the longitudinal direction of the hollow beam from the region of the second hose connector to a first point (p1) at a first predetermined distance from the second hose connector, and configured to allow internal twisting of a pair of hoses from the region of the second hose connector up to a second point at a second predetermined distance from the second hose connector, the twisting being the result of a pivotation of the stabilizer leg.

[0008] Because the holder arrangement is configured to prevent a predetermined motion of the hoses in a direction perpendicular to the longitudinal direction of the hollow beam from the region of the second hose connector to a first point at a first predetermined distance from the second hose connector, the movement of the hoses due to twisting which causes the hoses to form curves and bends diverging from their route in the longitudinal direction of the beam is limited within a section defined between said region of the second hose connector and said first point at the first predetermined distance from the second hose connector. Thus, the predetermined motion of the hoses in said direction perpendicular to the longitudinal direction of the hollow beam can be controlled and undesired motions of the hoses in said direction that may affect their lifetime and functionality negatively can be prevented.

[0009] Further, because the holder arrangement is configured to allow internal twisting of a pair of hoses from the region of the second hose connector up to a second point at a second predetermined distance from the second hose connector, the stabilizer legs can be pivoted, i.e. rotated while the hoses may be twisted in a controllable manner.

[0010] Accordingly, the above described object is achieved.

[0011] According to one embodiment, in the longitudinal direction of the hollow beam, at the second predetermined distance from the second hose connector there is provided an element configured to fix the position of the respective hose of each pair of hoses in relation to the longitudinal axis of the hollow beam. Thus, the twisting induced by the rotation of the stabilizer leg is prevented from continuing beyond said element at said second predetermined distance.

[0012] According to one embodiment, the first point and the second point are at the same distance from the second hose connector.

[0013] According to one embodiment, the holder arrangement comprises a tube, inside which the hoses extend. Thereby, the hoses extend along the tube and are enclosed by the tube. As a result the predetermined motion of the hoses in the direction perpendicular to the longitudinal direction of the hollow beam can be prevented in an efficient manner by the tube. According to one embodiment, the element for fixing the positon of the hoses is attached to the tube, preferably to an end of the tube.

[0014] According to one embodiment, that the holder arrangement comprises a plurality of discrete holder elements.

[0015] According to one embodiment, the second predetermined distance is long enough to enable a twisting of the hoses induced by a pivotation of the stabilizer leg of at least 90°.

[0016] According to one embodiment, from the second point, the hoses follow a path along which they are bent to a U-shape and from which U-bend they extend in the longitudinal direction of the hollow beam to the first hose connector.

[0017] According to one embodiment, the first hose connector is located at a first part of the hollow beam, in relation to which first part the stabilizer leg and the second hose connector is displaceable in the longitudinal direction of the hollow beam as a result of a telescopic motion of a second part of the hollow beam, to which second part the stabilizer leg is pivotally connected.

[0018] According to one embodiment, the holder arrangement is connected to the second part of the hollow beam.

[0019] According to one embodiment, a piston-cylinder arrangement configured for a telescopic displacement of a second part of the hollow beam in relation to a first part of the hollow beam is arranged inside the hollow beam, wherein the hoses extend in parallel with and beside the piston-cylinder arrangement.

[0020] According to one embodiment, the holder arrangement is also configured to house electric cables extending at least partly in parallel with the hoses, thereby preventing a predetermined motion of the electric cables in a direction perpendicular to the longitudinal direction of the hollow beam from the region of the second hose connector to the first point.

[0021] It is also an object of the present invention to provide an improved crane arrangement. The object is achieved by a crane arrangement comprising a crane which comprises a support arrangement according to any one of the embodiments described above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] In the following, preferred embodiments of the invention are described with reference to the attached drawings, on which:

Fig. 1 is perspective view showing a crane mounted on a support arrangement with the stabilizer legs in an active position,

Fig. 2 is perspective view showing a crane mounted on a support arrangement with the stabilizer legs in an inactive position,

Fig. 3 is a cross section of a support arrangement with a hollow beam in a retracted position,

Fig. 4 is a cross section of a support arrangement with a hollow beam in an extended position,

Fig. 5, is an enlargement of a part of fig. 3, and

Fig. 6 is a perspective view showing a part of the support arrangement, including a holder arrangement.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0023] Figs. 1 and 2 show a crane arrangement comprising a crane 1 and a support arrangement 2 according to by which support arrangement 2 the crane 1 is supported. A truck on which the crane arrangement may be

arranged is also indicated in figs. 1 and 2.

[0024] The support arrangement 2 comprises a support structure comprising a telescopically extendable hollow beam 3, a first stabilizer leg 4 arranged at a first end of the hollow beam, and a second stabilizer leg 5 arranged at a second end of the hollow beam 3.

[0025] Each stabilizer leg 4, 5 comprises a first part 6, 7 and a second part 8, 9 that are displaceable in relation to each other in a longitudinal direction of the stabilizer leg 4, 5. There is provided a hydraulic piston-cylinder arrangement 10 in each stabilizer leg 4, 5, which hydraulic piston-cylinder arrangement 10 is configured to execute said displacement.

[0026] Each stabilizer leg 4, 5 is pivotally connected to the hollow beam 3 around an axis generally parallel with a longitudinal axis x of the hollow beam 3. For each stabilizer leg 4, 5, there is provided at least two hoses 11, 12 configured for the supply and return of hydraulic liquid to and from the hydraulic piston-cylinder arrangement 10 of the stabilizer leg 4, 5. In figs. 3-5 only one of hoses 11, 12 is actually visible, since they are in alignment with each other. Fig. 6, however, shows both the hoses 11, 12.

[0027] For each stabilizer leg 4, 5 said hoses 11, 12 extend inside the hollow beam 3 and are fixedly connected to a first hose connector 13 provided at the hollow beam 3 and a second hose connector 14 provided at an end of the respective stabilizer leg 4, 5 adjacent the hollow beam 3. The hoses 11, 12 of the respective stabilizer leg 4, 5 extend from its associated second hose connector 14 in the longitudinal direction of the hollow beam 3.

[0028] For the hoses 11, 12 of each respective stabilizer leg 4, 5, the support arrangement 2 comprises a holder arrangement 15 configured to prevent a predetermined motion of the hoses 11, 12 in a direction perpendicular to the longitudinal direction of the hollow beam 3 from the region of the second hose connector 14 to a first point p1 at a first predetermined distance from the second hose connector 14. The holder arrangement 15 is also configured to allow internal twisting of the pair of hoses 11, 12 from the region of the second hose connector 14 up to a second point p2 at a second predetermined distance from the second hose connector 14. The twisting of the hoses 11, 12 is the result of a pivotation of the stabilizer leg.

[0029] In the longitudinal direction of the hollow beam 3, at said second point p2 at said second predetermined second distance from the second hose connector there is provided an element 16 configured to fix the position of the respective hose 11, 12 of each pair of hoses in relation to the longitudinal axis x of the second part 20 of the hollow beam 3.

[0030] The first point p1 and the second point p2 are at the same distance from the second hose connector 14. The first point p1 and the second point p2 may however be located at different distances from the second hose connector 14. As an example the distance between p2 and the second hose connector 14 may be greater than between p1 and the second hose connector 14. This would make it possible to only restrict the movements of the hoses where there is a risk that they may get entangled in other components inside the hollow beam 3 such as the piston-cylinder arrangement 21, but still allow for a relatively long distance to p2, thereby enabling a long distance for distributing the twisting forces from the pivoting of the stabilizer leg 4, 5 on the hoses 11, 12.

[0031] According to one embodiment of the invention shown in figure 3-6, the holder arrangement 15 comprises a tube 17, inside which the hoses 11, 12 extend. In the embodiment shown, said element 16 configured to fix the position of the respective hose 11, 12 and preventing further twisting beyond the second point p2 comprises a plug 16 arranged at an end of the tube 17 (see fig. 6 in particular). The position-fixing element 16 is attached to and held by the tube 17. In this case the element 16 is a plug which is inserted to and fitted to the end of the tube 17. The plug 16 has separate holes enabling passage of the hoses through said holes, each hole having a diameter corresponding to the outer diameter of the respective hose extending through the hole.

[0032] According to an alternative embodiment, not shown, the holder arrangement 15 may comprise a plurality of discrete holder elements. The discrete holder elements may be interconnected, and may define a tubular shape together.

[0033] The second predetermined distance is long enough to enable twisting of the hoses induced by a pivotation of the stabilizer leg of 180°. Accordingly, the length of the tube is adapted to the diameter of the hoses 11, 12 and the presumed maximum pivotation of the stabilizer leg. The forces on the hoses due to the pivoting movements of the stabilizer leg will be distributed over the length of the hoses between the second hose connecter 14 and p2. A relative short distance between p2 and the second hose connector 14 will generate greater stresses on the hose and hence greater movements, curves and bends of the hoses, compared to a relative longer distance between p2 and the second hose connector 14. The stiffness of the hoses originating from the material and diameter of the hoses will also affect movements of the hoses.

[0034] From said first point p2, where the position-fixing element 16 is located, the hoses 11, 12 follow a path along which they are bent to a U-shape 18 and from which U-bend they extend in the longitudinal direction of the hollow beam 3 to the first hose connector 13.

[0035] With reference to figs. 3 and 4, the first hose connector 13 is located at a first part 19 of the hollow beam 3. The stabilizer leg 4 and the second hose connector 14 are displaceable in relation to the first part 19 in the longitudinal direction of the hollow beam 3 as a result of a telescopic motion of a second part 20 of the hollow beam 3, to which second part 20 the stabilizer leg 4 is pivotally connected.

[0036] The holder arrangement 15, showed as the tube 17 in figs. 3-6, is connected to said second part 20 of the hollow beam 3, at the end of the latter where the latter is

connected to the associated stabilizer leg 4.

[0037] Inside the hollow beam 3, there is provided a piston-cylinder arrangement 21 configured for a telescopic displacement of the second part 20 of the hollow beam 3 in relation to the first part 19 of the hollow beam 3. The hoses extend 11, 12 in parallel with and beside said piston-cylinder arrangement 21, and prevented by the holder arrangement 15 (for example the tube 17 in figures 3-6)from contact with or entanglement with said piston-cylinder arrangement 21.

[0038] The holder arrangement 15, showed as a tube 17 in figures 3-6 may also be configured to house electric cables (not shown) extending at least partly in parallel with the hoses 11, 12. For example, the electric cables may be cables for the electronic control and powering of the motions of the stabilizer leg 4. The holder arrangement 15 thereby prevents a predetermined motion of the electric cables in a direction perpendicular to the longitudinal direction of the hollow beam 3 from the region of the second hose connector 14 to said first point p1. Similar to the hoses 11, 12 the electric cables may further also be fixed at p2 in one embodiment of the invention. This would further prevent the electric cables from twisting beyond the point p2.

[0039] In the description of the invention the at least two hoses 11, 12 has been used as an example. Of course, the described embodiments of invention may be further adapted to a larger amount of hoses depending on the application. The plug 16 may as an example be arranged to fix 4 hoses and optional electric cables.

Claims

1. A support arrangement (2) for supporting a truck-mounted crane (1), said arrangement comprising

- a support structure comprising
  - a telescopically extendable hollow beam (3),
  - a first stabilizer leg (4) arranged at a first end of the hollow beam (3), and
  - a second stabilizer leg (5) arranged at a second end of the hollow beam (3), wherein
  - each stabilizer leg (4, 5) comprises a first part (6, 7) and a second part (8, 9) that are displaceable in relation to each other in a longitudinal direction of the stabilizer leg (4, 5), and wherein there is provided a hydraulic piston-cylinder arrangement (10) in each stabilizer leg (4, 5), which hydraulic piston-cylinder arrangement (10) is configured to execute said displacement,
  - each stabilizer leg (4, 5) is pivotally connected to the hollow beam (3) around an axis generally parallel with a longitudinal axis (x) of the hollow beam (3), and, for each stabilizer leg (4, 5),
  - at least two hoses (11, 12) configured for the supply and return of hydraulic liquid to and from the hydraulic piston-cylinder arrangement of the stabilizer leg (4, 5), wherein, for each stabilizer leg (4, 5),
  - said hoses (11, 12) extend inside the hollow beam (3) and are fixedly connected to a first hose connector (13) provided at the hollow beam (3) and a second hose connector (14) provided at an end of the respective stabilizer leg (4, 5) adjacent the hollow beam (3), and wherein
  - said hoses (11, 12) extend from the second hose connector (14) in the longitudinal direction of the hollow beam (3), and said support arrangement being **characterized in that**, for said hoses (11, 12) of each respective stabilizer leg (4, 5), it comprises

- a holder arrangement (15) configured to prevent a predetermined motion of the hoses (11, 12) in a direction perpendicular to the longitudinal direction of the hollow beam (3) from the region of the second hose connector (14) to a first point (p1) at a first predetermined distance from the second hose connector (14), and configured to allow internal twisting of a pair of hoses (11, 12) from the region of the second hose connector (14) up to a second point (p2) at a second predetermined distance from the second hose connector (14), said twisting being the result of a pivotation of the stabilizer leg (4, 5).

2. A support arrangement according to claim 1, **characterized in that**, in the longitudinal direction of the hollow beam (3), at said second predetermined distance from the second hose connector (14) there is provided an element (16) configured to fix the position of the respective hose of each pair of hoses (11, 12) in relation to the longitudinal axis of the hollow beam (3).

3. A support arrangement according to claim 1 or 2, **characterized in that** the first point (p1) and the second point (p2) are at the same distance from the second hose connector (14).

4. A support arrangement according to any one of claims 1-3, **characterized in that** the holder arrangement (15) comprises a tube (17), inside which the hoses (11, 12) extend.

5. A support arrangement according to any one of claims 1-3, **characterized in that** holder arrangement (15) comprises a plurality of discrete holder elements.

6. A support arrangement according to any one of claims 1-5, **characterized in that** the second predetermined distance is long enough to enable a twisting of the hoses (11, 12) induced by a pivotation of the stabilizer leg (4, 5) of at least 90°.

7. A support arrangement according to any one of claims 1-6, **characterized in that**, from said second point (p2), the hoses (11, 12) follow a path along which they are bent to a U-shape and from which U-bend (18) they extend in the longitudinal direction of the hollow beam (3) to the first hose connector (13).

8. A support arrangement according to any one of claims 1-7, **characterized in that** the first hose connector (13) is located at a first part (19) of the hollow beam (3), in relation to which first part (19) the stabilizer leg (4, 5) and the second hose connector (14) is displaceable in the longitudinal direction of the hollow beam (3) as a result of a telescopic motion of a second part (20) of the hollow beam (3), to which second part (20) the stabilizer leg (4, 5) is pivotally connected.

9. A support arrangement according to claim 8, **characterized in that** the holder arrangement (15) is connected to said second part (20) of the hollow beam (3).

10. A support arrangement according to any one of claims 1-9, **characterized in that** a piston-cylinder arrangement (21) configured for a telescopic displacement of a second part (20) of the hollow beam (3) in relation to a first part of the hollow beam (3) is arranged inside the hollow beam (3), and that the hoses (11, 12) extend in parallel with and beside said piston-cylinder arrangement.

11. A support arrangement according to any one of claims 1-10, **characterized in that** the holder arrangement (15) is also configured to house electric cables extending at least partly in parallel with the hoses (11, 12), thereby preventing a predetermined motion of the electric cables in a direction perpendicular to the longitudinal direction of the hollow beam (3) from the region of the second hose connector (14) to said first point (p1).

12. A crane arrangement comprising a crane and **characterized in that** it comprises a support arrangement (2) according to any one of claims 1-11, by which support arrangement a crane (1) is supported.

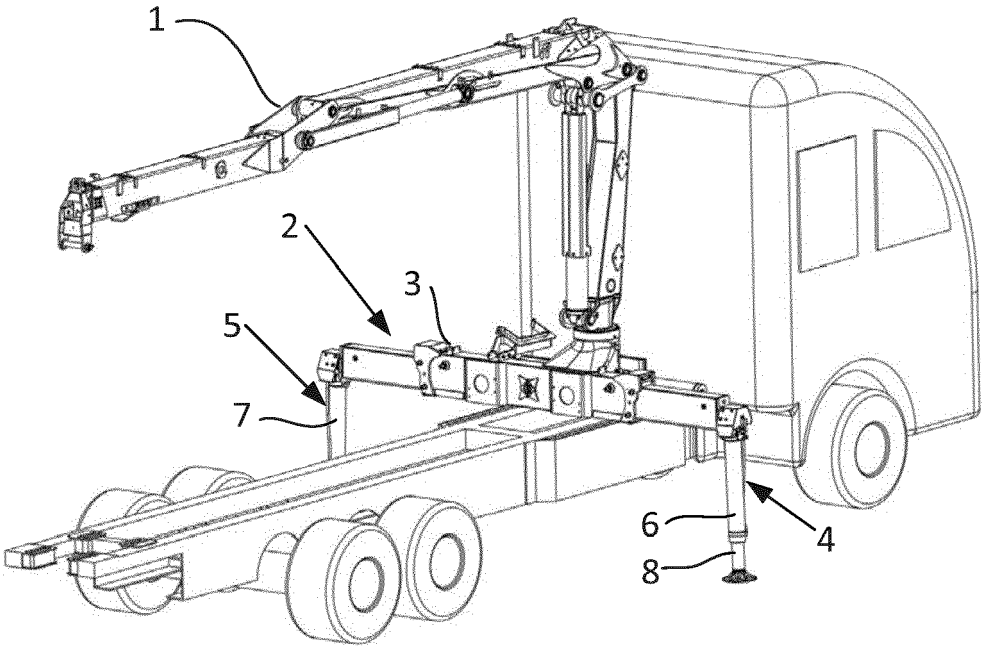

Fig. 1

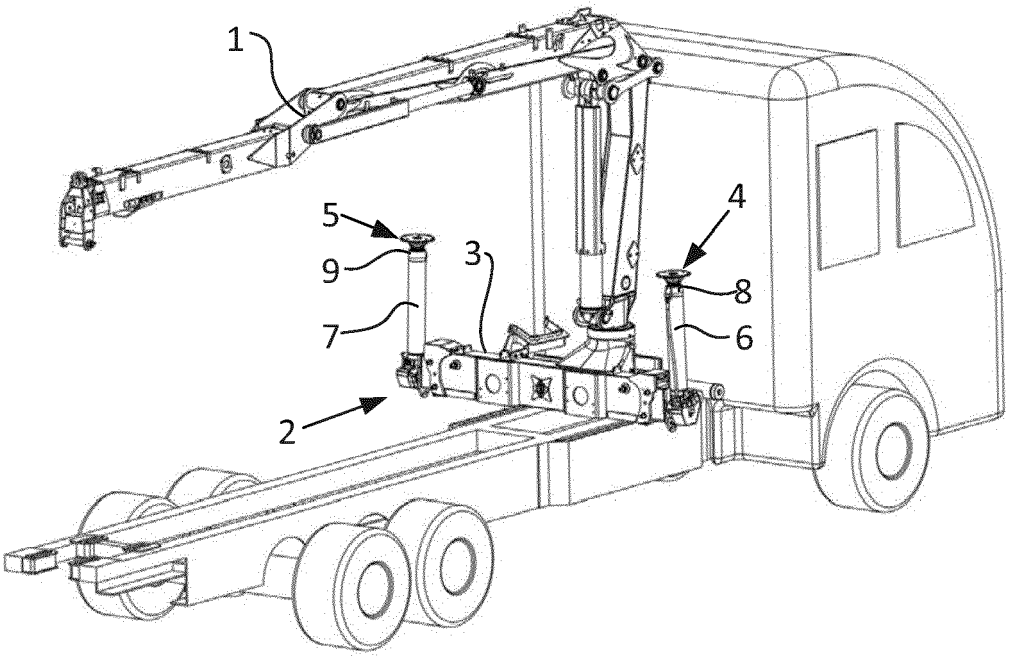

Fig. 2

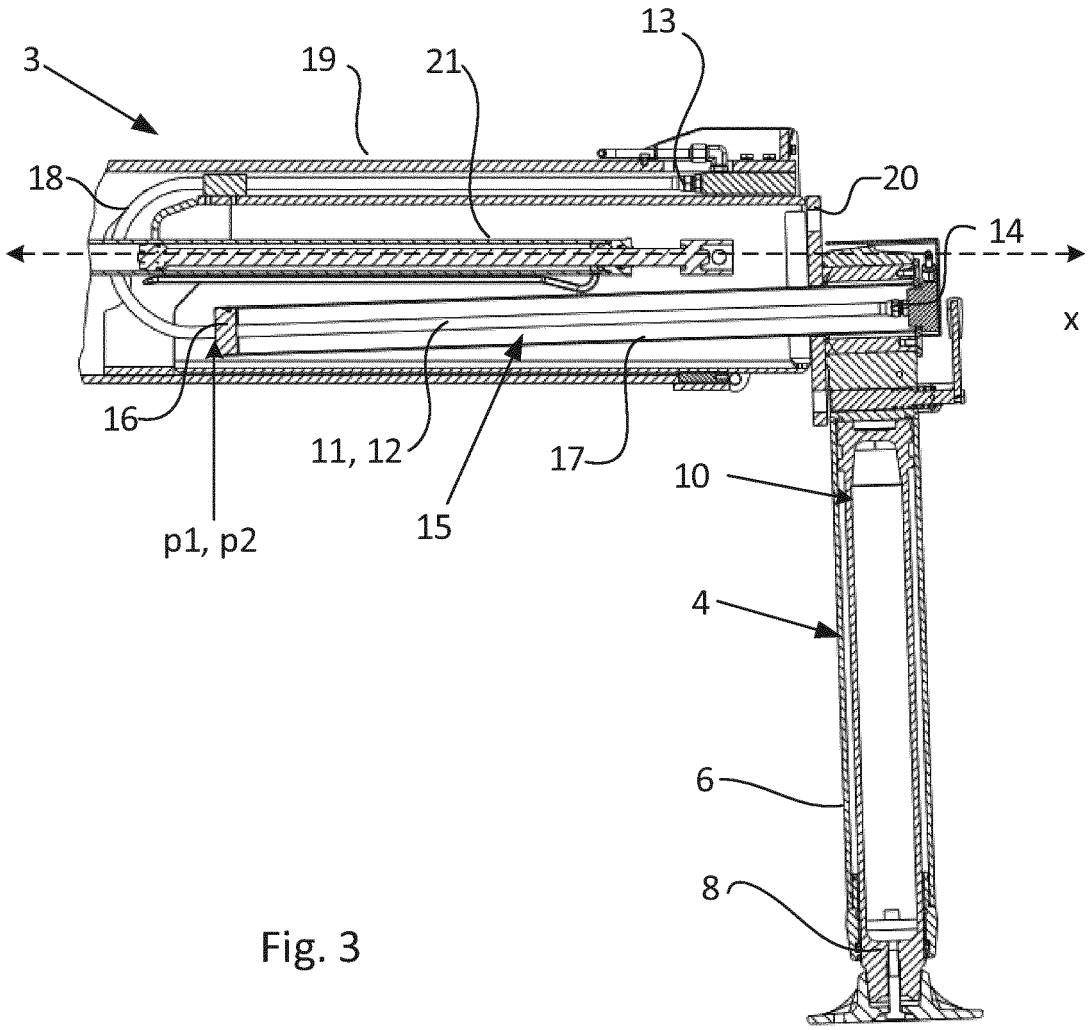

Fig. 3

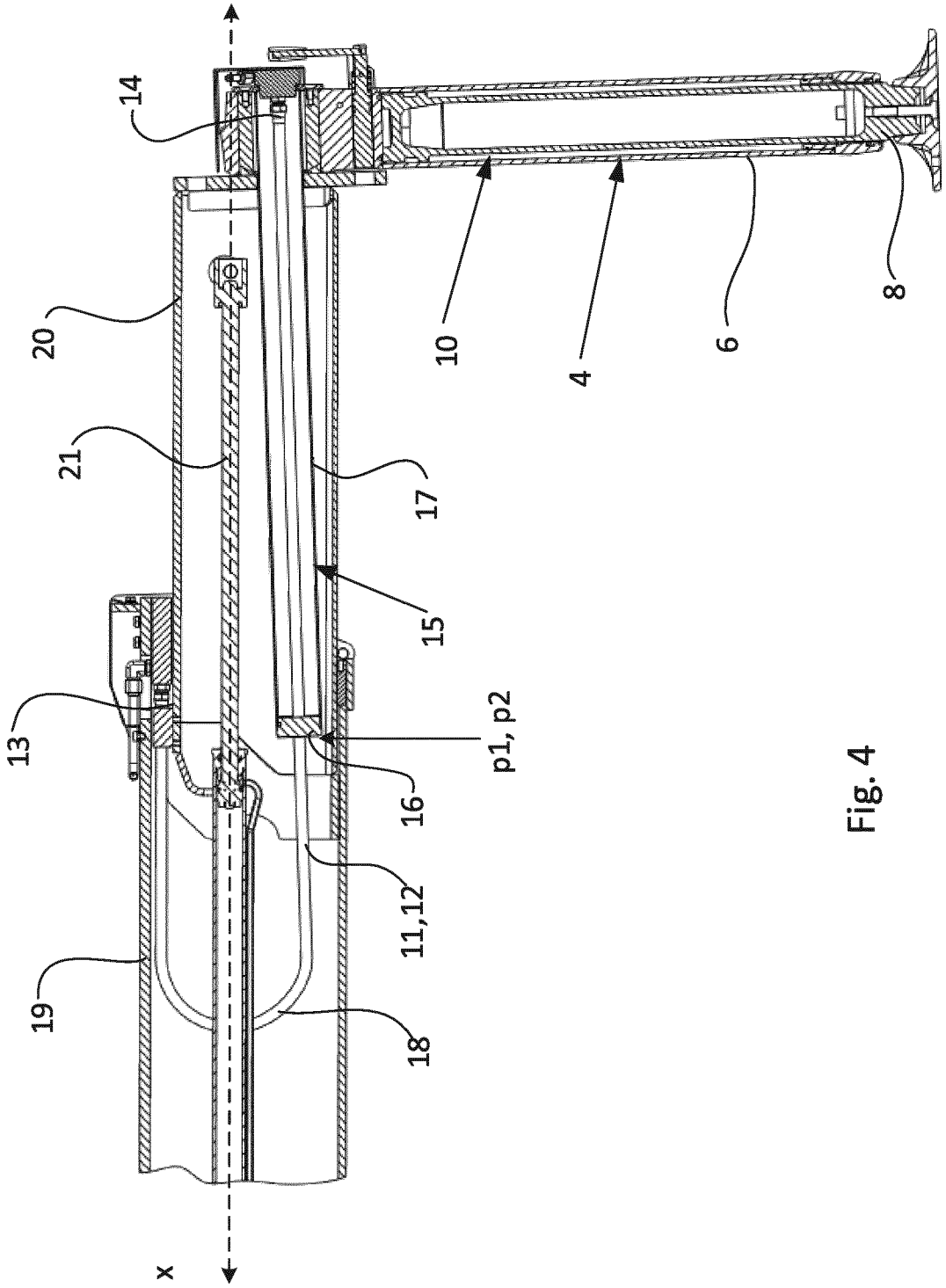

Fig. 4

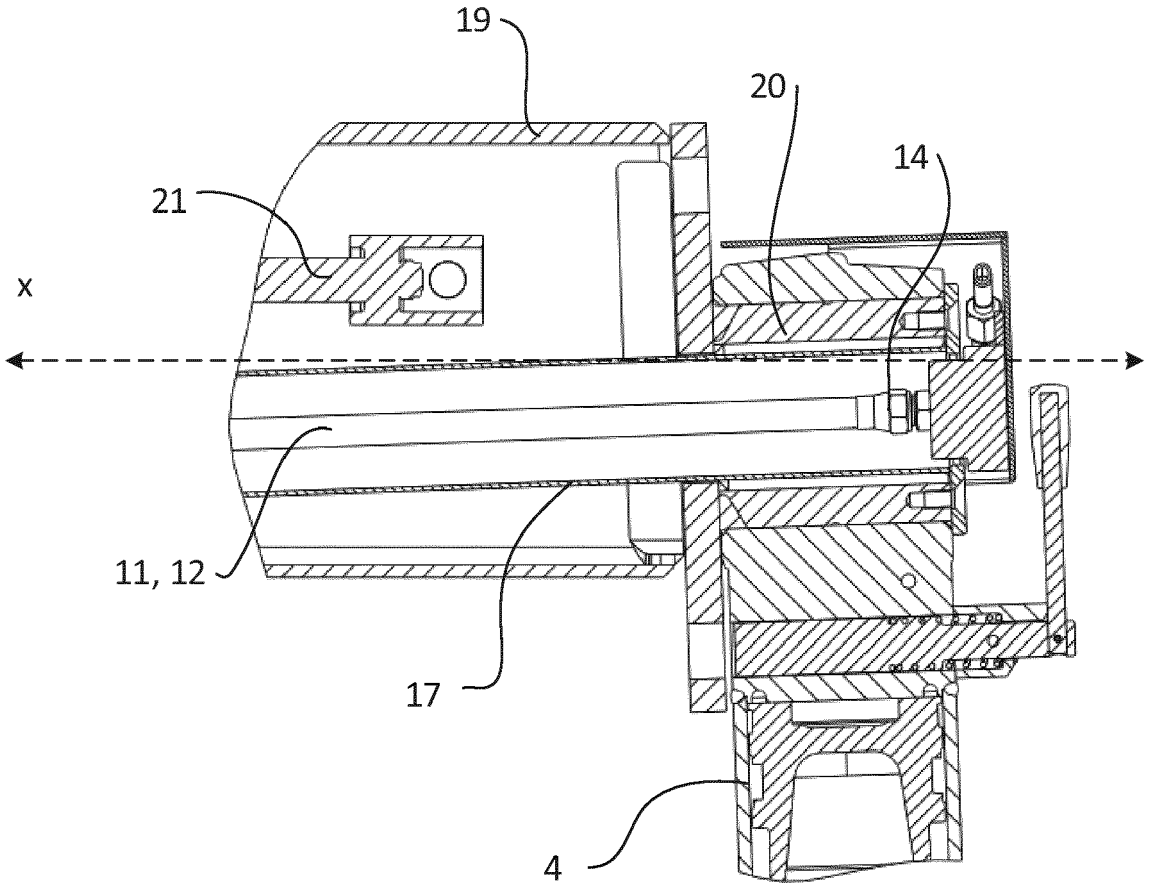

Fig. 5

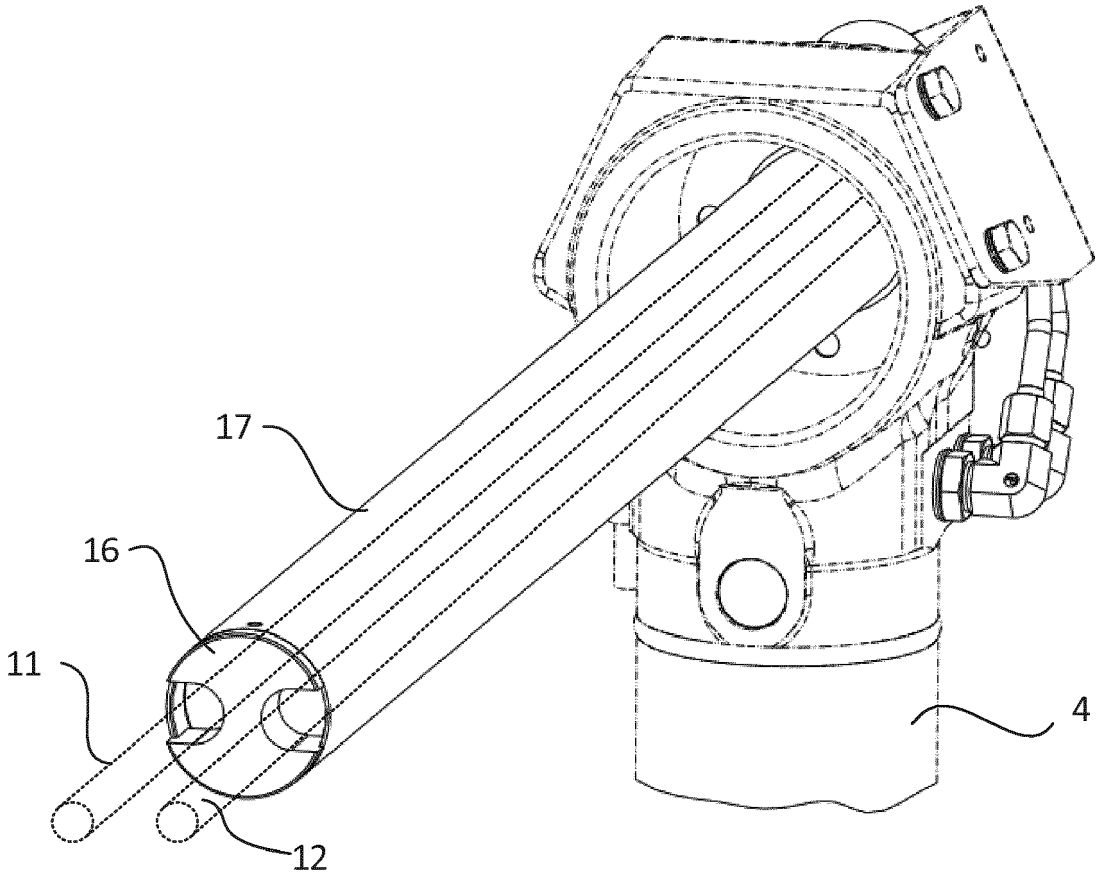

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 0075

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 3 406 563 A1 (CARGOTEC PATENTER AB [SE]) 28 November 2018 (2018-11-28) * paragraph [0021] * * abstract * * figures *	1-3,6-8, 10,12 4,5,9,11	INV. B66C23/80
A	JP S48 72662 U (UNKNOWN) 11 September 1973 (1973-09-11) * abstract * * figures *	1-12	
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			TECHNICAL FIELDS SEARCHED (IPC) B66C E02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 August 2020	Colletti, Roberta

CATEGORY OF CITED DOCUMENTS

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28-08-2020

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82