

ARRANGEMENT IN A LIFTING DEVICE

The present invention relates to arrangements in lifting devices, and particularly to an arrangement which provides an improvement of the operational capacity of a so-called spreader, designed for lifting a goods-container.

For the purpose of loading and re-loading in container transport, various types of lifting devices exist, for example, the type from which a rails-bound or wheel-supported crane is lowered over a container to engage with its corner fittings during a lift from a vessel to a dock, for example. The present invention is aimed at improving the operational capacity of such lifting devices, commonly referred to as spreaders. The following disclosure relates to a design comprising a central housing body in which two or several beams are accommodated for telescoping and oppositely directed relative movements. The beams have at their outer ends a pair of coupling means for engaging with the corner fittings, and are driven hydraulically or electrically to extend or retract, respectively, to adapt to the container's length. The driving means and the movement-transmitting means are arranged in or on the housing body, which is suspended by the cables of the crane or positioned at the end of the beam of the crane.

The handling of containers is a constantly developing activity, and continuous adaptation of current technique is required to fill the needs of the transport market. In the technical field there are containers of various standardised lengths of 20, 30, 40 and 45 feet. Because of the demands for rational and cost-saving goods handling, a growing need has arisen to handle containers also of greater lengths, for example 48, 53 feet, etc. in docks and goods terminals. Thus, there is a need for spreaders which have great flexibility and a capacity to handle containers of greater lengths so as to avoid set up time for changing lifting arrangements.

The technical solutions to accommodate the above mentioned requirements are limited, among other things since the length of the centre housing body shall

permit retraction also to allow containers, having the shortest lengths, to be lifted. Other restrictions reside in the total weight of the spreader and the position of a coupling member at the outer end of the spreader beam. These limitations cause problems when designing an arrangement wherein the opposite ends of the beams are moved to pass each other or to overlap in the retracted end position of the beams. One previous solution to these problems comprises hydraulic, telescopic beams of conventional type in two or more sections.

The present invention is aimed at providing an alternative, cost-saving solution to the above stated problems by providing a spreader, comprising a central housing, wherein at least two beams are stored in parallel and which project and retract in opposite directions, respectively. Said spreader, on each respective beam, has an axially moveable, additional beam member, acting as an extension of the beam when the beam is projected, and when the beam is in retracted position is designed to rest in an overlapping position on the beam.

This object is achieved by an arrangement according to the attached claim 1, and embodiments of the invention are stated in the subsequent claims.

Embodiments of the invention are described in more detail below and refer to the enclosed drawings, wherein

Figure 1 is a vertical side view of a beam member according to the invention;

Figure 2 is an end view of the beam member in Figure 1;

Figure 3 is a top plan view of the beam member in Figure 1 and Figure 2;

Figure 4 is a partially broken, cross sectional view of the beam member according to the invention attached to a beam of a spreader;

Figure 5 is a cross sectional view along the line V-V in Figure 4;

Figure 6 is a schematic view of the beam and the beam member in Figure 4, attached in a housing body of a spreader and in a projected end position, and

Figure 7 is a schematic view of the beam and the beam member in Figure 6 in a retracted end position in the housing body.

In Figures 1, 2 and 3 an illustrating embodiment of the invention is shown, comprising an essentially I-formed beam member 1, having a body 2 and an upper and lower longitudinal plate 3 and 4, respectively.

The end profiles of the beam member 1 are formed to adapt to the spreader's overall design so as to take advantage of the available standing space in a box body, not shown in Figure 1. The end profiles are not critical for the technical effect of the invention but can be given any suitable design for each adaptation, therefor these are not described in detail.

On the upper side of the upper plate 3, there is a spacing block 5 arranged at one end of the beam member 1. Above the spacing block is a sliding member 6. Likewise, on the underside of the plate 4, a spacing block 7 having a sliding member 8 placed on the under side, is arranged at the same end of the beam member 1. The upper spacing block 5 comprises a stop bolt for restricting the motion of the beam member in a manner disclosed more closely below, with reference to Figure 6. At the opposite end of the beam member 1 a sliding member 9 is arranged on the upper side of the upper plate 3.

Figure 4 is a partially broken cross sectional view of a beam 10, in a spreader designed for lifting containers. The beam 10 is formed as a box, at one end of which, hereinafter referred to as its inner end, a beam member 1 is introduced by slip fitting to allow axial motion in relation to the beam 10. Cf. also Figure 5, which illustrates a cross sectional view along the line V-V in Figure 4. The sliding members 11, 12 and 13 may be arranged internally in the beam 10 to facilitate movement of the beam member 1 in the beam 10, and are of a material selected to cope with the heavy loads involved. As examples of suitable materi-

als for the sliding members, metal, rubber or synthetic material, can be mentioned, optionally a mixture of these and having self-lubricating properties.

Internally, on one of the vertical sides of the beam 10 (in Figure 4, broken off) a heel 14 is arranged in the space between the beam member's body 2 and the inside of the beam 10. The heel 14 engages with the stop bolt 15 (cf. also Figure 1) on the body 2 of the beam member, to ensure, on projection of the beam 10 out of the housing body, that the beam member 1 follows the movement. It can be seen that the beam member 1 is axially movable in relation to the beam 10 and that the motion of the beam member is restricted by the spacing blocks 5 and 15 in a manner which, in part, is described above and, in part, is described below in connection with Figures 6 and 7.

Without it being specifically shown, it is mentioned here that instead of the heel 14 and the spacing block 15, engagement members of other design can be arranged between the beam 10 and the beam member 1 to bring it into movement. Furthermore, the beam member can be provided with a driving means, such as a piston/cylinder unit, acting either between the beam member and the box body 1, or between the beam member and the beam 10, for controlling the beam member's movement. In a preferred embodiment, however, the beam member 1 is freely axially movable on the beam 10 so as to be brought into its projection or retraction, respectively.

The beam 10 at its other end, or outer end, is arranged to accommodate conventional coupling means, not shown, for coupling the spreader having the device according to the invention to the corner fittings of a container.

Figure 6 illustrates schematically the beam 10 with the beam member 1 accommodated for outward and return movement in the housing body 16 of a spreader, in an outer end position. The beam 10 is carried for sliding motion in the housing body 16, optionally with the aid of friction plates or pressure plates, and for projection and retraction, respectively, is driven by hydraulic, electrical or mechanical drive means and movement transferring means such as

rods, endless chains or wires. The driving means are not crucial to the concept of the invention and several conventional methods are to be found in prior art on how to generate the movement of the beam 10 in the housing body 16. Therefore, for the sake of clarity, the driving and movement transferring means have been left out on the drawings. For the same reason the fastenings for crane lines or for a crane beam, which are generally arranged on the upper side of the housing body 16, have not been shown either.

In the outer end position, as illustrated in Figure 6, the beam member 1 has been brought by beam 10 into a position where the stop block 5 is at a standstill and lies against a heel 17 which juts down from the top side of the housing body 16 into the storing space of the beam to a depth which allows the beam 10 to pass the heel 17 on its retraction from the illustrated end position. For guidance of the beam 10 in the housing body 16 the beam member's spacing block/stop bolt 5 protrudes upwards with the sliding member 6 over the outer surface of the beam 10, to lie against the upper, horizontal inner side of the storing space. In the same manner the beam member's spacing block 7 juts down with the sliding member 8 below the under side of the beam 10, to lie against the lower, horizontal inner side of the storing space. In this manner an undesired drawer effect may be avoided and a problem-free movement of the beam 10 together with the beam member 1 may be carried out in the housing body 16.

Figure 7 illustrates schematically the beam 10 with the beam member 1 in a retracted position or end position in the housing body 16. On retraction of the beam 10, the beam member 1 is carried along by the upper edge of the inner end of the beam 10 which is designed to engage the stop block 5 and to push the beam member 1 forward. A stop heel 18 may be arranged on the box body 16 to define a definite end position for the retraction movement and to prevent the beam member 1 from hitting and damaging constructive elements of the beam/beams, carried in a parallel manner and axially moveable in mutual opposite direction and with coupling means for engaging with the corner fittings of a container.

When studying Figure 6, it may easily be seen that the arrangement according to the invention provides a simple and cost-saving technical solution to the problem of improving the operational capacity of a spreader designed for hoisting containers. By still retaining the length of the box shaped body, a spreader will be able to adjust for lifts of container lengths of 20', at the same time as additional extending length is provided for lifting container lengths of 48' or more. By means of the storing of the beam member 1 over the beam 10, necessary engagement lengths are achieved from the box body 16 for carrying out safe lifts by acceptable stress at engagement points, and by means of the free movement of the beam members in relation to the beam 10, a cost-saving design without extra driving or power requirements is achieved.

The invention here has been described in connection to a spreader comprising at least two side-by-side carried, in mutual opposite direction extendable, retractable, respectively, beams 10. The scope of invention is obviously also applicable to spreaders which have four, in pairs, axially moveable beams, operated synchronically or non-synchronically in their movement.

CLAIMS



1. An arrangement on a spreader intended for hoisting containers, comprising at least two, in opposite directions, outwardly extendable beams (10), having coupling members at their outer ends, the beams being parallel to each other and carried in a sliding manner in a mutual housing body (16) including driving means and movement-transferring means for the extending and retracting movements of the beams, characterized in that each respective beam at its inner end has an axially moveable additional beam member (1) in relation to the beam (10), and which is brought into the motion of the beam (10), so that when the beam is in extended position, it acts as an extension of the beam (10) and provides the necessary engagement with the housing body (16) for lifts even in the fully extended position, and by the beam (10) being positioned to overlap the beam (10) in the retracted end position of the beam (10).
2. An arrangement according to claim 1, characterized in that the movement of the additional beam member (1) in relation to the beam (10) is restrained, partly by a front or outer stop bolt (15) formed in the beam member which engages with the beam, and partly by a back or inner stop bolt (5) formed in the beam element, which engages with the beam.
3. An arrangement according to claims 1 and 2, characterized in that the beam (10) has the form of a box, the beam element (1) being carried at its inner end in a sliding manner and freely axially moveable in relation to the beam to a length which is restricted by the stop bolts (5) and (15), whereby the beam member (1) in its fully overlapping position on the beam (10) has a protruding section having a sliding contact surface (6, 8) for engaging the inner space of the housing body (16) accommodating the beam (10) for guiding the beam and the beam member on extending and retracting, respectively, relative to the housing body (16).



4. An arrangement according to claim 3, characterized in that the beam member (1) partially has larger cross sectional dimensions than the beam (10) in the direction of the height of the beam member.

5. A spreader for lifting goods-containers, comprising a housing body (16) in which four beams (10) are carried in pairs in a parallel manner for extending and retracting axial movement in opposite directions and further comprising driving means and movement transferring means to generate the movement of the beams (10) in relation to the housing body (16) and coupling means at the outer ends of the beams for engaging with the corner fittings of a goods-container, characterized in that the beams (10) are box-shaped and at their inner ends have an internal, axially moveable additional beam member (1) carried in a sliding manner in relation to the beam, whose length of movement in relation to the beam is limited, partially by a front or outer stop block (15), and partially by a back or inner stop block (5) and which is moved by the beam (10) to operate, also in the fully extended end position of the beam (10), as an extension of the beam (10) while providing the necessary engagement with the housing body (16), and which is moved by the beam (10) to rest in an overlapping position on the beam (10) in the fully retracted end position of the beam (10).