May 14, 1940. C. L. HENRY 2,200,775

DERRICK

Filed Aug. 15, 1938

Fig. 1.

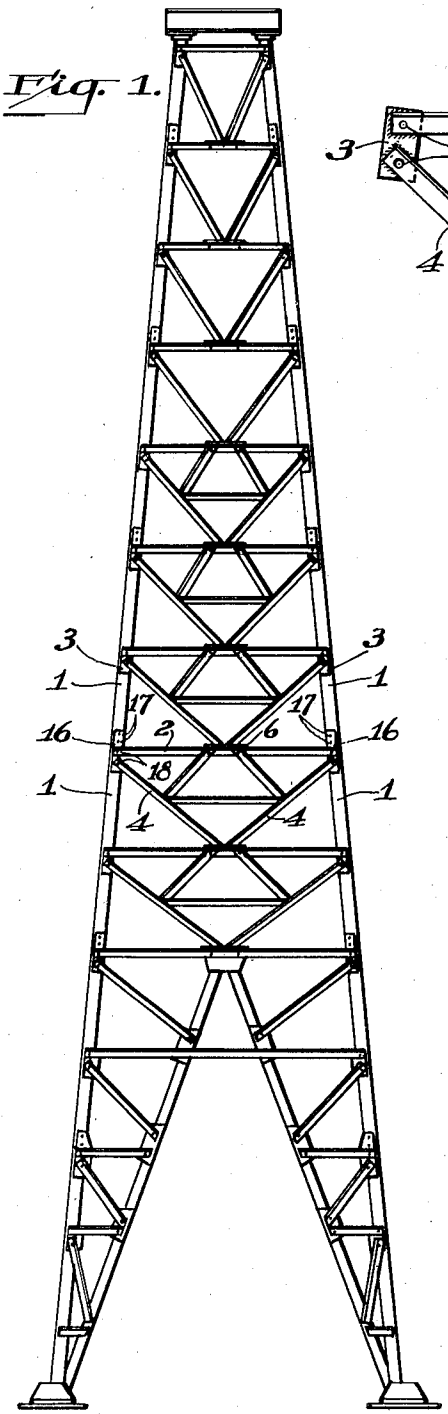


Fig. 2.

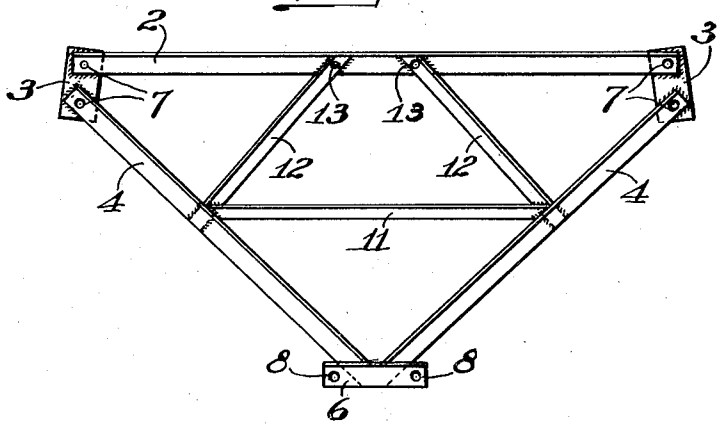


Fig. 3.

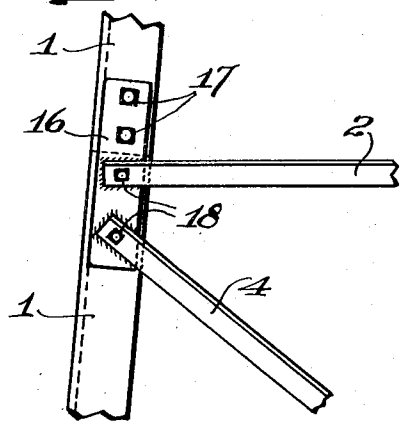
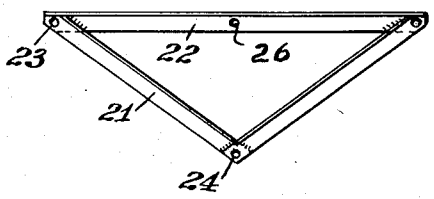


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE

2,200,775

DERRICK

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Application August 15, 1938, Serial No. 224,842

6 Claims. (Cl. 189—13)

This invention relates to fabricated steel towers, and more particularly to oil derricks and the like constructed from a plurality of upright legs connected together by girts and braces. The invention is likewise applicable to other mast-like structures of this character, such as radio and power line towers, but for the purpose of this application these shall all be referred to under the name of derrick.

In erecting derricks it is the customary practice to set up leg sections, rigidly connect them together by separate intervening steel girts and braces in the form of angle irons or the like, connect further leg sections to the top of the lower sections and secure them together in the same way, and continue this procedure until a derrick of the desired height has been assembled. The girts and braces are connected to the legs of the derrick and to each other by means of bolts or rivets, and to secure the necessary rigidity each end of each member is generally provided with two holes for receiving two fastening members. Gusset plates are also necessary at times to make proper connections. Therefore, a great many fastening members are required, and considerable time and labor are involved in fastening the various individual elements together.

It is among the objects of this invention to provide a derrick which is formed from a plurality of separate panels individually prefabricated at a place where advantage can be taken of mass production. More specific objects are to provide prefabricated panels for use in constructing derricks and which require a minimum of fastening members for securing them in place.

In accordance with this invention the derrick is formed from a plurality of legs and a plurality of individually prefabricated panels or trusses rigidly connected to the legs and spanning the space between them. Each panel comprises a horizontal girt provided at each end with a single hole, and a gusset plate welded to each end of the girt having a hole in line with the adjoining girt hole. A pair of inclined braces are welded at their upper ends to the gusset plates and converge downwardly to a connecting member welded to their lower ends. The upper end of each brace is provided with a single hole in line with a hole in the adjoining gusset plate, and the connecting member is provided with only two holes. Fastening members extend through the gusset plate holes for securing the panel to two of the derrick legs, and other fastening members extend through the connecting member holes for securing the panel to the central portion of the girt of the panel below. Each large panel is preferably strengthened by a pair of short inclined braces secured at their lower ends to the other braces and converging upwardly with their upper ends welded to the central portion of the girt in which there are two holes. Each of the upper ends of these short braces is provided with a single hole in line with one of the two holes in the central portion of the girt which are spaced apart the same distance as the holes in the connecting member and are directly above them, whereby they receive fastening members extending through the holes in the connecting member of the panel above. Each connecting member is preferably a short angle iron so that it has a horizontal flange adapted to rest on the underlying girt and support the panel while it is being fastened in place. The gusset plates and connecting member make it possible to prefabricate the truss, and as the girt and braces are rigidly welded together, only one hole is needed in the end of each member for fastening the truss in place.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a side view of my derrick; Fig. 2 is an enlarged side view of one of the prefabricated panels; Fig. 3 is an enlarged fragmentary view of one end of the type of panel used at the leg splices, and Fig. 4 is a view similar to Fig. 2 of a prefabricated panel suitable for short derricks of small capacity.

Referring to Fig. 1 of the drawing, the derrick legs are formed from a plurality of sections 1 disposed end to end and spliced together in a manner to be described presently. These legs are shown as being made of angles, but they may also be formed from tubes. The legs are rigidly connected together to form a derrick by means of a plurality of vertically spaced horizontal girts and inclined bracing members, whereby the major portion of the derrick has the appearance of being formed from a plurality of superimposed trusses.

It is a feature of this invention that these trusses or panels are individually prefabricated in such a manner that they can be quickly and easily fastened into place in order that a derrick can be erected with a minimum of time and labor. Accordingly, as shown in Fig. 2, each prefabricated panel comprises a horizontal girt 2 welded at each end to a gusset plate 3. A pair of inclined braces 4 are likewise welded

at their upper ends to the same gusset plates and converge downwardly. The lower ends of the braces are welded to a connecting member 6, preferably a short angle iron. The gusset plates and connecting member thus unite the girts and braces into a rigid, independent panel that is shipped and handled as a unit.

To permit the panel to be quickly attached to the derrick legs, each end of girt 2 and the upper end of each brace 4 is provided with only a single hole 7 which is in line with or registers with a similar hole in the underlying gusset plate. These holes are adapted to register with holes in the central portion of the derrick leg sections, and to receive bolts or rivets for securing the panel to the legs. Connecting member 6 at the lower end of the braces is likewise provided with only two holes 8 adapted to receive fastening members for connecting the bottom of the panel to the central portion of the girt of the underlying panel. By using an angle iron for the connecting member, the horizontal flange of the angle can be rested on the underlying girt to support the panel while it is being fastened in place.

The larger panels may be further strengthened by secondary girts and braces. That is, a relatively short girt 11 is welded at its ends to the central portions of main braces 4 to which the lower ends of a pair of upwardly converging short braces 12 are also secured. The upper ends of the short braces are welded to the central portion of main girt 2 which is provided with a pair of holes spaced apart the same distance as holes 8 in connecting member 6. These girt holes are directly above holes 8 so that they will register with holes 8 in the connecting member of the panel above. The upper end of each of the secondary braces 12 is provided with a single hole 13 that registers with one of the central holes in the main girt.

As shown in Fig. 3, the panels that are to be used at the leg section splices are provided with longer gusset plates 16 than the intermediate panels so that they will bridge the joint between two leg sections. Girt 2 and brace 4 are welded to one end of the plate, and the other end is provided with a pair of holes for receiving fastening members 17. The latter fastens the plate to one leg section, while fastening members 18 passing through the girt and brace secure the plate to the adjoining leg section. A portion of the prefabricated panel thus serves as a leg splice.

A derrick constructed in accordance with this invention can be quickly and cheaply erected. The panels are prefabricated in a factory where mass production can be used and where skilled rig builders are not required. At the well the derrick is quickly erected because the number of major parts and fastening members is so greatly reduced by the use of the panel units. The welded connections between the various members of each panel transmit the stresses directly from one to another without the use of fastening members. Heretofore it has generally been necessary to use at least two fastening members in each end of each main girt and brace to assure safe transfer of stresses from one member to a leg and from the leg to the other member. With this invention stresses are transmitted directly through the gusset plates from girt to brace, and only enough fastening members need be used to transfer a fraction of the stresses from the plates to the legs.

In the modification shown in Fig. 4, no gusset plates or connecting members are used, but the outer ends of the braces 21 overlap the outer ends of the girt 22 to which they are welded. Each of these welded end portions is provided with a single fastener-receiving hole 23 extending therethrough. The lower ends of the braces are likewise overlapped and welded and provided with a single hole 24 adapted to register with a hole 26 in the center of the girt of the panel below.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A derrick formed from a plurality of legs and a plurality of individually prefabricated triangular panels rigidly connected to the legs and spanning the space between them, each panel comprising a horizontal girt, a gusset plate welded to each end of the girt, a pair of inclined braces converging vertically with their outer ends welded to said plates, whereby stresses are transmitted directly through the gusset plates from girt to braces, a connecting member welded to the adjacent inner ends of the braces, said member and plates being provided with holes, fastening members extending through said gusset plate holes for securing the panel to two of said legs, and fastening members extending through said connecting member holes for securing the panel to the adjacent panel.

2. A derrick formed from a plurality of legs and a plurality of individually prefabricated triangular panels rigidly connected to the legs and spanning the space between them, each panel comprising a horizontal girt provided at each end with a single hole, a gusset plate welded to each end of the girt and provided with a hole in registration with the adjoining girt hole, each plate also having a hole through it below the girt, a pair of inclined braces welded at their upper ends to said plates and converging downwardly, the upper end of each brace being provided with a single hole in registration with said lower hole in the adjoining gusset plate, whereby stresses are transmitted directly through the gusset plates from girt to braces, a connecting member welded to the lower ends of the braces and provided with only two holes, fastening members extending through said girt and gusset plate holes for securing the panel to two of said legs, and fastening members extending through said connecting member holes for securing the panel to the panel next below.

3. A prefabricated triangular panel for use in forming a derrick, comprising a horizontal girt provided at each end with a single hole, a gusset plate welded to each end of the girt and provided with a hole in registration with the adjoining girt hole, each plate also having a hole through it below the girt, a pair of inclined braces welded at their upper ends to said plates and converging downwardly, the upper end of each brace being provided with a single hole in registration with said lower hole in the adjoining gusset plate, and an angle iron welded to the lower ends of the braces and provided with a single hole between each end and the brace ends, said holes being adapted to receive fastening

members for securing the panel to other derrick panels and derrick legs to form a derrick.

4. A prefabricated triangular panel for use in forming a derrick, comprising a horizontal girt provided at each end with a single hole, a gusset plate welded to each end of the girt and provided with a hole in registration with the adjoining girt hole, each plate also having a hole through it below the girt, a pair of inclined braces welded at their upper ends to said plates and converging downwardly, the upper end of each brace being provided with a single hole in registration with said lower hole in the adjoining gusset plate, a connecting member welded to the lower ends of the braces and provided with only two holes, the central portion of said girt being provided with a pair of holes spaced apart the same distance as the holes in said member and directly above them, and a pair of inclined braces secured at their lower ends to said first-mentioned braces and converging upwardly with their upper ends welded to the central portion of said girt, each of said upper ends being provided with a single hole in registration with one of said holes in the central portion of the girt, all of said holes being adapted to receive fastening members for securing the panel to derrick legs and to similar panels.

5. A prefabricated panel for use in forming a derrick, comprising a horizontal girt, a gusset plate welded to each end of the girt, a pair of inclined braces converging vertically with their outer ends welded to said plates, and a connecting member welded to the adjacent inner ends of the braces, said member and plates being provided with holes for receiving fastening members whereby to connect the panel to other derrick panels and derrick legs to form a derrick.

6. A prefabricated triangular panel for use in forming a derrick, comprising a horizontal girt provided at each end with a single hole, a gusset plate welded to each end of the girt and provided with a hole in registration with the adjoining girt hole, each plate also having a hole through it below the girt, a pair of inclined braces welded at their upper ends to said plates and converging downwardly, the upper end of each brace being provided with a single hole in registration with said lower hole in the adjoining gusset plate, and a connecting member welded to the lower ends of the braces and provided with only two holes, said holes being adapted to receive fastening members for securing the panel to other derrick panels and derrick legs to form a derrick.

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