To all whom it may concern:

Be it known that I, LEE C. MOORE, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steel Towers or Derricks, of which the following is a specification.

This invention relates to metal towers and the like, and more particularly to oil well derricks.

The object of the invention is to improve upon prior constructions of metal towers or derricks, and particularly to provide an improved form of clamp for uniting the ends of the leg sections, and fastening girts and braces thereto, which clamp is formed of forged metal, is light and strong, and can be easily manufactured and clamped very tightly to the leg sections and in which the exposed parts on the outside of the tower or derrick are comparatively smooth and free of projections and obstructions.

The invention comprises the construction and arrangement of parts hereinafter described and claimed.

In the accompanying drawings Figure 1 is a longitudinal section through one of the improved clamps, showing the ends of the derrick braces and girts secured thereto; Fig. 2 is a horizontal section on the line 2–2, Fig. 1; Fig. 3 is a plan of the punched blank from which the clamp is formed; Fig. 4 is an elevation of the clamp, viewed from the right, Fig. 2, and Fig. 5 is a detail view of a modified form of bolt.

The present invention comprises an improvement upon the tower or derrick construction described and claimed in the patents granted September 7, 1909, to Thomas A. Neill, No. 933,856, and January 30, 1912, to myself, No. 1,015,821. The present improvement relates to the clamp or socket for uniting adjacent leg sections or securing girts and braces thereto.

The tower or derrick itself, except as to the clamp or socket, is intended to be constructed as shown and described in the aforesaid patent to Neill and is constructed entirely of metal tubes in order to get maximum strength with minimum weight. With the specific clamp illustrated the derrick is intended to be provided with four legs, inclined so that the derrick tapers from its top, the legs being composed of sections of tubes, as is usual.

In the drawing one of the leg sections is indicated by 5 and the other leg section by 6. These can be easily cut off exactly square so as to abut each other endwise around the entire circumference of the tubes. In building up derricks it is customary to make the leg sections twice the length of the height of a panel, meeting ends of adjacent leg sections being secured in clamps or sockets to which the braces and girts of the derrick are secured, other clamps being secured about midway of each leg section for the attachment of intermediate girts and braces, as described in my Patent No. 1,015,821, referred to. That patent shows and describes a clamp or socket which is free from interior ribs or bosses and may be used not only for securing together the meeting ends of adjacent leg sections but also may be slipped over the leg sections and used as the intermediate clamps. The present clamp is susceptible of similar use and its interior surface is smooth and imperforate and is not obstructed by ribs, bosses, or other projections, so that it can be clamped to adjacent leg sections or intermediate the ends of a single section. It also has as much, if not more, surface contacting with and frictionally grasping the leg sections than the construction shown and described in my patent referred to.

The present clamp or socket is also formed of forged metal, preferably plate metal, as in my patent aforesaid, such metal being not only lighter than cast metal but yielding, so that the clamps or sockets can be drawn very tightly around the leg sections, thereby absolutely preventing movement of the leg sections and preventing failure of the derrick from this cause.

Each clamp or socket is practically a tube or sleeve split or slotted on one side, as at 8, from top to bottom, or longitudinally, and provided at the edges of the slit or opening with flanges or ears 9. These are preferably integral with the tube or sleeve forming the body of the clamp. The flanges or ears 9 are spaced from each other around the tube and are each provided with two sets of perforations or apertures 10 and 11, the first set being disposed in line along the inner edge of each flange or ear, and slightly spaced from the edge of the slit 8 referred to. The perforations or apertures 11 of the second set are in line with each other longitudinally of the flanges and spaced along the outer edges thereof. Pref-
eralby, and as indicated in Fig. 3, the apertures of the respective sets are in staggered relation to each other, for a purpose to be described.

The first set of apertures 10 is provided to receive compression bolts 12. These may be straight from end to end, in which case ordinary beveled washers will be placed on each end of the bolts between the heads and nuts and the flanges 9, but preferably are curbed to conform to the curvature of the leg sections. They may be provided at one end with round heads 13, and at the other end threaded, as at 14, to receive ordinary nuts 15, as illustrated in Fig. 2, or may be threaded at each end to receive the nuts 15, as shown in Fig. 5. That portion of each compression bolt 12 adjacent to the head 13 and passing through the aperture 10 is straight and preferably non-circular, as at 16, to fit the non-circular apertures 10. At the other end of each bolt the threaded portion 14 passing through the flanges 9 is also straight so that the nuts 15 will work easily on the threads.

The apertures 11 of the second set are non-circular in the same manner as apertures 10 and are provided to permit the securing of girts and braces 17 to the clamps or sockets 7. These are secured in the manner shown in Fig. 2, that is, the girts and braces are placed against the adjoining faces of the flanges 9 and within the space therebetween. Each girt and brace 17 is preferably formed as a tube with its end portion, flattened, as at 18, and perforated. The girts and braces are secured to the flanges 9 by ordinary clamping bolts 19, and nuts 20, the round heads of the bolts 19 being placed on the outside surfaces of the flanges 9, and the shanks thereof being non-circular for the non-circular apertures 11, and are thereby held from turning so that the nuts can be tightened up with the use of only a single wrench.

The clamp or socket described is preferably formed from plate metal, although it may be formed by forging or partly by rolling and then by pressing or bending.

The preferred method of manufacture of the clamp consists in punching or shearing a flat plate to the shape indicated in Fig. 3. This plate is then punched with the holes 10 and 11 for the compression bolts 12 and clamping bolts 19, after which the plate is heated and subjected to suitable dies processes to bend the body portion of the plate to form the tube or sleeve 7 and bend the flanges 9 radially with reference to the opening in the sleeve. It will of course be understood that the space or distance between the flanges 9 is determined by the character of derrick with which it is used. For example, in a case of a four-sided derrick the flanges 9 are spaced substantially 90 degrees apart, as in the embodiment shown, while with a three-sided derrick the flanges are 60 degrees apart, and in a two-legged shear or derrick they will almost but not quite abut.

In erecting a tower derrick or shear with this clamp, the compression bolts 12 are inserted through the apertures 10 and the nuts 15 partly threaded thereon. The sleeve is then slipped over a standing leg section and the nuts 15 on the lower compression bolts 12 tightened up to clamp this end of the sleeve thereto. The upper leg section is then inserted in the sleeve, which can be freely done, as the tightening of the lower compression bolts does not close the upper end of the sleeve or prevent this, after which the upper compression bolts 12 are tightened to clamp the upper leg section. If it is desired to secure girts and braces to a leg section intermediate its ends, a clamp is slipped over the upper end of the leg section and down to where it is desired to secure the girts and braces, after which it is securely clamped to the leg section. The metal of the clamp is of sufficient resiliency to enable it to be expanded into the space therebetween, as shown in Fig. 4.

The end clamps, making it unnecessary to carry in stock and transport to the place of erection two different types of sleeves, as has hereunto been necessary, and also preventing loss of time which is occasioned by workmen taking the wrong sleeve for any one part of the tower or derrick.

The cost of manufacture is also reduced entirely with the punched out ears of my prior patent referred to. It is therefore much cheaper to construct, and in use, is considerably stronger. The body portion of the sleeve or tube is imperforate and has a much greater frictional grasp upon the leg sections. The girts and braces are secured to the inner faces of the flanges 9 and the round heads of the bolts 19 are placed on the outer faces of the flanges as stated. Moreover, there are no projections on the outer surface of the tube or sleeve 7. For these reasons the parts of a joint exposed on the outside of the derrick or the sleeve. The parts and no sharp corners exist to catch the clothing of workmen climbing around the derrick in the erection of the same. Moreover, the attachment of the girts and braces to the same flanges through which the compression bolts 12 pass has the function of assisting in the clamping action of the sleeve. The strain imposed by each of the girts and braces upon its flange assists in more tightly

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drawing the sleeve around the leg sections. Moreover, since the girts and braces are all attached to the same flange, they mutually strengthen one another, and the entire flange offers resistance to the lateral bending of each one of the girts and braces, a result which could not be obtained if a separate flange or ear were provided for each girt or brace.

In the embodiment illustrated four compression bolts 12 and six girts, braces and apertures therefor are illustrated. In other words, in each flange there are provided four apertures 10 and three apertures 11. These are in staggered relation to each other, as described, so that there will be no interference in turning the nuts on the bolts in the respective sets of apertures. The perforations in the flanges 9 are moreover spaced from each other and the metal of the flange is not so weakened as if the perforations were directly opposite to each other.

It will of course be understood that various changes may be made in the shape or proportions and relations of the parts without departing from the spirit of the invention.

What I claim is:

1. A clamp for towers, derricks and the like, comprising an imperforate, cylindrical, resilient sleeve adapted to be clamped upon a tubular leg section, said sleeve being open or slotted longitudinally on one side, and at the edges of the opening or slot having outwardly extending radially disposed integral flanges, said flanges being each provided with two longitudinal rows of apertures, the inner row for receiving a plurality of bent compression bolts spanning the space between said flanges, and the outer row for the attachment to the clamp of a plurality of girts and braces, the width of said opening or slot between said flanges being less than the internal diameter of said sleeve, and said clamp being adapted either to be placed endwise over the end of a leg section or to be placed sidewise upon the same.

2. A tower, derrick or the like, comprising tubular leg sections arranged to abut each other at their ends, an imperforate, cylindrical sleeve surrounding said leg sections at their meeting ends and having an unbroken interior clamping surface extending around more than half the circumference of said leg sections and provided with radially disposed flanges, said sleeve and flanges being formed of resilient material, said flanges being provided with inner and outer sets of longitudinally spaced perforations, bent compression bolts in the inner set of perforations spanning the space between said flanges and firmly securing the clamp to the leg sections and the leg sections to each other, girts and braces fitting the inner adjacent faces of the flanges, and bolts passing through said girts and braces and said outer set of perforations, the distance between said flanges adjacent to said sleeve being less than the external diameter of said tubular leg sections.

In testimony whereof, I have hereunto set my hand.

Lee C. Moore.

Witnesses:

Elbert L. Hyde,
William B. Wharton.