(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 062 846 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.05.2009 Bulletin 2009/22

(51) Int Cl.:
B66C 19/00 *(2006.01)* ***B66C 1/10*** *(2006.01)*
B66C 11/00 *(2006.01)*

(21) Application number: **07121102.3**

(22) Date of filing: **20.11.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Bromma Conquip AB**
164 22 Kista (SE)

(72) Inventor: **NILSSON, Kjell-Åke**
191 62, SOLLENTUNA (SE)

(74) Representative: **Fröderberg, Anders Oskar**
BRANN AB
Västgötagatan 2
P.O. Box 17192
104 62 Stockholm (SE)

(54) **A mechanism and a method for stowage of an inactive spreader in a crane**

(57) A mechanism (8) is provided and arranged for temporary stowage of an inactive spreader in the lower side of a crane trolley, by which mechanism the spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley. The mechanism is arranged to be suspended from the trolley and in stowage docking to the stowing spreader, and arranged detachable from the trolley to be supported by the stowing spreader. A method for providing temporary stowage of an inactive spreader in the lower side of a crane trolley is likewise provided, by which method the inactive spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley.

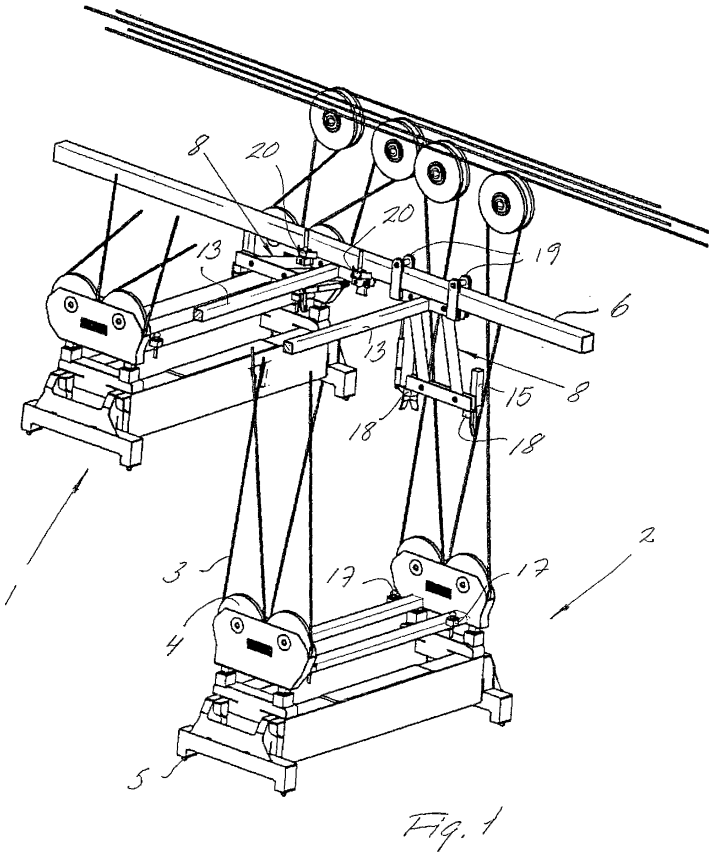

Fig. 1

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to arrangements on container shifting equipment, and more specifically to arrangements in spreaders and cranes by which an inactive spreader is stowed temporarily in the upper crane structure in single lift operations. The invention also refers to a method for providing a spreader stowage function in a crane.

BACKGROUND AND PRIOR ART

[0002] In the following disclosure, the expression "spreader" refers to a structure adapted for shifting containers from one location to another. Typically, the spreader is adapted for lifting and lowering operations driven by a crane from which the spreader is suspended in ropes. The ropes are guided in rope sheaves to run from a crane drive to the spreader, via a trolley that is movable on rails in the upper crane structure. The ropes attach to the spreader through rope sheaves which are journalled in the upper end of the spreader. The lower end of the spreader includes coupling means for coupling the spreader to corner casings arranged on a container to be shifted. The coupling means may be supported from frames or beam structures that can be detachably connected to a spreader head-block, in which the rope sheaves are journalled. As used herein, the expression spreader shall thus be understood to encompass the separate head-block, and when appropriate also the head-block and coupling structures in combination.

[0003] A customary practise in ports include that spreaders are interconnected in side by side lift operations, i.e. shifting operations wherein two or more containers are handled simultaneously by spreaders that are operated side by side from the crane trolley. In order to meet frequent demands for single lift operations, an inactive spreader is temporarily stowed away in the upper crane structure to avoid collision with the ropes that operate the active spreader.

[0004] A previous solution includes that the inactive spreader is hoisted to engage a stowage position arranged under the trolley. In the stowed position, the spreader is pushed laterally away from the ropes operating the active spreader. The displacement is provided by means of a seat formed on the trolley, comprising a slanting guide plate which is fixed to the trolley substructure, and which engages and controls the spreader into a laterally displaced position at the end of the stowing operation. Additional structures are typically required at the stowage position in order to stabilize the stowed spreader, which is subjected to accelerations and decelerations as the trolley reciprocally moves along the crane beam in container shifting operations.

[0005] The solution discussed above encounters a problem in connection with maintenance and repair, as well as in mounting/dismounting of the guiding structures, requiring the maintenance personnel to operate at considerable height in the upper crane structure.

SUMMARY OF THE INVENTION

[0006] An object for the present invention is to provide an arrangement for stowage of an inactive spreader in single lift operations, by which repair and maintenance in the upper crane structures can substantially be avoided.

[0007] The object is met through a mechanism comprising the features specified in claim 1. Preferred and advantageous embodiments of the invention are further specified in the subordinated claims.

[0008] Briefly, a mechanism is provided and arranged for temporary stowage of a inactive spreader in the lower side of a crane trolley, by which mechanism the spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley. Coupling means are provided by which the stowage mechanism is arranged to be suspended from the trolley and in stowage docking to the stowing spreader, and by which coupling means the stowage mechanism is arranged detachable from the trolley.

[0009] Preferably, coupling menas are also provided by which the stowage mechanism is arranged optionally to be supported on the spreader. Advantageously, coupling means may be provided such that the stowing mechanism is arranged to be supported from the trolley and in stowage docking to the spreader, and arranged optionally to be supported on the spreader and in stowage docking to the trolley.

[0010] The stowage mechanism is a link mechanism, and foldable between an extended docking position and a pivoted stowage position wherein the inactive spreader is positioned close to the trolley.

[0011] The link mechanism preferably comprises an upper link member and a lower link member, both of which are pivotally connected to an intermediate link member. The upper link member is arranged for docking or connecting to the trolley, and the lower link member is arranged for docking or connecting to the spreader. Advantageously, the intermediate link member is arranged to move the lower link member laterally away from the crane ropes of the adjacent spreader in the stowing operation.

[0012] In a preferred embodiment, the stowage mechanism comprises two corresponding link mechanisms pivotable in parallel vertical planes, each of which has an upper horizontal link member arranged for docking or connecting to the trolley, and a lower horizontal link member arranged for docking or connecting to the spreader.

[0013] The stowage link mechanism advantageously comprises two parallel link mechanisms which are interconnected through a horizontal beam member and which are each connectable to the spreader at substantially equal distances from a longitudinal centre of the spread-

er.

[0014] Each stowage mechanism preferably comprises a damper that counteracts oscillations in the stowage mechanism.

[0015] Connection and disconnection can be realized by means of remotely controlled coupling means that are arranged to detachably connect the stowage mechanism to the stowing spreader. Remotely controlled coupling means by which the stowage mechanism is detachably connectable to the trolley are likewise envisaged. Positioning guides are likewise preferably arranged for mating the coupling means on the stowage mechanism with corresponding coupling means arranged on the spreader/trolley. A limiter is advantageously arranged on the stowage mechanism, limiting the pivotal movement of the stowage mechanism in stowage operations.

[0016] The stowage mechanism as disclosed teaches a new method for providing temporary stowage of an inactive spreader in the lower side of a crane trolley, by which the inactive spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley. The method comprises the steps of:

- arranging a stowage link mechanism connectable to the trolley and to the spreader, respectively;
- connecting the stowage mechanism to the spreader;
- lifting the stowage mechanism by means of the spreader for connection to the trolley, and
- disconnecting the stowage mechanism from the spreader.

[0017] The method additionally makes possible the steps of connecting the stowage mechanism to the spreader; disconnecting the stowage mechanism from the trolley, and lowering the stowage mechanism to the ground by means of the spreader, for maintenance or repair on the stowage mechanism.

SHORT DESCRIPTION OF THE DRAWINGS

[0018] The invention is further explained below with reference to the accompanying schematic drawings, illustrating a partly broken away spreader assembly in fig. 1, and on a larger scale the same assembly in a close up view of fig. 2.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0019] As used in the following disclosure, "horizontal" refers to a horizontal projection of a spreader, and "vertical" refers to a normal to the horizontal projection of the spreader.

[0020] In the drawings figs. 1 and 2, a first and a second spreader 1, 2 are shown in side by side lift operation. The spreaders 1, 2 are each suspended in ropes 3 from a rope crane (not shown) and operated for shifting containers from one location to another. The ropes connect to an upper end of a spreader, typically via rope sheaves 4 which are journalled for rotation in a head-block comprised in the spreader structure. In a lower end of each spreader, twist locks 5 are operative as coupling means for coupling and uncoupling, respectively, of the spreader and a container to be shifted. In single lift operations one of the spreaders is inactive. In side by side lift operations, the first and second spreaders are together operated in lifting/lowering and shifting operations.

[0021] In the drawing, the spreader 1 is inactive and the spreader 2 is operated in single lift operation. The inactive spreader 1 is held by the crane ropes in a stowage position in the lower side of a trolley, the trolley in the drawings represented by a beam 6 which is comprised in the substructure of the trolley. In container shifting operations, the stowed spreader 1 thus travels with the trolley in reciprocal movements along a crane beam (not shown). In the stowed position, the stowed spreader 1 is docked in a stowage mechanism generally designated by reference numeral 8. The stowage mechanism 8 effects a displacement of the stowed spreader 1 out of the pathway for the ropes 3 that operate the active spreader 2 in lifting and lowering movements.

[0022] According to the present invention, the stowage mechanism 8 is arranged as a link mechanism and foldable between an extended docking position and a pivoted stowage position wherein the inactive spreader is positioned close to the trolley.

[0023] In a preferred embodiment illustrating the invention, the stowage mechanism 8 comprises a link mechanism having an upper horizontal link member 9 and a lower horizontal link member 10. The upper and lower link members 9, 10 are both pivotally connected to an intermediate link member. As will appear from the following disclosure, the upper link member 9 is arranged for docking or connecting to the trolley, and the lower link member 10 is arranged for docking or connecting to the spreader. Advantageously, the upper and lower link members 9, 10 may be interconnected through a pair of parallel link members 11 and 12, respectively.

[0024] Albeit only one stowage mechanism 8 is illustrated in the drawing for reasons of visibility, it should be understood that each spreader is associated with two corresponding mechanisms 8 arranged pivotable in parallel vertical planes, each mechanism having an upper horizontal link member 9 engaging the trolley, and a lower horizontal link member 10 engaging the spreader. A horizontal beam member 13 interconnects the associated stowage mechanisms 8, which are separated by the beam member to engage the subject spreader at substantially equal distances from a longitudinal centre of the spreader. Other configurations of a folding stowage mechanism are however conceivable.

[0025] Each stowage mechanism 8 has a damper 14 arranged to counteract oscillations in the parallel links that may otherwise be induced from accelerations and decelerations in the driven movement of the trolley. The damper 14 may be hydraulic or air/gas operated, or me-

chanical.

[0026] The damper 14 may additionally be effective for biasing the stowage mechanism 8 into an initial position in which the ascending spreader is receivable for docking with the stowage mechanism. From the docking position, the stowage mechanism is foldable towards a stowage position close to the lower side of the trolley. The desired folding direction is ensured by arranging the stowage mechanism to take an over-centre position in the docking mode. The over-centre position may be secured through a biasing member as discussed above, or by means arranged on the mechanism for mechanically restricting the pivotal movements of the stowage mechanism. In the further upwards movement of the spreader, driven by the crane ropes, the spreader engages the stowage mechanism to cause the same to pivot outwards from the docking position until a limiter 15 on the stowage mechanism engages the beam 6 in the trolley structure. In the stowed position illustrated by spreader 1 on the left hand side of the drawing, the inactive spreader is thus positively positioned out of reach for the ropes that operate the active spreader.

[0027] In the docking position, the stowing spreader engages the lower link member 10 of the stowage mechanism 8. A correct positioning is ensured through guides 16 which are arranged on the stowage mechanism 8 to cooperate with structural members included in the spreader structure. In the alternative, the positioning guides are supported on the spreader to capture the stowage mechanism in a docking operation. In either case, the positioning guides optionally effectuate a mating between coupling means 17 supported on the spreader and corresponding coupling means 18 arranged on the stowage mechanism. The coupling means 17 are driven and remotely controlled by the crane operator. The coupling means 17 may be realized as twist locks, notoriously known in the art, and may be electrically or hydraulically driven for coupling and uncoupling, respectively. The coupling means 18 on the stowage mechanism then obviously may be realized as seats for the twist locks, corresponding to the corner casings found on containers, e.g.

[0028] In a mounted position under the trolley, the stowage mechanism 8 connects detachably to beam member 6 of the trolley. This first embodiment is illustrated in connection with spreader 2 on the right hand side of the drawing. In the first embodiment, the upper link member 9 is clamped to the beam by means of a bolted clamp 19. In this implementation, the stowage mechanism 8 is thus stationary on the trolley, however dismountable, and docking to the spreader in single lift operations.

[0029] In the alternative implementation, illustrated in connection with the spreader 1 on the left hand side of the drawing, the stowage mechanism 8 connects detachably to beam member 6 of the trolley by means of remotely controllable coupling means. To this purpose, the upper link member 9 is arranged connectable to the beam member 6 through corresponding coupling means 20, such as twist locks, arranged on the trolley beam 6 or alternatively on the link member 9.The coupling means 20 may be remotely controllable by the crane operator in coupling and uncoupling manoeuvres, respectively. Positioning guides arranged on the trolley, or on the link member 9 if appropriate, then ensure a mating between the coupling means 20 and corresponding seats formed on the beam member 6, or vice versa, in the connecting operation.

[0030] It will be appreciated that the alternative implementation provides for arranging the stowage mechanism 8 stationary on the spreader and docking to the trolley in single lift operations. Positioning guides may be arranged on the trolley to ensure a correct docking position for the stowage mechanism in this alternative embodiment.

[0031] From the foregoing it will be appreciated that the stowage mechanism 8, by being detachably connectable to the trolley as well as to the spreader, can be lowered to the ground by means of the spreader for maintenance and repair, or for exchange by another stowage mechanism, if appropriate.

Claims

1. A mechanism arranged for temporary stowage of an inactive spreader in the lower side of a crane trolley, by which mechanism the spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley, **characterized in that** coupling means (19; 20) are provided by which the stowage mechanism (8) is connectable to the trolley and in stowage docking to the stowing spreader, and by which coupling means the stowage mechanism (8) is arranged detachable from the trolley.

2. The mechanism of claim 1, **characterized in that** coupling means (17, 18) are provided by which the stowage mechanism (8) is arranged optionally to be connected to the spreader.

3. The mechanism of claim 1 or 2, **characterized in that** coupling means (17, 18; 19; 20) are provided by which the stowage mechanism (8) is arranged to be supported from the trolley and in stowage docking to the spreader, and arranged optionally to be supported from the spreader and in stowage docking to the trolley.

4. The mechanism of any of claims 1-3, **characterized in that** the stowage mechanism (8) is a link mechanism foldable between an extended docking position and a pivoted stowage position wherein the inactive spreader is positioned close to the trolley.

5. The mechanism of claim 4, **characterized in that**

the link mechanism comprises an upper link member (9) and a lower link member (10), both of which are pivotally connected to an intermediate link member (11; 12).

6. The mechanism of claim 5, **characterized in that** the upper link member (9) has means (19; 20) for docking or connecting to the trolley, and the lower link member (10) is arranged for docking or connecting to the spreader.

7. The mechanism of claim 6, **characterized in that** the intermediate link member (11; 12) is arranged to move the lower link member (10) laterally away from the crane ropes of the adjacent spreader in the stowing operation.

8. The mechanism of claim 7, **characterized in that** the stowage mechanism comprises two corresponding link mechanisms (9-12) pivotable in parallel vertical planes, each of which has an upper horizontal link member (9) arranged for docking or connecting to the trolley, and a lower horizontal link member (10) arranged for docking or connecting to the spreader.

9. The mechanism of claim 8, **characterized in that** the stowage link mechanism comprises two parallel link mechanisms (9-12) which are interconnected through a horizontal beam member (13), and which are each connectable to the spreader at substantially equal distances from a longitudinal centre of the spreader.

10. The mechanism of claim 9, **characterized in that** each parallel link mechanism (9-12) comprises a damper (14) that counteracts oscillations in the parallel link mechanism.

11. The mechanism of any of claims 1-10, **characterized in that** remotely controlled coupling means (17, 18) are arranged, which detachably connect the stowage mechanism (8) to the stowing spreader.

12. The mechanism of any of claims 1-10 or claim 11, **characterized in that** remotely controlled coupling means (20) are arranged which detachably connect the stowage mechanism (8) to the trolley.

13. The mechanism of claim 12, **characterized in that** positioning guides (16) are arranged for mating the coupling means on the stowage mechanism with corresponding coupling means arranged on the spreader/trolley.

14. The mechanism of any previous claim, **characterized in that** a limiter (15) is arranged on the stowage mechanism (8), limiting the pivotal movement of the stowage mechanism in stowage operations.

15. A method for providing temporary stowage of an inactive spreader in the lower side of a crane trolley, by which the inactive spreader is moved out of the way for crane ropes which operate an active spreader from the same trolley, comprising the steps of:

- arranging a stowage link mechanism connectable to the trolley and to the spreader, respectively;
- connecting the stowage mechanism to the spreader;
- lifting the stowage mechanism by means of the spreader for connection to the trolley, and
- disconnecting the stowage mechanism from the spreader.

16. The method of claim 15, further comprising the steps of:

- connecting the stowage mechanism to the spreader;
- disconnecting the stowage mechanism from the trolley, and
- lowering the stowage mechanism to the ground by means of the spreader.

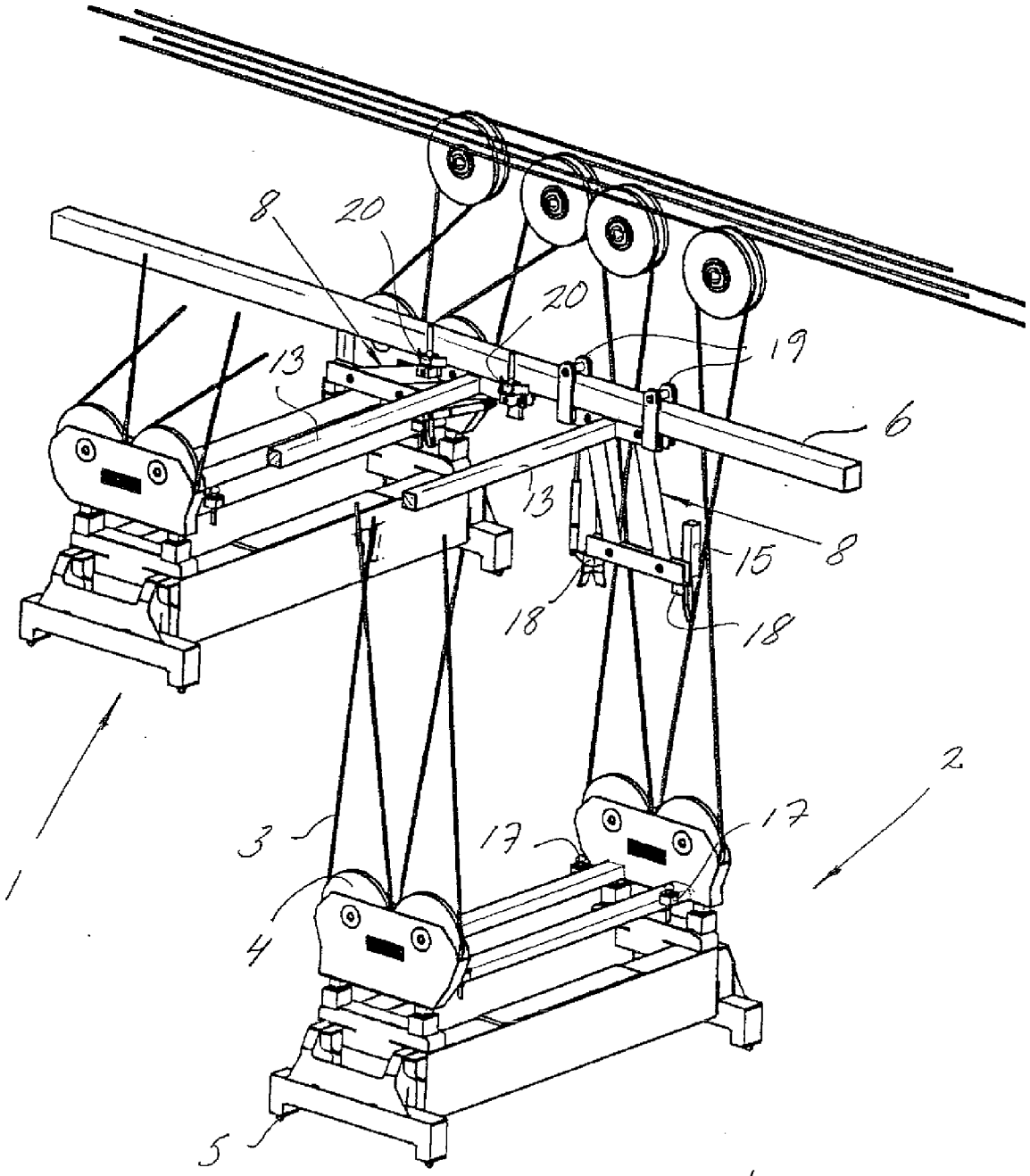

Fig. 1

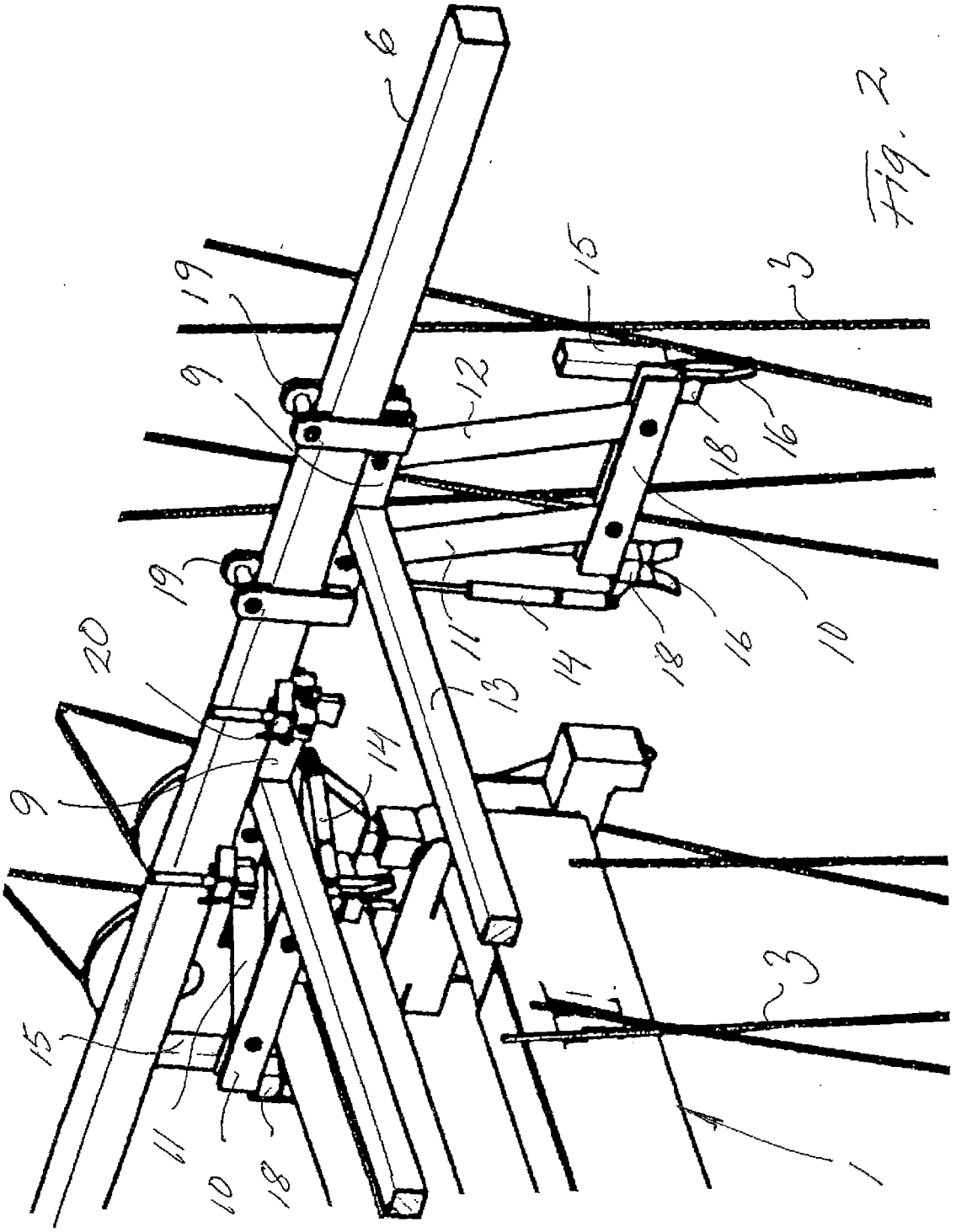

Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 12 1102

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TECHNICAL FIELDS SEARCHED (IPC)

B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 April 2008	Verheul, Omiros

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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