Jan. 1, 1952 C. R. ATHY ET AL 2,580,503

SECTIONAL FRAME STRUCTURE

Filed July 23, 1945 2 SHEETS—SHEET 1

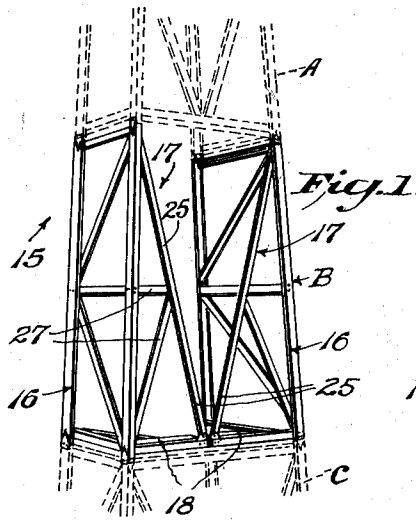


Fig. 1.

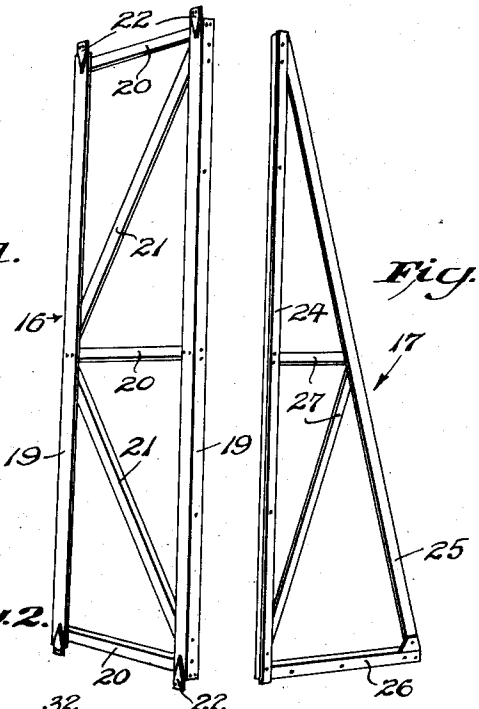


Fig. 2.

Fig. 3.

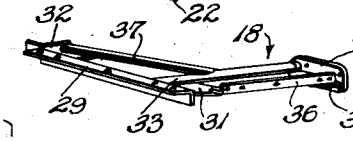
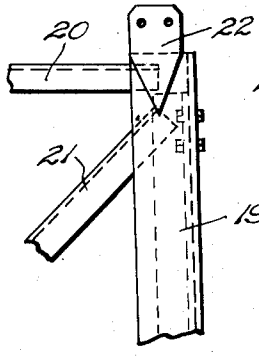


Fig. 4.

Fig. 5.



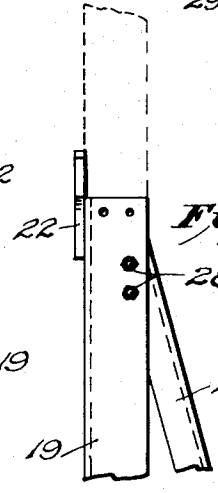


Fig. 6.

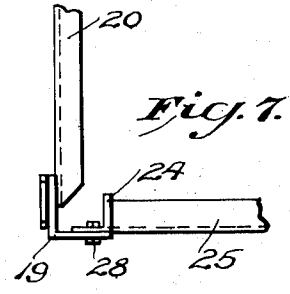


Fig. 7.

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SECTIONAL FRAME STRUCTURE

Filed July 23, 1945 2 SHEETS—SHEET 2

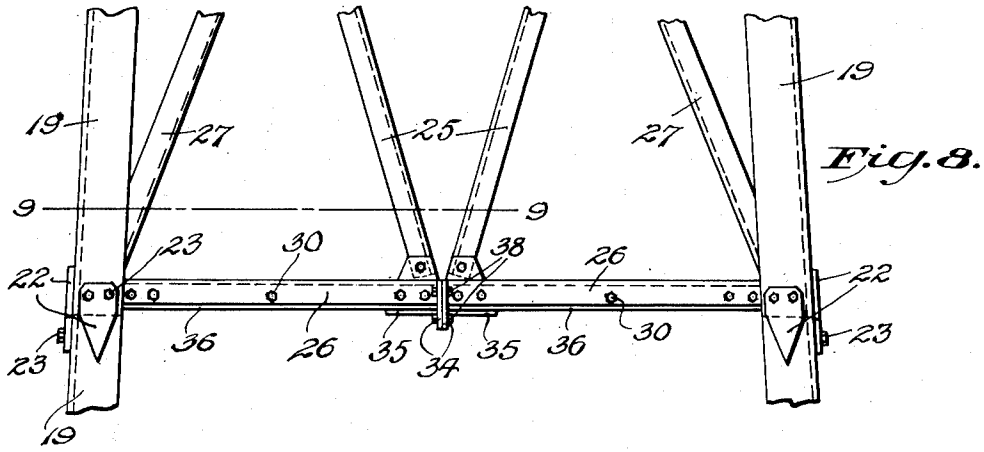


Fig. 8.

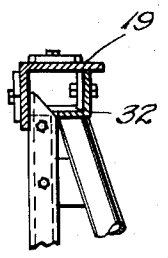


Fig. 9.

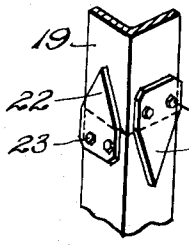


Fig. 11.

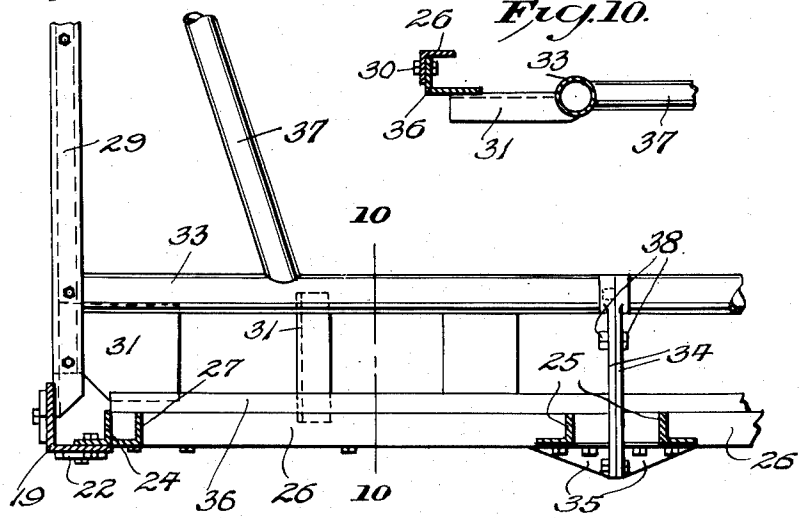


Fig. 10.

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SECTIONAL FRAME STRUCTURE

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Application July 23, 1945, Serial No. 606,660

2 Claims. (Cl. 189—13)

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This invention relates to an improved demountable panel construction for use in skeletonized frame structures, such as well derricks, masts, radio towers and the like. In the formation of such structures, use is made generally of corner legs united and braced by means of a multiplicity of cross members, trusses and/or braces. Usually, these parts are formed separately by the manufacturer so that they may be shipped in a knockdown, compact state to consignees, the separate parts being then assembled in operative order by bolting, welding or riveting operations at the places of erection. Such erection involves considerable labor and time loss, but the same has been considered unavoidable or necessary in the art since if the parts were assembled at the point of manufacture, the size and bulk thereof would render the same unacceptable to public carriers, or, if acceptable, would impose unduly high transportation costs from a standpoint of space requirements, particularly in connection with export shipments.

It is, therefore, an object of the present invention to provide a structural body of the character indicated composed of a plurality of panels of novel formation, which are adapted to be completely formed and united by the manufacturer and shipped in a flat compact state, the construction and method of uniting the panels being such as to minimize the time and labor required at the erection site over previous practice, but without increasing substantially shipping costs or space requirements.

In connection with the foregoing, we have developed a number of novel structural details and arrangements, all of which may be fully understood by reference to the following description and the accompanying drawings, wherein:

Fig. 1 is a perspective view of a plurality of panels formed in accordance with the present invention and disclosing the same operatively assembled in derrick or tower construction;

Fig. 2 is a perspective view of one of the side panels;

Fig. 3 is a similar view of one of the front panels;

Fig. 4 is a detail perspective view of one of the brace panels;

Fig. 5 is a side elevational view of the upper corner construction of the side panels;

Fig. 6 is a front elevational view of said corner construction;

Fig. 7 is a top plan view of the corner union between the front and side panels;

Fig. 8 is an enlarged fragmentary front elevational view of the front and horizontal brace panels disclosing the same in assembled relationship;

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Fig. 9 is a horizontal sectional view on the plane indicated by the line 9—9 of Fig. 8;

Fig. 10 is a transverse sectional view on the plane indicated by the line 10—10 of Fig. 9;

Fig. 11 is a detail perspective view disclosing the construction employed in uniting the adjoining ends of the corner legs of contiguous panels.

In the accompanying drawings, our invention has been illustrated in the specific form which it preferably assumes in the construction of sectional well derricks, although it will be appreciated, as the description proceeds, that its features of construction are applicable to other structural steel assemblies, such as masts, towers and other types of upright frames.

The derrick, indicated generally at 15, is composed of a plurality of panel units which, when united, produce vertically superposed sections, as indicated at A, B and C in Fig. 1. Each of these sections is composed of a pair of duplicative side panels 16, a pair of front panels 17 and a pair of horizontal brace panels 18, the back of the derrick being open.

Each of the side panels comprises a rectangular frame composed of spaced parallel corner legs 19, horizontal cross bars 20 of angle iron and diagonally extending struts 21. The ends of the cross bars and struts may be welded to the corner legs or riveted or bolted thereto by the manufacturer to form the complete panel unit. The upper and lower ends of the corner legs have suitably fastened or welded thereto attaching plates 22. These plates project beyond the ends of the corner legs for detachable connection as at 23 with the ends of the corner legs of adjoining derrick sections.

Each of the front panels comprises, as shown particularly in Fig. 3, a triangular frame unit embodying a vertically extending corner leg 24, preferably in the form of an angle iron, a hypotenusal leg 25, a horizontal base leg 26 and horizontal and diagonal struts 27, the parts 24, 25, 26 and 27 being suitably united at the point of manufacture to provide the complete panel. The corner leg 24 of each of the front panels is usually at the time of derrick erection bolted, as at 28, to the forwardly facing flange of the complemental corner leg 19 of a side panel. Often when a well derrick is dismantled to permit the derrick to be moved from one adjacent site to another, it is unnecessary to disconnect the front and side panels of each derrick section, as a sec-

tion may be handled as a unit or divided into two parts, as will be set forth more fully hereinafter. For long distance shipping, however, the panels are completely disconnected and nested in flat parallel order, thus providing compactness.

Each of the horizontal brace panels, shown at 18, comprises a side bar 29 of angular construction which is adapted to be detachably bolted to an adjoining lower cross bar 20 of a side panel 16. Each of the bars 29 has secured to the ends thereof horizontally disposed chair plates 31 and 32. Welded or otherwise secured to the side bar 29 of each of the brace panels and its chair plate 31 is one end of a tubular brace rod 33, the other end of each of said rods being welded or otherwise joined to a vertical clamping plate 34, each of the latter being formed with a horizontal flange 35.

At the front of each of the brace panels, and extending parallel with its rod 33 is an angular front bar 36, the ends of the latter being secured to the chair plate 31 and to the flange 35 of the clamping plate 34. A diagonal brace rod 37 is provided for each of the brace panels and is welded or otherwise connected at one end with the associated rod 33 and at its opposite end with the chair plate 32. For each section of the derrick a pair of the horizontal brace panels is used, the side bar 29 of each brace panel being bolted to the bottom bar 20 of each of the side panels, and the angular front bar 36 being bolted as at 30 to the base leg 26 of each associated front panel. When so secured, the clamping plates 34 of each pair of contiguous brace panels are disposed in side by side relationship and are detachably united with each other by the bolt connections shown at 38.

From the foregoing, it will be seen that we have provided a sectional derrick or mast composed of a multiplicity of factory-formed panels, which are capable of being shipped in a flat knockdown form at low freight or transportation charges and adapted to be readily assembled at the point of erection in a quick, low cost and convenient manner. The arrangement disclosed avoids the necessity heretofore presented of securing each part of the derrick in proper position, since units or panels are handled rather than individual parts. Also, the construction simplifies the tasks of disassembling a derrick or mast to permit of its removal to another adjacent operating site, since the derrick may be taken down in sections, as indicated at A, B and C, or in half sections, when the clamping plates 34 are disconnected.

While we have described what we consider to be a preferred operative form of our improved derrick or mast construction, nevertheless it will be understood that the structural details are subject to certain variation or modification without departing necessarily from the scope and spirit of the following claims.

We claim:

1. Tower and derrick frame construction comprising a plurality of superposed sections, each of said sections being composed of a pair of upright side panel units, each of said side panel units embodying corner legs rigidly united by horizontal and diagonally extending cross members, attaching plate permanently secured to the ends of said corner legs and projecting beyond the latter and detachably connecting the corner legs of the side panel units of next adjacent

sections, a pair of triangular front panel units, each of said front panel units embodying rigidly united vertical, hypotenusal and base rail members, the vertical rail members of said front panel units being substantially coextensive with and disposed adjacent to the corner legs of cooperative side panel units and detachably connected therewith, and a pair of horizontally disposed brace panel units having outer rail members disposed in registration with the base rails of said front panel units and the lower horizontal cross members of said side panel units and detachably connected therewith, the said brace panel units having adjoining ends, and the hypotenusal members of the front panel units diverging from a place adjacent the adjoining ends of the brace panel units.

2. Sectional tower construction, comprising: a plurality of superposed detachably united sections, each of which sections embodies a pair of substantially restangular side panel units composed of vertical corner legs rigidly united in spaced order by horizontally and diagonally extending cross members; a pair of composite substantially triangular front panel units having vertical, hypotenusal and horizontal rail members; means detachably securing the vertical rail members of said front panel units with adjacent vertical corner legs of said side panel units; a pair of horizontally disposed brace panel units having rigidly united and perpendicularly disposed rail members, said perpendicular rail members being disposed in registration with the horizontal rail members of said front panel units and the lower horizontally extending cross members of the side panel units; means detachably securing the horizontal rail members of said front panel units and the lower horizontal cross members of the side panel units to the rail members of the brace panel units with which said horizontal rail and cross members are in registry; and means detachably securing the adjoining ends of a contiguous pair of brace panel units in united order, the hypotenusal rail members of the front panel units diverging from a place adjacent the adjoining ends of the brace panel units.

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