STEELE, TOWER MEMBER

Carl Bauer, St. Louis, Mo., assignor to Missouri
Rolling Mill Corporation, St. Louis, Mo., a corporation of Missouri

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STEEL TOWER MEMBER

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This invention relates generally to structural steel towers, such as oil well derricks, wind-mills, wind-power, and transmission towers, vertical radiators, and the like. More particularly, my present invention relates to certain new and useful improvements in, some of the tower-forming members and has for its primary object the provision of tower-forming members so co-operatively formed and shaped as to enable assembly and erection of a rigid, strong, durable tower "on the ground", as it is said, quickly, expeditiously, conveniently, economically, with the consummation of little labor, and with the elimination of the usual drilling, fitting, and riveting operations in the field or on the ground.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawings (2 sheets)—

Figure 1 is a front elevational view of the lower portion of a steel tower embodying in its construction leg-members of my invention;

Figure 2 is a front elevational view of the upper portion of the tower;

Figure 3 is an enlarged fragmentary horizontal sectional view of the tower, taken approximately along the line 3—3, Figure 1;

Figure 4 is an enlarged fragmentary elevational view, illustrating a leg-joint of the tower;

Figure 5 is a horizontal sectional view of a leg-joint, taken approximately along the line 5—5, Figure 4;

Figure 6 is an enlarged fragmentary front elevational view, illustrating the top leg-joint of the tower;

Figure 7 is a horizontal sectional view of the top leg-joint, taken approximately along the line 7—7, Figure 6.

Referring now in more detail and by reference characters to the drawings, which illustrate a preferred embodiment of my invention, the present tower is preferably in the form of a three-sided structure and, accordingly, in the present instance, comprises three upstanding legs A preferably in converging relation, as shown, each formed preferably of a series of endwise connected or joined structural steel or other metallic members transversely inter-connected in tower-formation by a plurality of vertically spaced, horizontally disposed girts B and intermediate struts C, each of the legs A being embedded at its lower extremity, as at D, in the ground or in a conventionally formed concrete foundation or footing, as will be understood and as best seen in Figures 1 and 2.

Each of the leg-members I, which are preferably fabricated in any convenient lengths and of any desirable size, thickness, and strength, includes integrally a central longitudinally extending web a and opposed longitudinally extending flanges b, b', projecting angularly outwardly from the opposite longitudinal margins of the web a, the planes of the flanges b, b', being, respectively, disposed at angles of approximately 120° from the plane of the web a and, correspondingly, at an angle of approximately 60° to each other, and each of the flanges b, b', being preferably at the mill or foundry provided with a plurality of longitudinally spaced transversely aligned apertures c, c', as best seen in Figure 3 and for purposes presently appearing.

Each of the leg-members I is further symmetrically transversely enlarged or bulged, as at d, for a short distance inwardly of its one extremity, as best seen in Figure 4, so as to fit overlappingly upon, and precisely conform at its inner face e with the outer face e' of the normal end d' of the next adjacent leg-member I to which it is attached or united in the formation of the tower, as best seen in Figures 4 and 5, the amount of the enlargement d of the end-portions of each member I being preferably such that the connected or united members I of a leg A will be substantially in axial alignment except at the specific joints therebetween.

Thus, it will be apparent that a plurality of leg-forming members I may be endwise bolted or joined together in the formation of a substantially unitary leg A of desired length, the component members I being all substantially in axial alignment. It has been found that this unique type of joint structure results in considerably decreased shear stresses against the connecting bolts and an attendant increase in structural strength, rigidity, and durability.

The girts B, which are preferably in the form of flat or angle strips apertured at their respective opposite ends for bolt-accommodation, are preferably arranged in horizontally disposed triangular sets, vertically spaced at suitable intervals upwardly of the tower A, each girt B being at its opposite extremities disposed flatwise upon suitable gusset-plates G, which are, in turn, secured upon the flanges b, b', respectively, of the leg-members I, the flanges b, b', gusset-plates G, and girts B being most conveniently secured each to the other by bolts 2, 2', or other suitable attachment means inserted through the apertures 55.
c, c', as best seen in Figure 3. The girts B are hence angularly disposed in a horizontal plane with respect to each other at an angle of approximately 60°, and it may be stated that the unique angular formation and relative arrangement of the leg-members 1 is such as not only to enable convenient placement of the strips B and C upon the flanges b of the respective leg-members 1 without any bending or distortion of the strips, but also to freely permit the insertion of the bolts 2 through the flanges b and the placement and threading thereupon of the securing nuts 3 without interfering with the one with the other.

Likewise, the intermediate struts C, which are also preferably in the form of flat or angle strips, are arranged in horizontally disposed triangular sets, positioned preferably midway between successive sets of girts, each intermediate strut C being at its extremities fitted upon and secured to the leg-members 1 in the same manner as the girts B.

As shown, the tower is preferably further provided with a plurality of diagonally extending wind-brace members 5, which are suitably bolted or otherwise secured to the leg-members 1, preferably between the gusset-plates G and the girts B at the point of juncture between the struts B and the leg-members 1, as best seen in Figures 1 and 3, a spacing washer or shim F being placed around the bolt 2 between the gusset-plates G and the girts B to compensate the thickness of the two overlying braces 8 around the other bolt 2, and it may again be stated in this connection that, by reason of the particular and unique cross-sectional shape of the leg-members 1, the attaching-bolts 2 may be readily tightened in place without interference one with the other.

As best seen in Figure 2, each of the leg-forming members 1' of a set adjacent the upper end of a particular tower is bent intermediate its length, as shown at 7, to provide a relatively short vertically sided top tower section s, and each of such leg-members 1' is also shaped at its upper extremity to receive and for jointed connection with a conventional form of stub tower, as best seen in Figures 2, 6, and 7. Since it is conventional practice to fabricate such stub towers from standard shaped angle iron, each leg-member 1' at its upper extremity is upset or deformed, as at g, to have merely a conventional right angular cross-section, as at h, to accordingly conform, and for jointed connection, with a standard angle iron stub-tower, as will be understood.

If desired and as shown, a conventional form of mounting ladder E may be bolted or otherwise secured vertically along one side of the tower for convenience in the installation of machinery, inspection, or other purpose.

Thus, by my present invention, I provide structural members so uniquely co-operatively shaped and formed as described as to enable the erection quickly, economically, and inexpensively of an exceptionally strong, rigid tower, and which members may also be readily disassembled at minimum cost and with minimum labor.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several members of the tower may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A metallic member having a central longitudinally extending web and a pair of opposed longitudinally extending flanges formed integrally with, and angularly extending divergently outwardly from, the web, the web having a width substantially equal to one-third the transverse distance between the outer margins of the flanges.

2. A metallic member having a central longitudinally extending web and a pair of opposed longitudinally extending flanges formed integrally with, and extending outwardly from, the web at an angle of approximately 60° to each other, said web having a width substantially equal to one-third the transverse distance between the outer margins of the flanges.

3. A structural steel member having a central longitudinally extending structural self-supporting web, and a pair of opposed longitudinally extending flanges formed integral with, and extending outwardly from, opposed margins of the web at an angle of approximately 120° to the web, said flanges being of substantially the same thickness as the web and said web having a width substantially equal to one-third the transverse distance between the outer margins of the flanges.

CARL BAUER.