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LOAD-CARRYING BRIDGE FOR OVERHEAD TRAVELLING CRANES, GANTRY CRANES AND THE LIKE

Filed Dec. 14, 1956

2 Sheets-Sheet 1

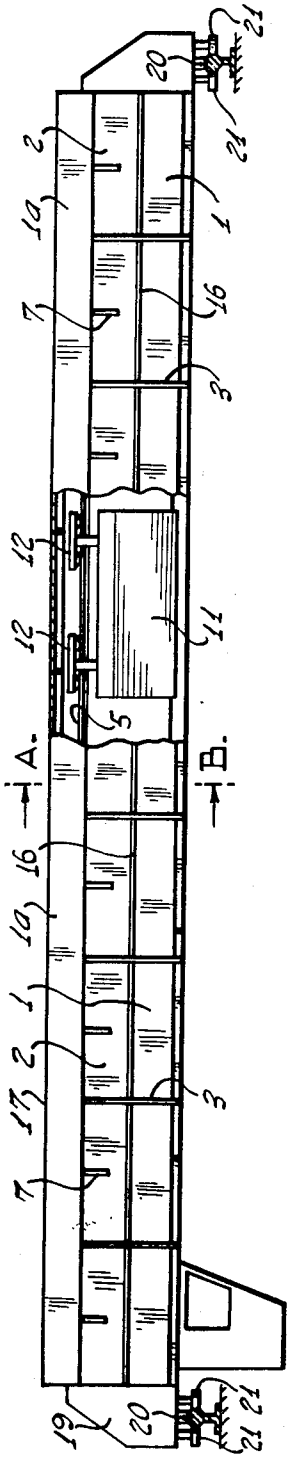

Fig. 2.

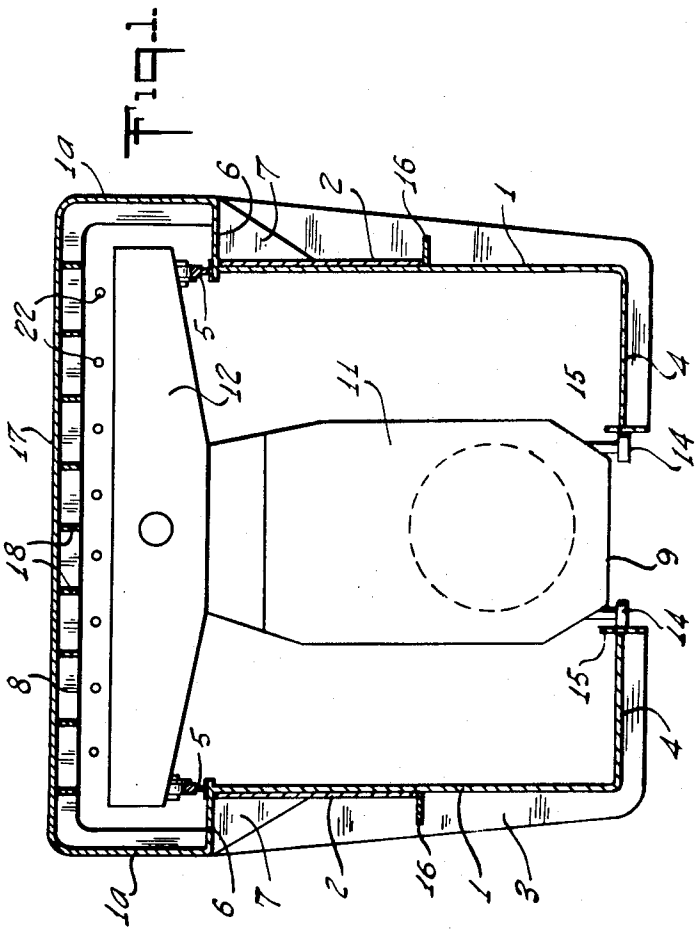

Fig. 1.

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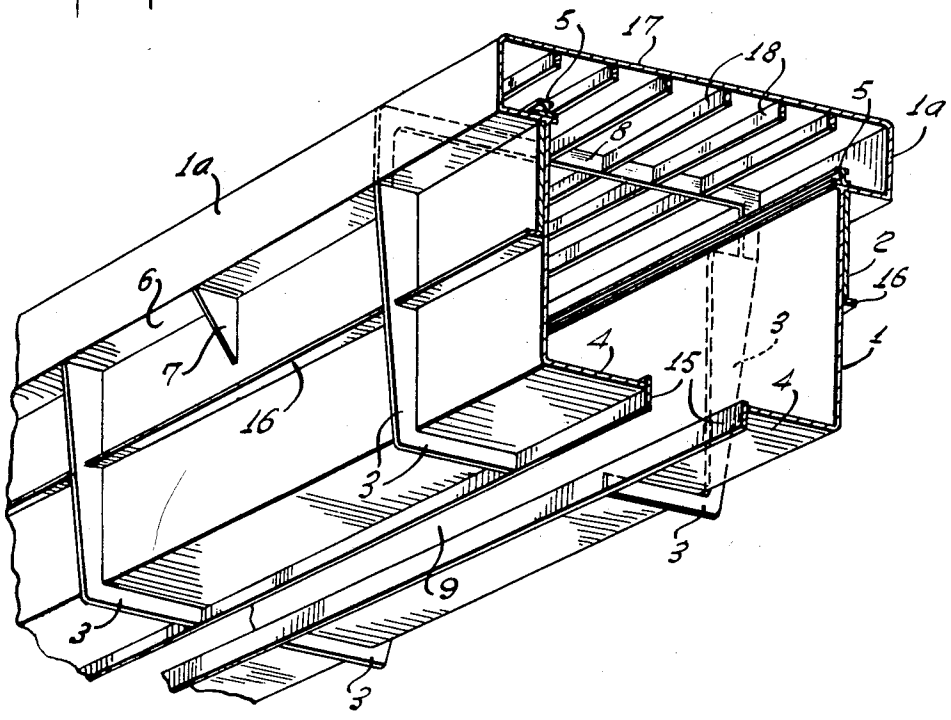
Fig. 3.



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2,983,390

LOAD-CARRYING BRIDGE FOR OVERHEAD TRAVELLING CRANES, GANTRY CRANES AND THE LIKE

Gerhard Lang and Rudolf Necke, Leipzig, Germany, assignors, by mesne assignments, to Institut für Fördertechnik des Ministeriums für Schwermaschinenbau, Leipzig, Germany

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6 Claims. (Cl. 212—18)

This invention relates to improvements in trolley-carrying bridges for overhead travelling cranes, gantry cranes, loading bridges, and similar types of lifting or loading devices. In particular, the invention relates to a novel bridge of this sort which is almost completely enclosed.

Conventional load-carrying bridges for travelling gantry cranes and similar lifting and loading devices which contain trolleys are made with openwork frames formed of rigid profile beams and structural sections on which the necessary machine elements and their electrical components are mounted for operation.

Such conventional designs present considerable disadvantages, particularly in the case of gantries which are located outdoors and are therefore exposed to the elements. Since the bridges are of openwork construction, the trollies must be enclosed in a suitable protective housing to protect their operating parts from the weather. This severely reduces the accessibility of the various machine and electrical elements for servicing and repair.

Such conventional structures further necessitate the provision of additional arrangements for the protection of the machine and electrical elements, and the entire gantry and trolley require constant and permanent supervision and servicing.

Another major disadvantage of conventional bridge designs is that a large number of component parts, such as secondary beams, cat walks, railings, etc., are not designed to contribute to the load-carrying structure of the gantry. On the contrary, these component parts merely add to the total weight of the structure and thus produce a greater load which must be borne by the load-carrying gantry structure.

An object of the invention is to provide a load-carrying bridge for gantries and the like having an enclosed outer shell structurally designed so that all of its parts contribute in supporting the load. Such design enables all of the component parts of the bridge to be utilized as functional structural components of the gantry to assist in bearing the load.

Another object of the invention is the provision of a bridge of the type described in which the top wall of the bridge serves as a roof to protect all of the mechanical and electrical components of the contained trolley, as well as the two cat-walks which are contained within the bridge. Thus separate protective arrangements for the mechanical and electrical devices are not required, and these parts are made readily accessible for servicing when necessary.

A further object of the invention is the provision of a bridge of the type described in the nature of an enclosed shell containing the trolley, in which the top wall of the shell is adapted to serve its primary function of receiving the upper horizontal stress of the structure.

Additional objects and advantages of the invention will become apparent in the course of the following specification when taken in connection with the accompanying drawings, in which:

Fig. 1 is a section taken along line A—B of Fig. 2, and showing a vertical cross-section of a travelling crane bridge with a trolley suspended therein between its cat-walks, the trolley structure being shown schematically;

Fig. 2 is a front elevation of the travelling crane bridge with a portion thereof broken away to reveal the trolley suspended therein; and

Fig. 3 is a partial perspective view of the bridge shown in Figures 1 and 2.

As shown in Fig. 1, the travelling crane bridge has an outer shell formed of relatively thin sheet material and bent in the form shown to provide a pair of spaced vertical side wall sections **1** and a top wall section **17**. The vertical side wall sections **1** terminate at their top ends in outwardly extending horizontal wall sections **6** which are connected to the top wall **17** by upper vertical side wall sections **1***a*. The bottom side wall sections **1** terminate at their bottom ends in inwardly-extending horizontal wall sections **4**, which serve as runways or cat-walks by which convenient access is afforded to the trolley **11** and the electrical system of the bridge.

To insure against buckling, light rib sections **3** are provided, the ribs **3** extending laterally around the exterior of the wall sections **1** and **4** and functioning to transfer the stresses resulting from the vertical loads on the cat-walks **4** to the top frame structure.

The bridge shell encloses a trolley which is suspended therein for rolling movement along the length of the bridge. The trolley comprises a trolley carriage **12** from the center of which is pivotally suspended the hoisting mechanism **11**, on a pivot **13**. The trolley rails **5** are located on the top surface of the horizontal wall sections **6** directly above the load bearing side wall sections **1** for engagement by the wheels of the trolley carriage **12**. The side walls **1** may be reinforced by suitably dimensioned additional sheets **2** located beneath the trolley-carrying rails **5**.

Because of the location of the trolley-carrying rails **5** directly above the side walls **1**, the upper vertical wall sections **1***a* are spaced outwardly from the plane of side walls **1**. To receive the compression stresses of the trolley load, intermediate wall portions or plates **7** are provided, connecting the side wall sections **1** and upper side wall sections **1***a*, and bracing the horizontal wall sections **6**.

The outer lateral stiffening ribs **3** are continuous with inner lateral ribs **8** extending along the interior of the upper side wall section **1***a* and top wall section **17**. The top wall section also has a plurality of longitudinally-extending inner ribs **18**, which, together with the inner lateral ribs **8** constitute the reinforcing and load-supporting structure of the top wall. The lateral stiffeners **3** and **8** form a continuous frame which is interrupted only at the center of the bottom side, that is to say by the opening **9** between the catwalks **4**. This opening **9** provides clearance for the travel of the hoist lines depending from the hoist mechanism **11**.

To avoid lateral movement of the hoisting mechanism **11**, guide rollers **14** are provided at the bottom of the hoisting mechanism. These guide rollers **14** engage flanges **15** which extend along the free longitudinal edges of the horizontal wall sections forming cat-walks **4** while simultaneously allowing sufficient space in the cat-walks. To forestall buckling of the side wall sections **1** due to lateral forces, additional stiffening ribs **16** are provided, extending longitudinally along the outer surface of wall sections **1**.

Similarly, buckling of the top wall section **17** is prevented by the longitudinal reinforcing ribs **18** and the lateral stiffening ribs **8**, which intercross.

As shown in Fig. 2, on the opposite ends of the bridge are affixed supporting heads **19** which may be welded to the side wall sections **1**. These supporting heads **19** contain the running wheels or rollers **20** which roll along the bridge tracks, and horizontal guide rollers **21** which engage the sides of the track to prevent tipping of the bridge. The electrical trolley glide cables **22** are located beneath the top wall section **17**, in which position they are protected from the elements.

Because of the suspension construction of the trolley and the absence of a protective housing about the trolley, all of the mechanical and electrical parts of the structure are made accessible to a degree never before realized. In addition, the thick heavy beams of the frame construction of conventional trolley assemblies are replaced in the arrangement of this invention by light simple bars or plates which can withstand the longitudinal stress because of the suspension of the trolley. This results in considerable reduction in the weight of the structure and a decrease in the load which must be supported by the structure.

While a preferred embodiment of the invention has been shown and described herein, it is obvious that omissions, changes, and additions may be made in such embodiment without departing from the spirit and scope of the invention.

We claim:

1. A load bearing bridge for a travelling crane comprising a unitary thin-walled elongated shell including a top, side walls and a flat base, an extended opening in said base of said shell adapted to allow passage of a lifting cable, a pair of longitudinal outward extensions of said shell forming lateral shoulders adapted to support trolley-carrying means disposed in said shell, and longitudinally extended vertical flanges secured to the sides of said shell at the opening thereof for supporting horizontal guide rolls to control transverse motion of a trolley pivotally depending on a trolley support in said bridge upon which the guide rolls are mounted.

2. In a load carrying bridge for a gantry crane and the like having a unitary thin-walled elongated shell including side walls and a flat base having an extended opening adapted to allow passage of a lifting cable; a pair of longitudinal inward extensions on the side walls of said shell forming lateral shoulders, trolley carrying means disposed in said shell and mounted to roll on said shoulders, a trolley pivotally mounted at the center of said trolley carrying means, a pair of vertical flanges extending longitudinally along the edges of said base along the opening therein, a plurality of guide rollers rotatably mounted on said trolley in position between said flanges for abutment against said flanges for absorbing lateral pressure produced by movement of the trolley when said trolley moves in a longitudinal direction with respect to the bridge.

3. In a bridge for traveling cranes as set forth in claim 2, said thin-walled elongated shell having supporting struts so as to make said side walls load bearing, said pivotally supported trolley and said trolley carrying means causing even distribution of forces resulting from the load to the parts of the bridge construction which contribute to the support of the load.

4. In a bridge for traveling cranes as set forth in claim 2, said shell including a protective roof, said roof absorbing part of the bending stresses which arise from the weight of the bridge and the load received by the trolley.

5. In a traveling crane having a unitary thin-walled elongated shell including a top, side walls, and a flat base having an extended opening adapted to allow passage of a lifting cable, a pair of longitudinally extensive catwalks formed by said opening in said base on either side of said opening, a pair of longitudinally inward extensions of said shell forming lateral shoulders, a bridge structure extending from one lateral shoulder to the other transverse to the longitudinal direction of said shell, supporting roller means mounted on said bridge structure for supporting said bridge structure upon said lateral shoulders, whereby said bridge structure may roll freely along the lateral shoulders in the longitudinal direction of said bridge, a trolley pivotally mounted at the center of said bridge structure in the direction transverse to the longitudinal direction of said shell, said trolley being pivotable transverse to the longitudinal direction of said shell, means in said trolley for supporting a cable which passes through the opening in said shell, a pair of longitudinal flanges extending upwardly into said shell and along the opening of said shell, a plurality of horizontal guide rolls rotatably mounted at the base of said trolley and capable of engagement with said flanges, said guide rolls being effective to transmit lateral pressures which control the pivotal movement of said trolley as said trolley moves in a longitudinal direction whereby the weight supported by said trolley is distributed to the side walls of said elongated shell.

6. A load bearing bridge as set forth in claim 5, wherein said bridge structure for pivotally mounting said trolley includes a pair of cross members each pivotally connected to said trolley and each having supporting roller means secured thereto.

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