

Feb. 17, 1948.

R. E. SMITH ET AL

2,436,337

GANTRY STRUCTURE

Filed July 13, 1946

2 Sheets-Sheet 1

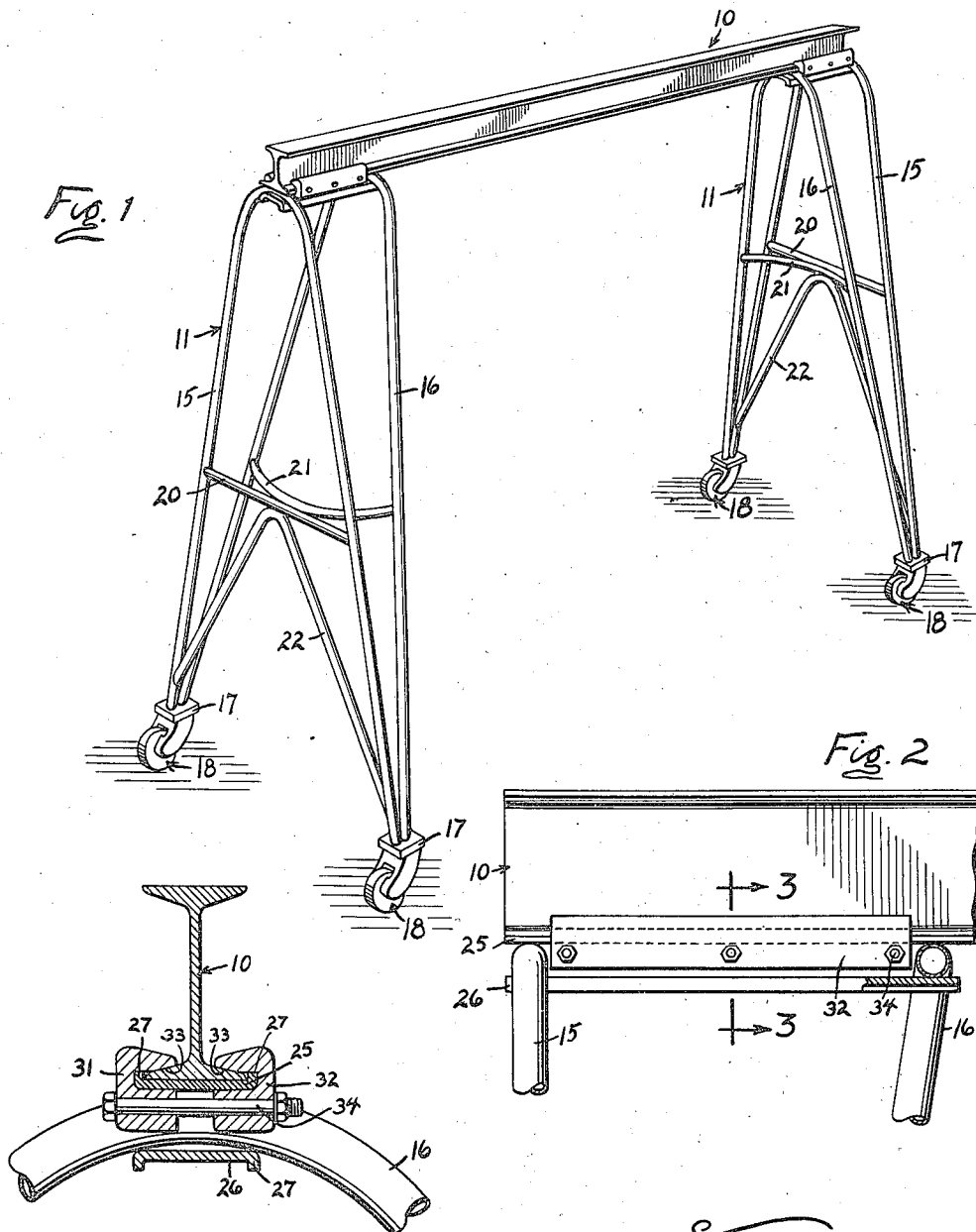


Fig. 3

INVENTORS
Ralph E. Smith
Lawrence H. Workman
BY *Garrett, P. & Co.* *Hubbard & Wolfe*
ATTORNEYS

Feb. 17, 1948.

R. E. SMITH ET AL

2,436,337

GANTRY STRUCTURE

Filed July 13, 1946

2 Sheets-Sheet 2

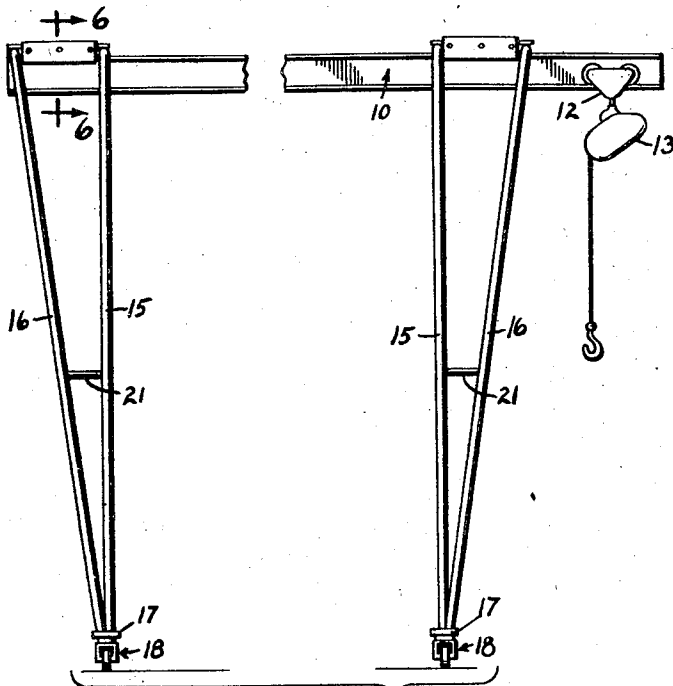


Fig. 4

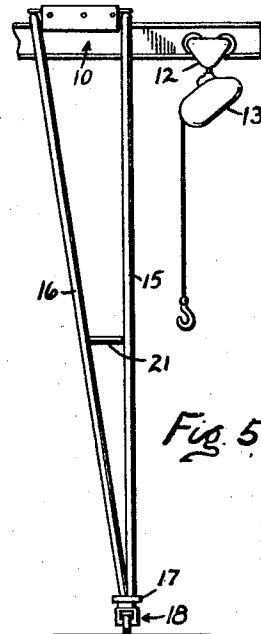


Fig. 5

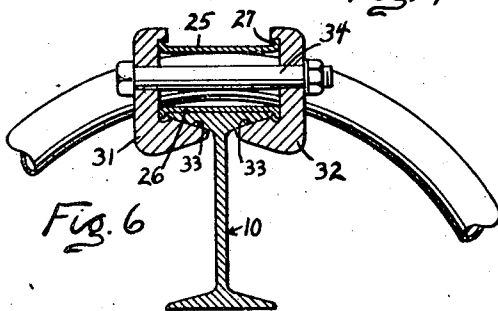


Fig. 6

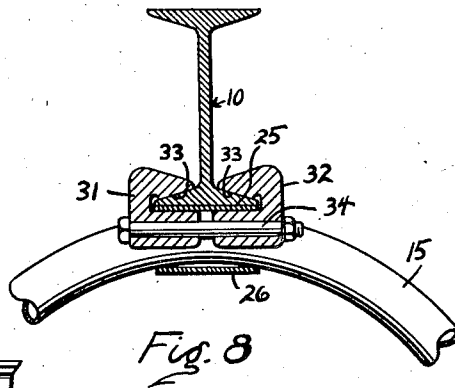


Fig. 7

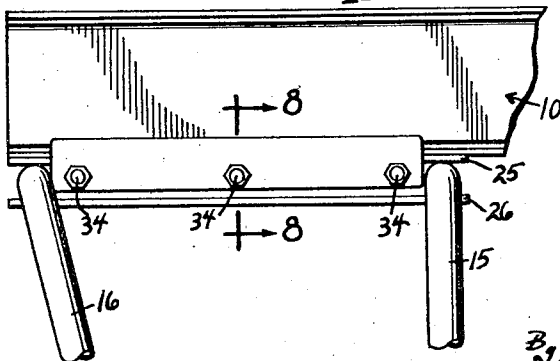


Fig. 8

INVENTORS
Ralph E. Smith
Lawrence H. Workman
By *William Peterson & Harold W. Wolf*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,436,337

GANTRY STRUCTURE

Ralph E. Smith and Lawrence H. Workman,
Muskegon, Mich., assignors to Manning, Maxwell & Moore, Inc., Muskegon, Mich., a corporation of New Jersey

Application July 13, 1946, Serial No. 683,540

13 Claims. (Cl. 212-13)

1

The invention relates to gantry structures generally, and more particularly to a portable gantry structure adapted to support small chain or power-driven hoists.

One object of the invention is to provide a portable gantry structure of the above general character which is strong and rigid, yet light in weight and easy to move about.

Another object is to provide a gantry structure utilizing a light standard structural steel beam as the bridging member, together with end frames constructed so that the structure may be assembled without requiring the drilling of holes in the beam, thus enabling the frames to be supplied in the form of a compact lightweight kit for use with a beam obtained locally, whereby shipping costs are materially reduced.

A further object is to provide an improved gantry end frame fabricated from tubular stock which is light in weight, yet extremely strong and rigid, and which may be secured to the bridging member of the gantry structure with a minimum of labor.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of a gantry structure embodying the features of the invention.

Fig. 2 is a detail view showing one arrangement for securing the end frames to the bridging member.

Fig. 3 is a transverse sectional view taken in a vertical plane substantially on the line 3-3 of Fig. 2.

Fig. 4 is a side view of the gantry structure showing the parts assembled to provide maximum clearance between the end frames and to provide support for a hoist beyond one end frame.

Fig. 5 is a fragmentary side elevational view of the gantry structure with the end frames arranged to provide maximum clearance at one end of the structure.

Fig. 6 is a transverse sectional view taken in a vertical plane substantially on the line 6-6 of Fig. 4.

Fig. 7 is a side elevational view of a modified form of connecting means for securing the end frames to the bridging member.

Fig. 8 is a transverse sectional view taken in a vertical plane substantially on the line 8-8 of Fig. 7.

While the invention is susceptible of various modifications and alternative constructions, I

2

have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The improved gantry structure comprises generally an elongated rigid bridging member 10 supported horizontally in an elevated position by end frames 11. The bridging member 10 preferably comprises a suitable length of standard structural beam, such as an I-beam, and provides a track for a trolley 12 (Fig. 4) adapted to support a conventional hoist 13 which may be of either the hand or power operated type.

In accordance with the invention, the end frames 11 are constructed to provide ample strength and rigidity for carrying any loads within the capacity of the hoist supported by the structure, coupled with lightness in weight which permits the structure to be moved about easily and which materially reduces shipping costs. For this purpose, the frames are constructed of light weight members, preferably tubular, bent into the required shapes and rigidly secured together as by welding. As herein shown, the frames for both ends of the structure are alike and are adapted to be assembled with the bridging member 10 in a variety of ways to enable the structure to function most efficiently under the particular operating conditions for which it is to be used.

Referring to Fig. 1 of the drawings, each of the end frames 11 comprises a pair of tubular members 15 and 16 bent into generally V-shaped configuration and assembled in inverted position with the free ends of their respective legs in closely adjacent relation and with the members diverging upwardly and outwardly from each other toward their closed ends. In the exemplary frame, the member 15 is disposed in a substantially vertical plane, while the companion member 16 is disposed in an inclined plane intersecting the vertical plane at the ends of the legs of the members.

The adjacent legs of the members 15 and 16 are rigidly secured together at their lower ends, in this instance by welding each pair of legs to a metal base plate 17 disposed substantially perpendicular to the plane of the member 15. To facilitate movement of the gantry structure, each plate is provided with a caster or roller 18, pref-

3

erably swivel mounted so that it may be turned in any direction.

Suitable bracing means is interposed between the frame members for imparting strength and rigidity thereto. As herein shown, the bracing means includes horizontal braces 20 and 21 extending between and rigidly secured at their ends to the legs of the respective frame members 15 and 16 approximately midway between their upper and lower ends. The braces comprise lengths of steel tubing or the like, one being straight and the other arcuately bent or bowed so as to contact the straight brace substantially at its mid-point. The braces are rigidly secured together at such contacting point by welding. Preferably, the brace 21 extending across the inclined frame member 16 is the arcuate brace as this provides maximum clearance for loads raised in close proximity to the inclined member of the frame. A V-shaped brace 22 secured at its closed end to the mid-point of the brace 20 and at its open ends to the legs of the member 15 closely adjacent their junction with the legs of the member 16 further stiffens the frame.

The bridging member 10 is preferably removably secured to the frames 11 so that the elements of the gantry structure may be shipped unassembled or in knock-down form. The invention provides a construction which permits of removable attachment of the bridging member and which enables the assembly to be effected quickly and easily. Moreover, the means provided for securing the elements together eliminates drilling or other machining of the bridging member, thus enabling the end frames to be used with a length of standard I-beam obtained locally. Accordingly, the end frames may be supplied in sets without the beam, whereby shipping costs are materially reduced by eliminating the need for including the beam in the set or kit.

The means provided for securing the beam to each end frame 11 preferably includes a pair of elongated metal plates 25 and 26 extending horizontally between the frame members 15 and 16 at their closed ends. The plates are associated with the members so as to form seats for the bridging member either on top of or in suspended relation to the frame members. If desired, the plates may be formed with narrow upright flanges 27 at opposite side edges, as shown in Fig. 3, to assist in locating the bridging member thereon, or the flanges may be omitted as shown in Fig. 8. In the latter case the plates are preferably made slightly narrower than the flanges of the beam.

The mounting plates 25 and 26 are preferably of sufficient length to overlap the frame members 15 and 16 and are arranged in opposed relation respectively above and below the end sections of the members, as best shown in Figs. 3, 6 and 8. They may be secured to the members in any suitable manner, as by welding, thus further strengthening the frame.

In the assembly of the gantry structure, the bridging member 10 may be seated on the top plate 25, as shown in Fig. 3, to provide maximum lift. Alternatively, it may be seated against the bottom plate, as shown in Figs. 4-6, so as to reduce overhead clearance requirements and to permit the hoist and trolley to be traversed through the end frames.

For removably securing the bridging member or beam to the mounting plates, we provide a clamping device comprising a pair of elongated clamping members 31 and 32 of generally U-shape cross section adapted to be mounted on opposite

4

sides of the beam in straddling relation to the mounting plate and to the flange of the beam.

The legs of the clamping member engaging the flange of the beam, which is normally tapered as shown in Fig. 3, are formed with inclined faces 33 so that clamping action of the members is regulated by moving the members toward or from each other transversely of the beam. Suitable means, such as through bolts 34, may be provided for drawing the clamping members together.

The clamping members 31 and 32 may be dimensioned to straddle one of the plates 25 or 26, as shown in Figs. 3 and 8, or to straddle both plates, as shown in Fig. 6. In the latter case, the legs engaging the plate remote from the beam may be relatively short and constitute hook-like elements engageable with the flanges 27 of the mounting plates.

The novel construction of the end frames and manner of mounting the cross members thereon permits the parts to be assembled in various ways to meet particular operating conditions. Thus the end frames 11 may be assembled with the bridging member 10, as shown in Fig. 1, with the inclined frame members 16 facing inwardly and the bridging member 10 mounted on the tops of the frames to provide maximum lift. Where it is desirable to traverse the trolley 12 and hoist 13 beyond either end frame, the bridging member may be suspended from the lower mounting plate 26, the upper ends of the frames providing sufficient clearance for the hoist and its load. It will be appreciated that the beam may be arranged either flush with the outer ends of the end frames or may be projected there-through to provide a substantial overhang, as shown in Figs. 4 and 5. When maximum clearance between the end frames is required, the frames may be assembled with the inclined members 16 facing outwardly, as shown in Fig. 4. The bridging member may be mounted on or suspended from the frames, as desired.

It will be apparent from the foregoing that the invention provides a gantry structure of novel and improved form. A simple structural member or beam is supported by end frames of lightweight, yet strong and rigid construction. These frames are provided with casters or rollers and by reason of their lightweight are easy to move about. Through the novel structural features provided for interconnecting the end frames and the bridging member, the frames may be assembled with and secured to the member without requiring the drilling of holes or other machining operations on the member. Accordingly, the end frames may be supplied in sets without the members for assembly with a locally obtained bridging member or beam, thus substantially reducing shipping costs.

We claim as our invention:

1. A gantry structure comprising, in combination, an elongated beam forming a support for a hoist, frames for supporting said beam at opposite ends, each of said frames comprising a pair of frame members of generally V-shaped configuration rigidly secured together in inverted side-by-side relation with the members diverging upwardly and outwardly from each other, an elongated plate connecting the closed ends of the members and providing a seat for said beam, and means for removably securing said beam to said plates.

2. A gantry structure comprising, in combination, an elongated beam forming a support for a hoist, frames for supporting said beam at op-

5

posite ends, each of said frames comprising a pair of frame members of generally V-shaped configuration rigidly secured together in inverted side-by-side relation with the members diverging upwardly and outwardly from each other, and a pair of elongated plates secured to the closed ends of each pair of members and rigidly connecting the same, one of said plates being disposed above and the other below the adjacent portions of the members to provide selectively available seats for mounting said beam upon the frames.

3. A gantry structure comprising, in combination, an elongated beam forming a support for a hoist, inverted generally V-shaped frames supporting said beam at opposite ends, a pair of elongated horizontal plates rigidly secured to each frame adjacent its upper end, one of said plates providing a seat for the beam on top of the frame and the other of said plates providing a seat for the beam in suspended relation to the frame, and means for rigidly clamping the beam to one of said plates.

4. A gantry structure comprising, in combination, an elongated beam forming a support for a hoist, frames for supporting said beam at opposite ends, each of said frames comprising a pair of frame members of generally V-shaped configuration rigidly secured together in inverted side-by-side relation with one member disposed in a vertical plane and the other in a plane diverging outwardly and upwardly therefrom, an elongated plate connecting the closed ends of said members and disposed substantially perpendicular to the vertical frame member to provide a seat for said beam, and means for securing said frames and said beam together.

5. A gantry structure comprising, in combination, an elongated beam forming a support for a hoist, frames for supporting said beam at opposite ends, each of said frames comprising a pair of frame members of generally V-shaped configuration rigidly secured together in inverted side-by-side relation with one member disposed in a vertical plane and the other in a plane diverging outwardly and upwardly therefrom, a pair of elongated plates connecting the closed ends of the frame members and disposed substantially perpendicular to the vertical frame member, said plates being located on opposite sides of the closed ends of said members to provide selectively available seats for mounting the beam upon the frames, and means for securing said beam to a selected pair of said plates.

6. A supporting frame for a gantry structure comprising, in combination, a pair of tubular members bent into generally V-shaped configuration, said members being assembled in inverted side-by-side relation with one member disposed in a vertical plane and the other disposed in a plane intersecting said vertical plane and diverging upwardly and outwardly therefrom, the legs of said members terminating closely adjacent the intersection of said planes and being rigidly secured together, and an elongated plate connecting the closed ends of said members, said plate being disposed in a plane perpendicular to said vertical plane.

7. A supporting frame for a gantry structure comprising, in combination, a pair of tubular members bent into generally V-shaped configuration and assembled in inverted side-by-side relation, said members having their respective legs disposed closely adjacent each other at their lower ends and diverging gradually from each

6

other toward their upper ends, means rigidly securing said members together at their upper and lower ends, and rollers secured to and supporting the legs of said member.

8. A supporting frame for a gantry structure comprising, in combination, a pair of tubular members bent into generally V-shaped configuration and assembled in inverted side-by-side relation, said members having their respective legs disposed closely adjacent each other at their free ends and diverging from each other toward their closed ends, a pair of metal plates disposed in a common horizontal plane and secured respectively to the adjacent legs of the members, and an elongated metal plate secured to the closed ends of said members and disposed in a plane parallel to said first-mentioned plane.

9. A supporting frame for a gantry structure comprising, in combination, a pair of elongated structural members bent into V-shaped configuration and assembled with their free ends closely adjacent each other, a metal plate rigidly secured to each pair of said free ends, said members diverging gradually from each other toward their closed ends, and an elongated metal plate disposed in overlapping relation to the closed ends of the members and rigidly secured thereto.

10. A supporting frame for a gantry structure comprising, in combination, a pair of V-shaped members having their respective free ends disposed closely adjacent each other and each pair rigidly secured to a flat metal plate, said members diverging gradually from each other toward their closed ends, and a pair of elongated plates connecting the closed ends of said members, said plates being disposed on opposite sides of the closed ends of said members and rigidly secured thereto.

11. A supporting frame for a gantry structure comprising, in combination, a pair of V-shaped members having their respective free ends disposed closely adjacent each other and each pair rigidly secured to a flat metal plate, said members diverging gradually from each other toward their closed ends, and an elongated metal plate disposed in overlapping relation to the closed ends of said members and rigidly secured thereto.

12. A supporting frame for a gantry structure comprising, in combination, a pair of tubular members bent into generally V-shaped configuration and assembled in inverted side-by-side relation, said members having their respective legs disposed closely adjacent each other at their free ends and diverging from each other toward their closed ends, means rigidly securing the adjacent legs of the members together at their free ends, other means rigidly securing the closed ends of the members together, bracing means for said frame including a straight bar extending between and rigidly secured to the legs of one of said members intermediate the ends of the member, and a second bar extending between and secured to the legs of the other of said members intermediate the ends of that member, said second bar being arcuately bent to meet said straight bar substantially at its mid-point and being rigidly secured thereto.

13. A supporting frame for a gantry structure comprising, in combination, a pair of tubular members bent into generally V-shaped configuration and assembled in inverted side-by-side relation, said members having their respective legs disposed closely adjacent each other at their free ends and diverging from each other toward their closed ends, means rigidly securing the ad-

adjacent legs of the members together at their free ends, other means rigidly securing the closed ends of the members together, bracing means for said frame including a straight bar extending between and rigidly secured to the legs of one of said members intermediate the ends of the member, an arcuately bent bar secured at its mid-point to said straight bar and at opposite ends to the legs of said other member, and a V-shaped brace secured at its closed end to said bars adjacent their juncture point and at opposite ends to the respective legs of the members adjacent their juncture points.

RALPH E. SMITH.

LAWRENCE H. WORKMAN.

10

15

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
302,945	Sargent -----	Aug. 5, 1884
1,101,610	Allord -----	June 30, 1914
1,147,663	Anderson -----	July 20, 1915
1,518,886	White -----	Dec. 9, 1924
2,343,014	Langan -----	Feb. 29, 1944