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

(11) **EP 2 062 844 A1**

(12) **EUROPEAN PATENT APPLICATION**

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

(51) Int Cl.:
B66C 1/10 *(2006.01)* ***B66C 1/66*** *(2006.01)*
B66C 19/00 *(2006.01)*

(21) Application number: **07121137.9**

(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: **Kindblom, Sven**
192 51, SOLLENTUNA (SE)

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

(54) **Retracting connecting arm in a side by side spreader arrangement**

(57) The invention relates to an arrangement which detachably interconnects a first and a second spreader side by side in lift operations, comprising an extendable arm (10) which is connected to the first spreader and has an end which is connectable to the second spreader, and movably journalled in the second spreader in the connected position. A release mechanism (17,18,19) is arranged on the arm and activated in result of a non-admissible vertical separation between the spreaders, wherein the release mechanism effectuates retraction of the arm from said second spreader. In a preferred embodiment the arm in its extended position is biased towards a retracted condition, and the release mechanism, upon release, activates a biased retraction of the arm from the disconnected second spreader.

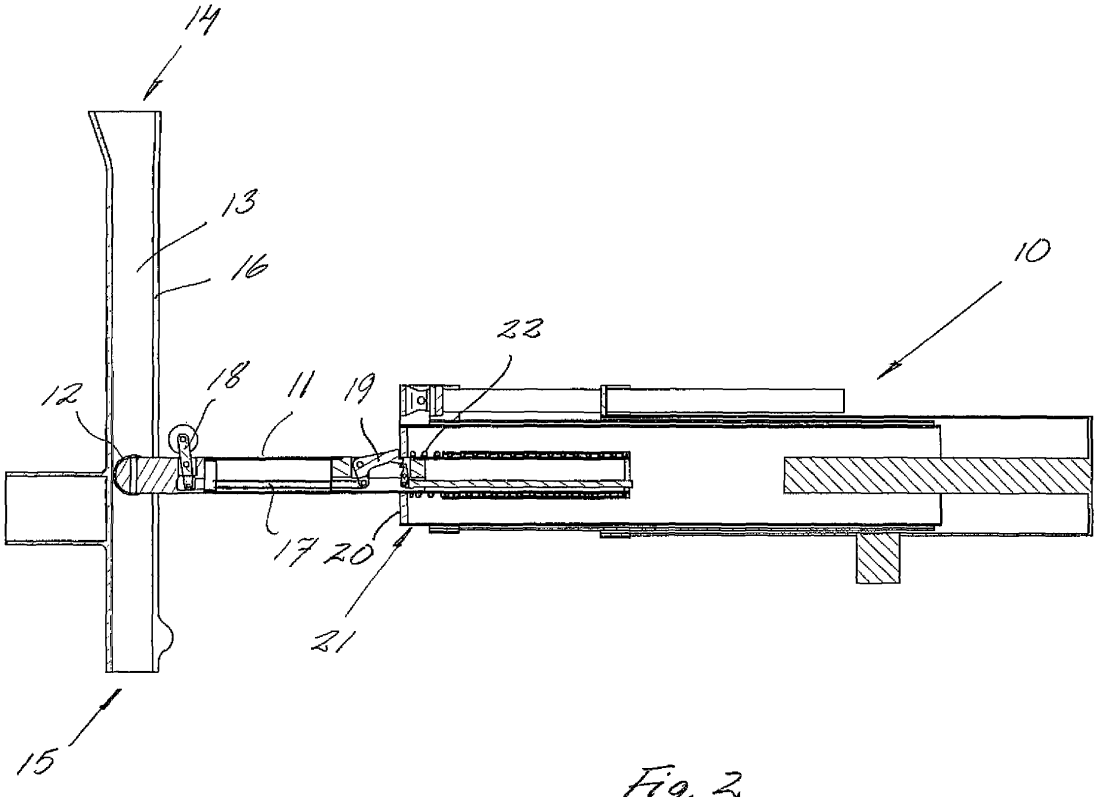

Fig. 2

EP 2 062 844 A1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to arrangements on spreaders, and more specifically to connecting arms arranged for interconnection of spreaders that are operated side by side in lift operations.

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 side of the spreader. The lower side 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 coupled 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, or if appropriate, the head-block and coupling structures in combination.

[0003] The literature contains several examples of spreaders that are interconnectable side by side in lift operations, i.e. shifting operations wherein two or more containers are handled simultaneously by spreaders that are interconnected side by side. The connecting means between the spreaders are typically realized as arms, which are journalled in both spreaders for some degree of movement in order to compensate for un-parallelism between the spreaders. The arms are typically hydraulically powered to permit a control of the relative position of spreaders and associated containers during shifting operations.

[0004] The connecting arms may be telescopically extendable, such as exemplified in US 2006/0243724 A1, or hinged as exemplified in WO 03/104132. In all cases, the ability to accommodate for spatial separation of the spreaders is of course limited, and in case of a non-admissible separation, there is a risk that the arms or connecting structures and journals get damaged. The risk for damage is at the largest during lift and lowering into the load compartment of a ship, wherein non-admissible vertical separation of the spreaders may result if one of the spreaders, or its associated container, gets jammed in vertical lowering guides while the other is free to move in the adjacent lowering guides.

SUMMARY OF THE INVENTION

[0005] The present invention aims at avoiding the risk of damages to the connecting structures between interconnected spreaders, such as damages resulting from collision in case of incidental non-admissible vertical separation of the spreaders when operated side by side in lift operations.

[0006] The object is met through an arrangement as defined in claim 1.

[0007] Briefly, in an arrangement which detachably interconnects a first and a second spreader in side by side in lift operations, an extendable connecting arm is connected to the first spreader and in its free end connectable to the second spreader, said connecting end being movably journalled in the second spreader in the connected position. A release mechanism is arranged on the connecting arm and activated in result of a non-admissible vertical separation between the spreaders, whereby the release mechanism effectuates retraction of the connecting arm from said second spreader.

[0008] In a preferred embodiment the connecting arm is biased towards a retracted condition, and the release mechanism, upon release and disconnection from the second spreader, is arranged to activate a biased retraction of the connecting arm from the second spreader.

[0009] The release mechanism is further arranged on an outer arm member of a telescopic arm, said arm member being spring biased to the telescopic arm, wherein the release mechanism is arranged to release the spring for retraction of the arm member into the telescopic arm.

[0010] In the preferred embodiment, the release mechanism further comprises a trigger arranged adjacent the end of the arm member, which trigger is acted upon from a limiter arranged on the second spreader. The location of the limiter on the second spreader determines a maximum length of admissible vertical separation between the first and second spreaders under which the spreaders remain connected.

[0011] In a connecting end thereof, the outer end carries a connector that is arranged in connecting position to move in the length direction of an elongate guide which is vertically oriented on the second spreader.

[0012] The arm may be arranged to have a part-spherical connector member carried in the connecting end of the arm, the connector being insertable to move in the length direction of a tubular seat of semicircular cross-sectional shape, which seat is vertically oriented on the second spreader. The limiter is preferably arranged adjacent to a lower end of the seat. The limiter may be shaped as a cam and the trigger may be shaped as a cam follower.

[0013] In a preferred embodiment, the release mechanism comprises a link mechanism journalled inside a hollow arm section; a trigger pivotally projecting outside the arm section and connected to the link mechanism, and a latch pivotally projecting outside the arm section and connected to the link mechanism, such that pivoting

of the trigger effects pivoting of the latch.

[0014] The latch is arranged to engage the front end of an end plate to the telescopic arm, through which end plate the arm's arm member projects with an inner end into the telescopic arm, wherein a coil spring supported about said arm member in one end is fixed adjacent to a rear and inner end of the arm member, while the other end of the coil spring acts upon a rear end of the end plate.

[0015] In order to reset the connecting arm's arm member into connecting mode, the arm member can be hydraulically activated for compression of the coil spring into a biased condition, wherein the latch again engages the front end of the end plate. To this purpose, a hydraulically operated actuator is incorporated in the telescopic arm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention will be further explained below with reference to the drawings, schematically illustrating embodiments of the invention. In the drawings,

Fig. 1 is a perspective view of first and second spreaders detachably interconnected in a side by side lift operation;

Fig. 2 is a longitudinal section through a connecting arm in connected mode;

Fig. 3 is a corresponding view showing the connecting arm in a sequence to be disconnected;

Fig. 4 is yet a corresponding view showing the connecting arm in retracted position, and

Fig. 5 is a corresponding view showing the connecting arm in a reset mode.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0017] As used in the following disclosure, "horizontal" refers to a planar horizontal projection of a spreader, and "vertical" refers to any normal to the horizontal projection.

[0018] In fig. 1, 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 rotatably journalled in a head-block comprised in the spreader structure. In a lower end of each spreader, twist locks 5 are supported and operative as connecting means for connection and disconnection, respectively, of spreaders and containers. 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.

[0019] In side by side lift mode, the first and second spreaders are detachably interconnected by means of a connecting arm 10. More precisely, a pair of connecting arms 10 are typically provided and separated by a distance in the longitudinal extension of the spreader.

[0020] The connecting arm 10 is attached to the first spreader, from which the connecting arm is telescopically extendable towards the second spreader. The connecting arm 10 is further pivotally attached to the first spreader in the horizontal plane. Extension/retraction and pivoting may be realized through hydraulic actuators as is common technology. The actuators are remotely controllable by the crane operator for connection/disconnection and for adjustment of the relative position of interconnected spreaders. The connecting arms 10 are operated by the actuators for connection to the second spreader. In connected mode, the connecting arms are operable by the actuators for control of the spatial relation between the first and second spreaders. Through a powered extension and retraction of the connecting arms, the relation between the spreaders can be manipulated in horizontal planes, in parallel as well as in unparallel displacements. As will be further explained below, the connecting arms are effective for controlling the mutual relation between the spreaders, to a limited extent, also when the spreaders are positioned in vertically separate planes.

[0021] Turning now to fig. 2, an extreme arm member 11 is arranged retractable into the connecting arm 10. In extended position, a connector 12 in the outermost end of arm member 11 is detachably connectable to the second spreader. In connected position, the connector 12 engages a guide or seat 13 arranged on the second spreader. The seat 13 forms an elongate, tubular guide running in vertical direction from an upper end 14 to a lower end 15. The connector 12 of arm member 11 is insertable via the upper end of the seat 13, to which purpose the seat may have a radially widened upper end as illustrated. In connected position, the connector 12 is received movable in the seat between the upper and lower ends to accommodate for vertical relative movements between the first and second spreaders in connected mode. The seat 13 has a circular, or to be more specific, a semi-circular cross-sectional shape in the horizontal plane. The connector 12 is preferably part-spherical. In the interconnected mode, the arm member 11 reaches out from the seat 13 via a longitudinal opening 16 running between the upper end lower ends of the seat 13. A horizontal width of the opening 16 is oversized with respect to the width of a corresponding portion of the arm member 11, permitting the same a certain degree of horizontal pivoting in the interconnected position. Additionally and preferred, a certain degree of pivotal relative movements also in vertical planes is achievable when the connector 12 is made spherical, or part-spherical.

[0022] The length of the seat 13 corresponds to an admissible vertical separation between the interconnected spreaders, during which the connecting arm 10 is operable for controlling the relative position of the spreaders

in horizontal planes. In case of a non-admissible vertical separation/displacement of the spreaders, a release mechanism arranged on the connecting arm 10 automatically effectuates disconnection of the spreaders, as will be further explained below. From the foregoing it will be appreciated though, that a non-admissible lowering of the second spreader results in disconnection by the connector 12 exiting the seat via its upper end, typically without a risk for damages caused to the connecting arm 10. It is thus mainly in connection with a non-admissible lifting of the second spreader, or a corresponding lowering of the first spreader, that the risk for damages rises dramatically, and caused by a passing container which is attached to the second spreader in side by side lift operations. From the teachings provided herein, however, it will be within reach of the skilled person to modify the embodiment presented for illustration purposes to effectuate an active and controlled disconnection at both ends of the admissible maximum vertical separation, if desired and appropriate.

[0023] Reference is now also made to fig. 3, wherein the connecting arm and the release mechanism are shown in a sequence to be disconnected. Arranged in the hollow arm member 11 is a link member 17 comprised in the release mechanism. A forward end of the link 17 is pivotally connected to a trigger 18, the trigger 18 in turn pivotally supported in the arm member 11 so as to project on the outside of the connecting arm, near the extreme end of the arm and adjacent to the connector 12. A rear end of the link 17 is pivotally connected to a latch 19, the latch 19 in turn pivotally supported in the arm member 11 so as to project on the outside of the connecting arm. Pivoting of the trigger 18 is thus transferred to the latch 19 via the link 17, obviously causing a corresponding pivoting of the latch. In the locking condition of fig. 2, the latch 19 engages a front end of an end plate 20 to a telescope section 21 of the connecting arm 10. The end plate 20 has a through-hole through which a rear end of the arm member 11 projects into the telescope section 21. A coiled spring 22 is supported about the rear and inner end of the arm member 11. One end of the coil spring 22 is fixedly attached in the rear end of the arm member, the opposite other end of the coil spring acting upon the rear end of end plate 20. In the locking condition the coil spring 22 is compressed, biasing the arm member 11 towards a retracted position in the telescope section 21. Pivoting of the trigger 18 thus causes the latch 19 to pivot out of engagement with the end plate 20, thereby releasing the arm member 11 to be retracted into the telescope section 21 by action of the expanding coil spring 22.

[0024] Fig. 3 shows the arrangement and release mechanism in disconnecting mode, as the arm member 11 is about to be retracted into the telescope section 21 of the connecting arm 10. The fully retracted position is illustrated in fig. 4. Release is initiated in result of the trigger 18 being pivoted and actuated upon from engagement with a limiter 23 arranged on the second spreader 2. The limiter 23 comprises a cam surface projecting into the path of movement for the trigger, as the connecting arm 10 travels towards the lower end of the seat 13 in a vertical relative movement of the two spreaders. The limiter 23 is arranged adjacent to the lower end of the seat, in practise by its position limiting the length of admissible vertical movement of the connector 12 along the guide/seat 13, and thus also limiting the admissible vertical separation between the spreaders in interconnected mode. As the connector 12 leaves the seat 13 from the lower end thereof, the trigger 18 travels like a cam follower over a cam surface on the limiter 23. The limiter thus causes the trigger 18 to pivot and to disengage the latch 19 from the end plate 20. In result, the arm member 11 is instantly retracted into the telescope section 21, eliminating the risk of collision between the connecting arm and the passing container in case of an uncontrolled vertical separation of the spreaders.

[0025] With reference to fig. 5, the release mechanism may be reset into connecting condition through an actuator 24 comprised in the connecting arm 10. The actuator 24 effectuates extension of the arm member 11, against the force of the biasing spring 22, till the latch 19 again engages the front end of end plate 20. The actuator 24 is stationary with respect to an outer telescope section 25, in which the telescope section 21 is journalled for extension and retraction. In its fully retracted position of fig. 4, the rear end of the arm member 11 is positioned near to a front end of the actuator 24, which projects into the telescope section 21 via the rear end thereof. The telescopic action is driven and controlled by means of a hydraulic cylinder 26. In reset the telescope section 21 is retracted into the actuator 24 which then acts on the rear end of arm member 11, as illustrated in fig. 5. Upon engagement with the rear end of arm member 11, the actuator 24 acts upon a rear end of a link member 27 which is comprised in the hollow interior of arm member 11. The opposite forward end of link member 27 is pivotally connected to a ratchet 28 which is pivotally supported in the arm member 11. The ratchet 28 is effective for holding the disengaged latch 19 radially inside the periphery of the arm member 11 in retraction, out of way for the expanding coil spring 22. In reset, the ratchet 28 is pivoted in result of the actuator 24 acting upon the rear end of link member 27. In result, the latch 19 is released from the ratchet and allowed to project outside the arm member 11 to engage again the front end of end plate 20.

[0026] It will be realized that the illustrated embodiment is disclosed for purpose of explanation, and that modification of the detailed structure will be available for the skilled person, from the above disclosure, and without departure from the invention as claimed.

Claims

1. An arrangement which detachably interconnects a first and a second spreader side by side in lift oper-

ations, comprising an extendable arm (10) which is connected to the first spreader and in its free end is connectable to the second spreader, the connecting end being movably journalled in the second spreader in the connected position, **characterized by** a release mechanism (17, 18, 19) comprised in the arm, the release mechanism arranged to effect retraction of the arm from said second spreader in result of a non-admissible vertical separation between the spreaders.

2. The arrangement of claim 1, **characterized in that** the arm in its extended position is biased towards a retracted condition, and **in that** the release mechanism, upon release, activates a biased retraction of the arm from the disconnected second spreader.

3. The arrangement of claim 2, **characterized in that** the release mechanism is arranged on an outermost arm member (11) of a telescopic arm (10), the arm member being spring biased (22) to the telescopic arm, wherein the release mechanism is arranged to release the spring for retraction of the arm member (11) into the telescopic arm (10).

4. The arrangement of claim 3, **characterized in that** the release mechanism comprises a trigger (18) arranged adjacent an outer end of said arm member (11), which trigger is acted upon from a limiter (23) arranged on the second spreader, the limiter by its location on the second spreader determining a maximum length of an admissible vertical separation between the first and second spreaders.

5. The arrangement of claim 5, **characterized in that** the arm member (11) in its connecting end carries a connector (12) that is arranged in connecting position to move in the length direction of an elongate guide (13) which is vertically oriented on the second spreader.

6. The arrangement of claim 5, **characterized in that** the arm member (11) in its connecting end carries a part-spherical connector (12) that is insertable to move in the length direction of a tubular seat (13) of semicircular cross-sectional shape.

7. The arrangement of any of claims 4-7, **characterized in that** the limiter (23) is arranged adjacent to a lower end of the guide or seat (13).

8. The arrangement of any of claims 4-7, **characterized in that** the limiter (23) is a cam and the trigger (18) is a cam follower.

9. The arrangement of any previous claim, **characterized in that** the release mechanism comprises

- a link mechanism (17) journalled inside a hollow arm member (11);
- a trigger (18) pivotally projecting outside the arm member (11) and connected to the link mechanism (17);
- a latch (19) pivotally projecting outside the arm member (11) and connected to the link mechanism (17), such that pivoting of the trigger (18) effects pivoting of the latch (19).

10. The arrangement of claim 9, **characterized in that** the latch (19) engages a front end of an end plate (20) to a telescope arm section (21), through which end plate the arm member (11) projects with an inner end into the telescope arm section (21), wherein a coil spring (22) supported about said arm member (11) in one end is fixed adjacent to the inner end of the arm member (11), while the other end of the coil spring (22) acts upon a rear end of the end plate (20).

11. The arrangement of claim 10, **characterized in that** the arm member (11) is hydraulically activated (26) for compression of the coil spring (22) into a biased condition, wherein the latch (19) engages the front end of the end plate (20).

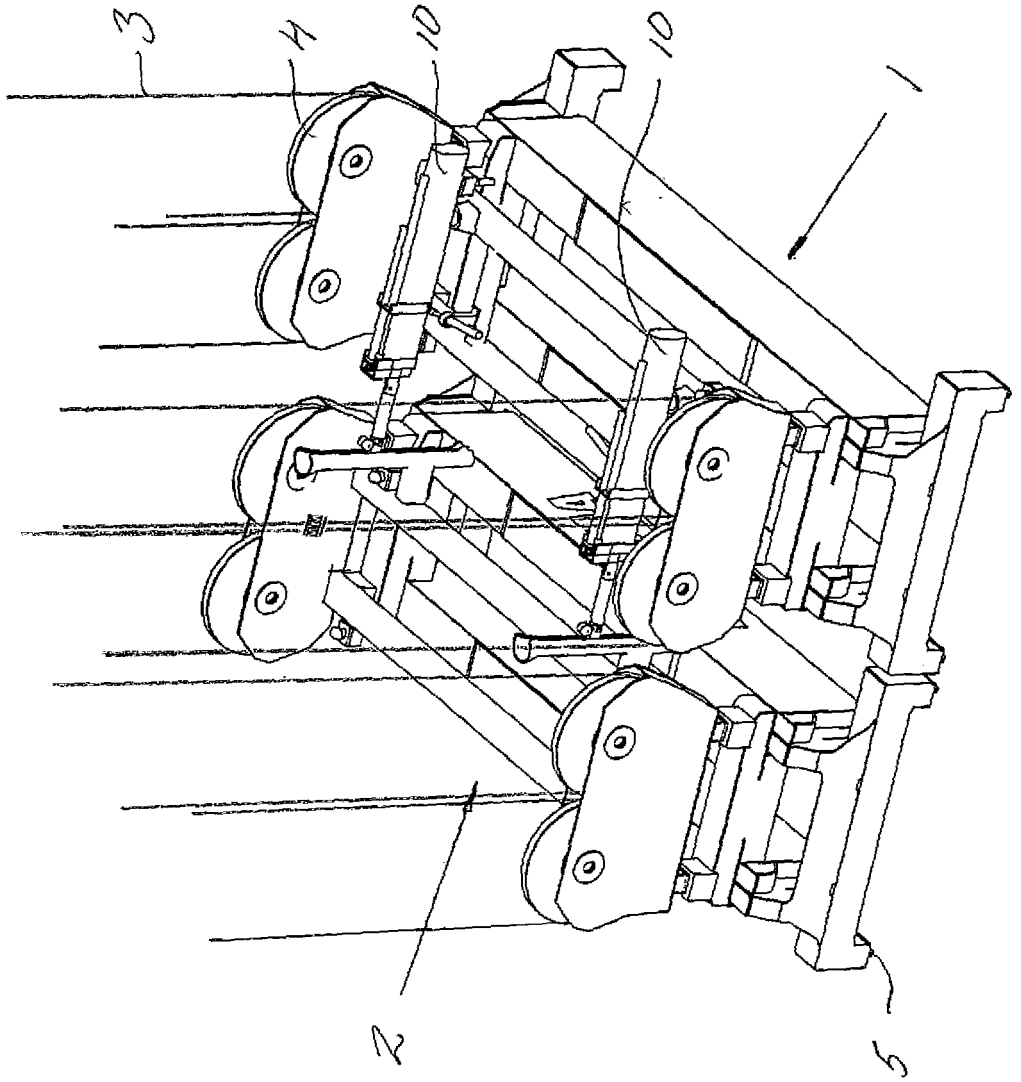

Fig. 1

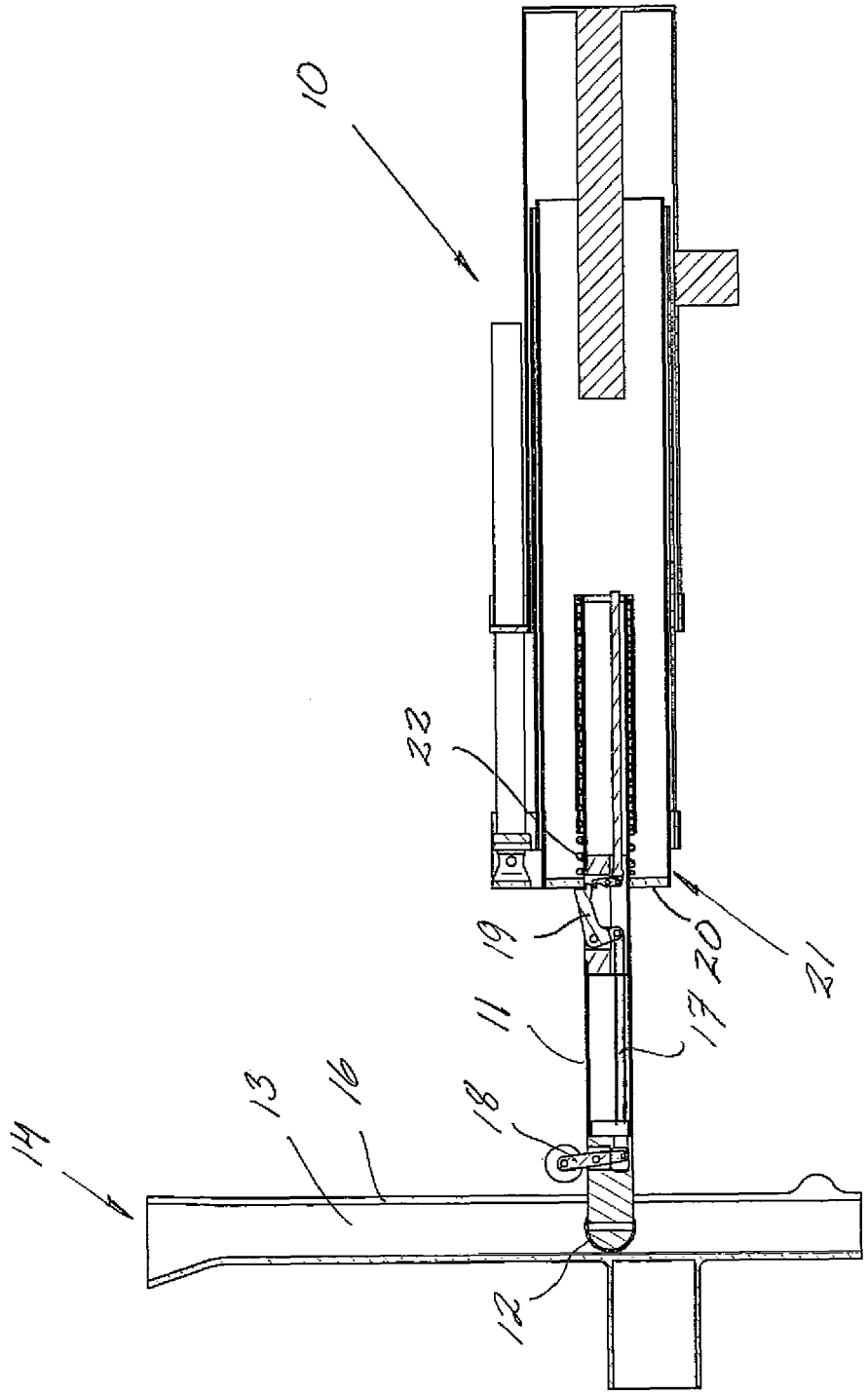

Fig. 2

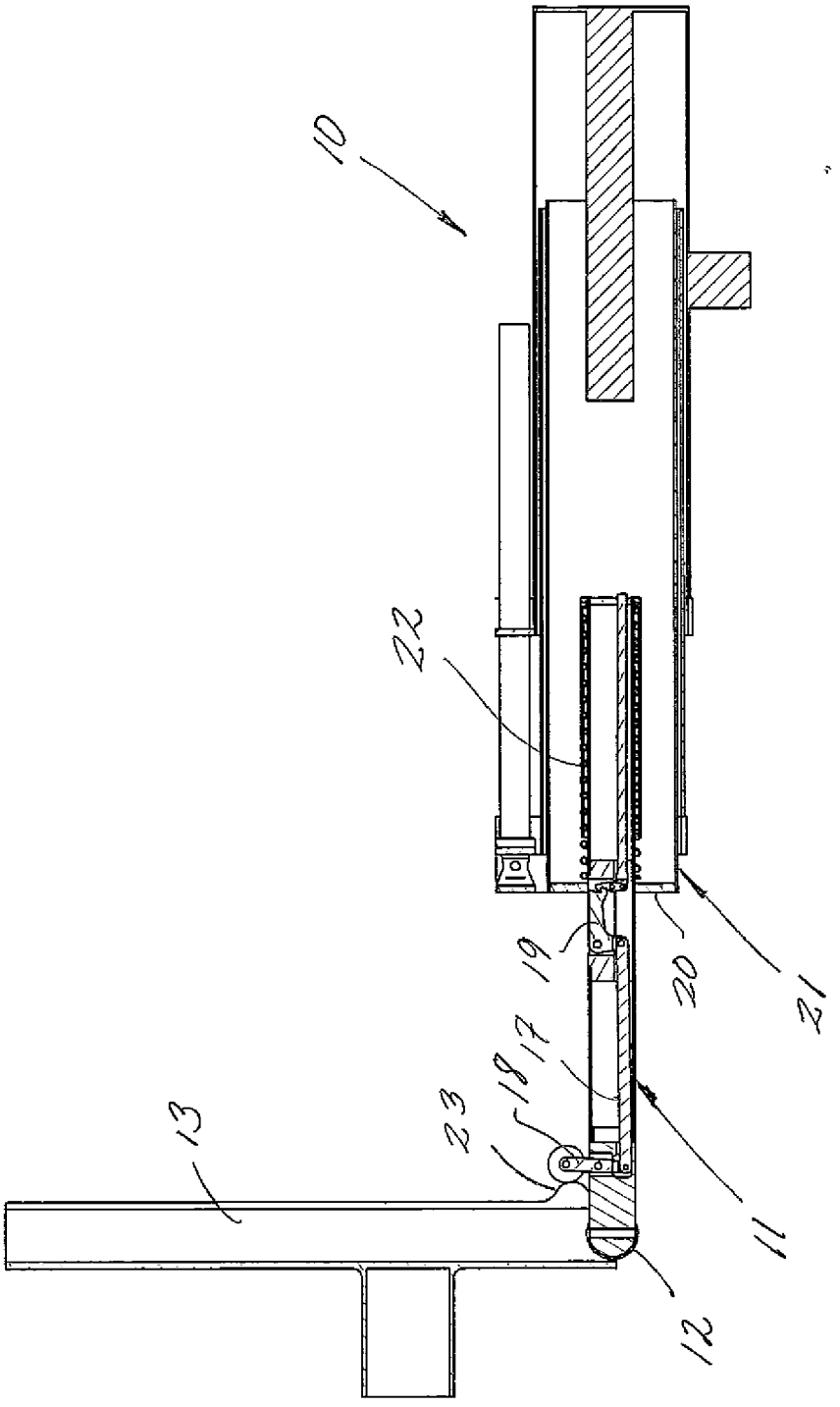

Fig. 3

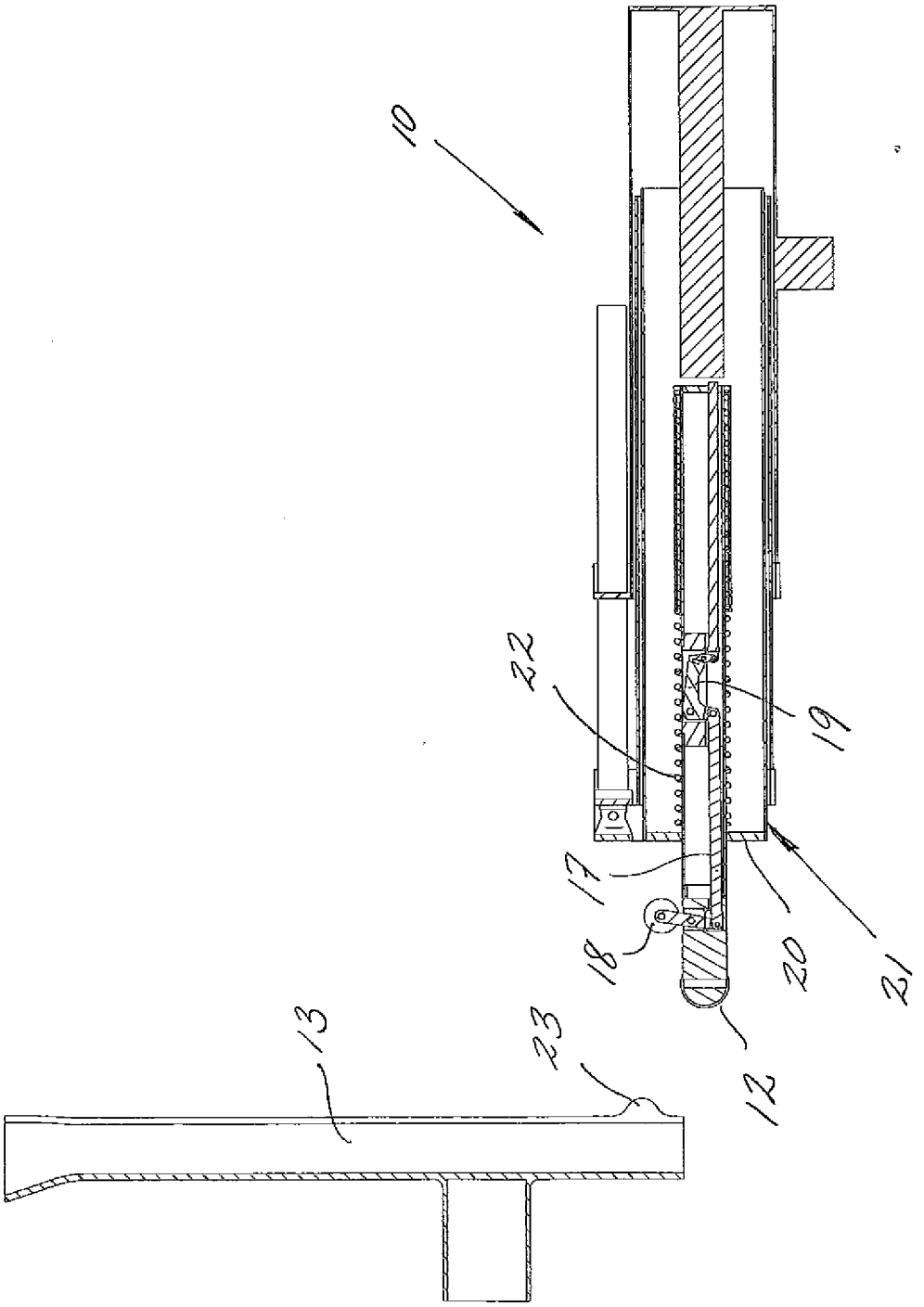

Fig. 1

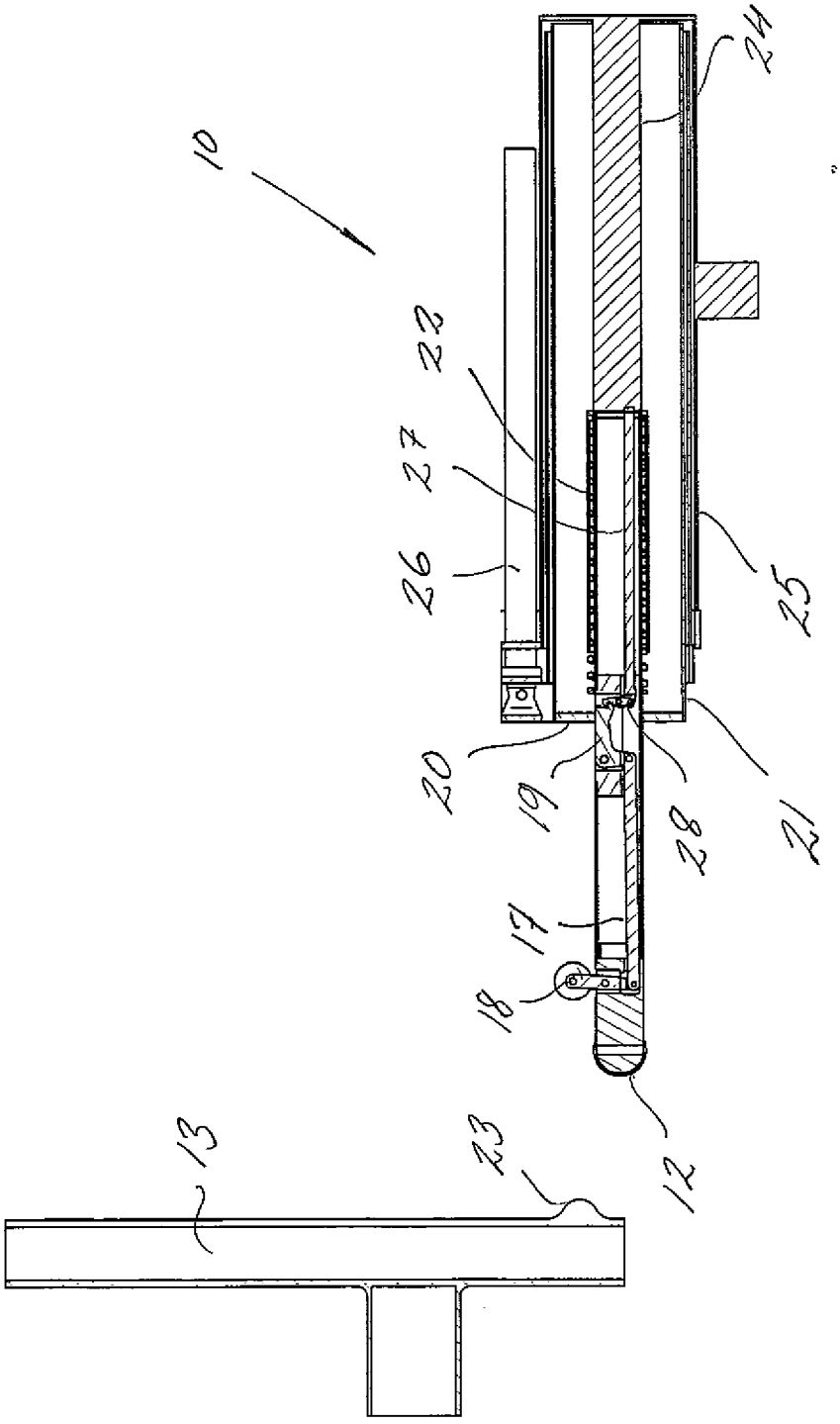

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 12 1137

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	US 3 747 970 A (FATHAUER J ET AL) 24 July 1973 (1973-07-24) * abstract; claims 1,4 * * column 1, line 32 - column 2, line 10 * * column 3, line 38 - line 44 * * column 4, line 49 - line 61 *	1,2	INV. B66C1/10 B66C1/66 B66C19/00
A	GB 1 302 245 A (STOTHERT & PITT LTD) 4 January 1973 (1973-01-04) * column 5, line 15 - line 49; figures * * abstract *	1,2	
E	WO 2007/136352 A (NSL ENGINEERING PTE LTD [SG]; MILLS ROBERT ARTHUR [GB]; BAO QIFAN [CN]) 29 November 2007 (2007-11-29) * page 25; figures 19A-19D * * abstract *	1	
A	DE 19 38 116 A1 (DEMAG AG) 4 February 1971 (1971-02-04) * claim 1; figures *	1	
D,A	US 2006/243724 A1 (SHAN JIANGUO [CN]) 2 November 2006 (2006-11-02) * abstract; figures * * paragraph [0029] *	3	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	29 April 2008	Verheul, Omiros

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 12 1137

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-04-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3747970 A	24-07-1973	CA 961893 A1	28-01-1975
		DE 2301349 A1	26-07-1973
		GB 1405857 A	10-09-1975
		JP 1023399 C	28-11-1980
		JP 48081254 A	31-10-1973
		JP 55014033 B	12-04-1980
		NL 7300105 A	19-07-1973
GB 1302245 A	04-01-1973	NONE	
WO 2007136352 A	29-11-2007	NONE	
DE 1938116 A1	04-02-1971	NONE	
US 2006243724 A1	02-11-2006	CN 1579916 A	16-02-2005
		WO 2005009885 A1	03-02-2005
		CN 1978307 A	13-06-2007
		EP 1650156 A1	26-04-2006
		JP 2007533564 T	22-11-2007

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20060243724 A1 **[0004]**
- WO 03104132 A **[0004]**