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(54) IMPROVEMENTS IN OR RELATING TO OVERHEAD CRANES

(71) We, J. H. CARRUTHERS & COMPANY LIMITED, a British Company of College Milton, East Kilbride, Glasgow, Great Britain, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to an overhead crane of the kind comprising a transverse overhead beam, a pair of carriages supporting the ends of the beam so as to form with the beam a longitudinally movable structure.

15 In a known overhead crane of this kind the transverse beam consists of a single longitudinal member from which a trolley having a hoist rope for receiving the load is suspended, while in another known crane of this kind the beam consists of two spaced parallel longitudinal members and the trolley is supported on the members and between same. In each of these known cranes the trolley usually includes electrically-operable driving means for the trolley and an electrically-operable winding device for the hoist rope. The height of the resulting combination is considerable and, if the crane is to be housed, necessitates the erection of a relatively high building for a given load lift. Moreover, the resulting combination is of necessity large, and consequently the traversing movement of the trolley is short, that is, the floor area covered by the hoist is limited.

It is an object of the present invention to obviate or mitigate the above disadvantages.

40 According to the present invention there is provided a crane comprising a transverse overhead beam, a pair of carriages supporting the ends of the beam and forming with the beam a longitudinally movable structure, a trolley carried by the beam for

traversing movement along the beam, traverse means for moving the trolley along the beam, hoisting means for a hoist rope depending from the trolley, mounting means for the trolley alongside a side wall of the beam and externally thereof to load the beam torsionally and power operable driving means for said traverse and hoisting means mounted on said structure.

Preferably, the hoisting means consist of a winding device mounted on one end carriage a pulley-wheel mounted on the second end carriage, a pair of side-by-side pulley wheels mounted on the trolley, a load receiving pulley wheel located under the trolley, and a hoist rope extending alongside the beam from the winding device, around the pulley wheel on the second carriage alongside the beam, over the pulley wheels on the trolley in a U-loop which carries the load-receiving pulley wheel, and alongside the beam to the second end carriage, the arrangement being such that the height of the load-receiving pulley wheel is unaffected by the traversing movement of the trolley.

Preferably also the beam is of box-section and the trolley is mounted externally of and alongside a side wall of the beam so as to load the beam torsionally.

An embodiment of the present invention will now be described by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a top perspective view of an overhead crane;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a side view of the crane;

Fig. 4 is an enlarged sectional end view on the line A-A of Fig. 3; and

Fig. 5 is a view corresponding to that shown in Fig. 4 of a modified trolley.

Referring to the drawings, an overhead crane consists of a transverse overhead beam 10, a pair of carriages 11, 12 supporting the ends of the beam 10 and forming with 90

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the beam a longitudinally movable structure, a trolley 13 carried by the beam 10 for traversing movement along the beam, and load hoisting means including a hoist rope 14 depending in loop form from the trolley 13 with the loop engaging around a load-receiving pulley wheel or snatch-block 15. The beam 10, as is best shown in Fig. 4, is of box-section and the trolley 13 is mounted for traversing movement externally of the beam 10 alongside a side-wall 10A thereof so as to load the beam torsionally. The sidewall 10A has upper and lower tracks 16, 17 on which the trolley 13 is mounted, the upper track 16 being of box-section and being suspended from cantilevers 18 secured at spaced intervals to the upper face 10B of the beam 10, so as to present an inwardly-facing vertically-disposed bearing surface 16A to the side wall 10A. The lower track 17 is also of box-section and is secured to the lower portion of the side-wall 10A so as to present a horizontally disposed bearing surface 17A and a vertically disposed bearing surface 17B.

The trolley 13 includes a frame 21 composed of box-section members carrying two spaced-apart upright load-bearing wheels 19 and two spaced-apart horizontal wheels 19A arranged respectively to run on the horizontally and vertically disposed bearing surfaces 17A, 17B, of the lower track 17, and two spaced-apart horizontal wheels 20 arranged to run on the bearing surface 16A of the upper track 16. The frame 21 extends outwardly from the sidewall 10A to support a load-bearing platform 25 carrying fore-and-aft pulley wheels 22 which support the hoist rope 14 and the snatch-block 15, the dimensions of the platform 25 and the pulley wheels 22 being such that the trolley 13 is accommodated within the overall height of the beam 10. The wheels 19, 19A, 20 each have rims made of resiliently compressible rubberlike material, such for example as polyurethane.

The stretches of the hoist rope 14 have extensions which pass in opposite directions around the pulley wheels 22 and alongside the beam 10 to the carriages 11, 12, one extension ending at and being anchored to the carriage 11 and the other extension passing first around a guide pulley 23 (Figs. 2 and 3) on the carriage 12 and then alongside the beam 10 to power-operated winding means in the form of a winding device 24 and a driving motor thereof (so called hoist block) mounted on the inner side wall 11B of the carriage 11 so that traversing movement of the trolley 13 does not affect the height of the load on the hoist rope 14.

Power-operable driving means for traversing the trolley 13 includes a driving motor 65 and winch 30 mounted within the carriage

12 beneath the hoist guide pulley 23, and a traversing guide-pulley 30A mounted on the carriage 11. One end portion of a traversing rope 33 extends from the winch 30 around the guide pulley on the carriage 11, and is anchored to the frame 21 of the trolley 13, and the other end portion of the rope 33 extends directly to and is anchored at the frame 21. In this manner an endless trolley-traversing rope is formed.

Driving motors 31 for longitudinal movement of the beam 10, are mounted on the inner side walls 11B, 12B of the end carriages 11, 12 and are operatively connected to the carriage wheels through reduction gearing.

The driving, winding, and traversing motors 31, 24, 30 are electric and are controlled from a panel 32 mounted on the inner side wall 12B of the carriage 12.

A modified trolley 13' of increased load-bearing capacity is shown in Fig. 5 and includes a frame 21' extending outwardly from the side wall 10A of the beam 10 to support a load-bearing platform 25' carrying spaced pairs of fore-and-aft pulley wheels 22' which support the hoist rope 14 and the snatch-block 15, and the frame carries wheels 19', 19A', 20' arranged to run on the tracks 16, 17 of the beam 10 in a manner similar to that described with reference to Fig. 4. In this instance however the load-bearing wheels 19' and the pulley wheels of the snatch block 15 are arranged in pairs in order to compensate for the greater load-bearing capacity of the trolley.

In a further modification, the overhead beam is of inverted-U section and the trolley is mounted for traversing movement within the beam. In this instance the walls of the beam may consist of I-beams, the webs of which, having been previously formed of castellated strip, have series of hexagonal apertures therein which substantially reduce the weight of the beam.

In operation, traversing movement of the trolley 13 is effected through the rope-and-pulley gearing by remote operation of the electrical motor and winch 30. Hoisting is similarly effected through the hoist rope-and-pulley gearing by remote operation of the electrical motor and winch 24.

By virtue of the invention the trolley is reduced to a simple wheeled frame carrying pulley wheels thereon and it can be made very compact so as to be readily accommodated within the overall height of the overhead beam. Thus, if the crane is to be housed, a minimum of headroom above the overhead beam is required whilst maintaining the maximum height of snatch-block lift. Moreover, the trolley can be fore-shortened to an extent that permits close approach thereof to the end carriages

so that the hoist covers a maximum of floor space.

Also, because the trolley is small and lightweight it is possible to provide a relatively lightweight overhead beam, which means that the crane is of minimal dead-weight and is economical to manufacture.

Moreover, as the electrical components are not located on the trolley, the high cost and practical difficulties associated with the transfer of electrical power from the crane structure to the trolley, which is movable relative thereto, are eliminated.

WHAT WE CLAIM IS:—

1. A crane comprising a transverse overhead beam, a pair of carriages supporting the ends of the beam and forming with the beam a longitudinally movable structure, a trolley carried by the beam for traversing movement along the beam, traverse means for moving the trolley along the beam, hoisting means for a hoist rope depending from the trolley, mounting means for the trolley alongside a side wall of the beam and externally thereof to load the beam torsionally and power operable driving means for said traverse and hoisting means mounted on said structure.

2. A crane as claimed in claim 1, wherein the beam is of box section.

3. A crane as claimed in claim 1 or claim 2, wherein the hoisting means consist of a winding device mounted on one end carriage a pulley-wheel mounted on the second end carriage, a pair of side-by-side pulley wheels mounted on the trolley, a load receiving pulley wheel located under the trolley, and a hoist rope extending alongside the beam from the winding device, around the pulley wheel on the second carriage alongside the beam, over the pulley wheels on the trolley in a U-loop which carries the load-receiving pulley wheel, and

alongside the beam to the second end carriage, the arrangement being such that the height of the load-receiving pulley wheel is unaffected by the traversing movement of the trolley.

4. A crane as claimed in any one of claims 1 to 3, wherein the traverse means for the trolley includes a power-operable winding device mounted on the structure and rope-and-pulley gearing connecting the winding device to the trolley.

5. A crane as claimed in claim 4 wherein the trolley driving means consist of a winding device mounted on said one end carriage, a pulley-wheel mounted on the second end carriage, and a rope extending alongside the beam from the winding device and around the pulley wheel and attached at its end to the trolley.

6. A crane as claimed in any one of claims 1 to 5, wherein said side wall has upper and lower tracks on which said trolley is mounted, the lower track being of box-section having horizontally and vertically disposed bearing surfaces, and the upper track being suspended from cantilevers secured to the beam and having a vertically disposed bearing surface spaced from said side wall.

7. A crane as claimed in any one of the preceding claims, wherein the trolley is mounted on wheels which have resiliently compressible rims.

8. A crane substantially as hereinbefore described with reference to Figs. 1 to 4 or Fig. 5 of the accompanying drawings.

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