L. C. MOORE.

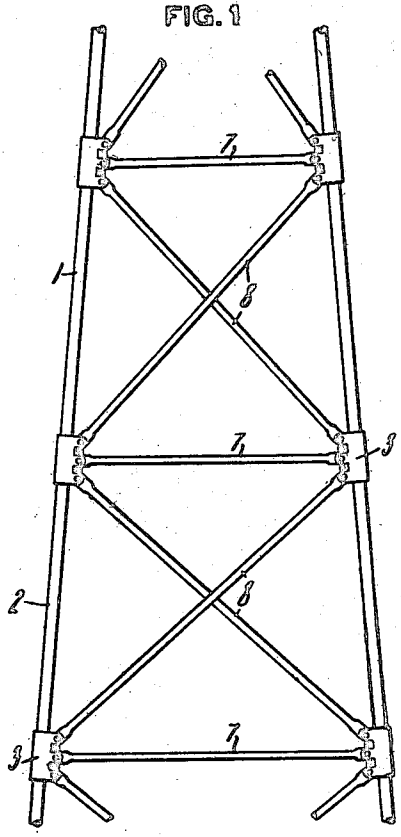
STEEL TOWER OR DERRICK.

APPLICATION FILED MAY 7, 1913.

1,151,810.

Patented Aug. 31, 1915.

FIG. 1



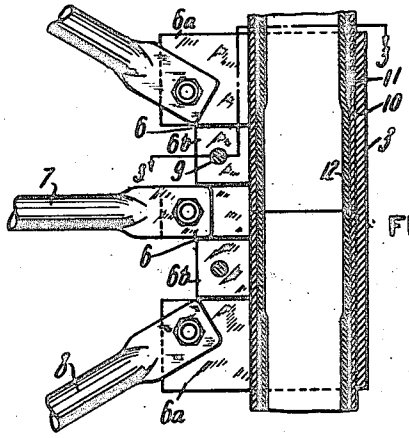


FIG. 2

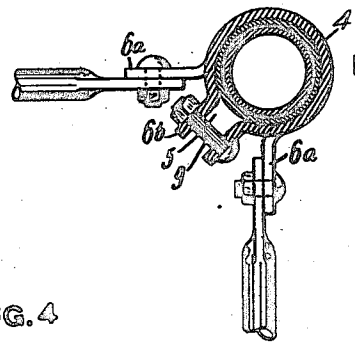


FIG. 3

FIG. 4

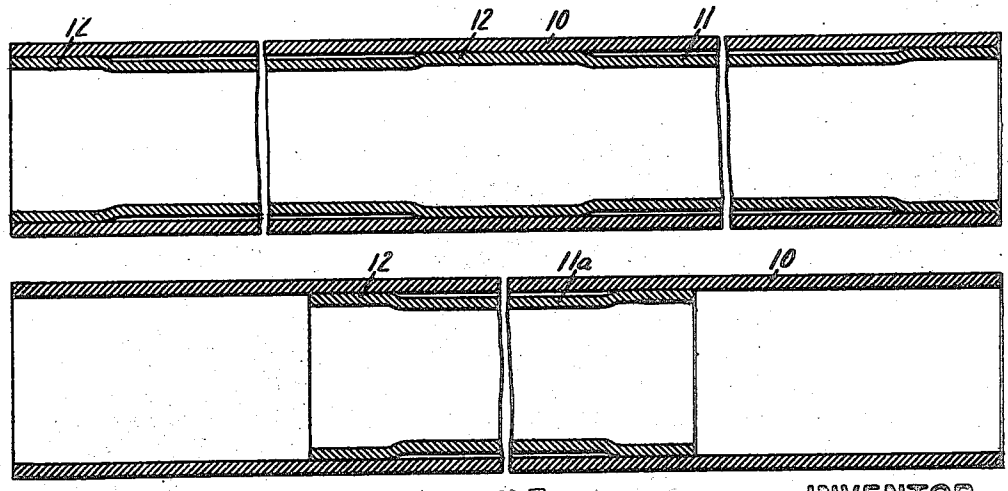


FIG. 5

WITNESSES

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UNITED STATES PATENT OFFICE.

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STEEL TOWER OR DERRICK.

1,151,810. Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed May 7, 1913. Serial No. 766,086.

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 more especially to oil or gas well derricks.

The object of the invention is to provide an improved metal tower or derrick which is considerably stronger than prior constructions of this type, and which can be manufactured at less cost and is less liable to collapse than prior similar constructions.

A further object of the invention is to provide a metal tower or derrick having leg sections formed of a plurality of tubes, arranged concentrically or one within another, thereby greatly increasing the strength of the leg sections, and enabling the same to be manufactured at a low cost.

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

In the accompanying drawings, Figure 1 is an elevation of a portion of an oil well derrick embodying one form of the invention; Fig. 2 is a detail sectional elevation, showing the abutting ends of two leg sections and a clamp embracing the same; Fig. 3 is a cross sectional view on the line 3—3, Fig. 2; Fig. 4 is a longitudinal sectional view on a reduced scale through one of the leg sections shown in Fig. 2; and Fig. 5 is a similar view of another form of the invention.

The tower or derrick illustrated is of the same general design and arrangement as those illustrated in the prior Patents, No. 933,386, granted September 7, 1909, to Thomas A. Neill, and No. 1,015,821, granted January 30, 1912, to me. It comprises a plurality of legs 1, of which there may be three, four, or more as desired. These legs are placed on an incline, as is usual, so that the derrick tapers toward the top. The legs are each composed of a series of sections 2, arranged with their ends abutting each other and connected by clamps or sockets 3. The clamps or sockets 3 may be of any suitable type, such as that shown in my prior application, Serial No. 720,882, filed September 17, 1912. As illustrated, the clamps consist of sleeves 4, formed of resilient, rolled or forged metal slotted or open longitudinally along one side, as at 5, and transversely, as at 6, to provide a plurality of radial flanges or ears 6^a, 6^b. The cylindrical portion of the sleeve 4 embraces the abutting ends of a pair of leg sections 2 throughout more than half the circumference thereof, and the ears 6^a extend out radially with respect to the leg sections at angles of 60 degrees, 90 degrees, or the like, to each other, in accordance with the number of legs in the particular tower or derrick. The ears 6^b lie in parallelism with each other. The several legs are connected by horizontal members or girts 7 and diagonal braces 8, the ends of which are bolted or otherwise secured to the flanges 6^a of the clamps or sockets 4. The clamps or sockets 4 are clamped securely around the leg sections by suitable securing bolts 9, passing through ears 6^b.

The structure described to this point is of a common type, such as can be purchased in the open market today. In the construction of such a tower or derrick it is necessary to use tubes for the leg sections which have been carefully tested to assure that no flaws exist therein. Usually butt or lap-welded tubes are used, and these are subjected to a hydraulic pressure test to disclose the presence of any flaws in the tubes. This is necessary in order to secure the proper factor of safety, as the strength of the tubular leg sections depends to a large extent upon the continuity of the tubular cross section, and any break or flaw in the weld weakens the tube at that point to such an extent that it will either bulge outwardly under the heavy compression, or bend under the lateral bending strain produced by wind or the like. Perfect welded tubes, that is, tubes which have been subjected to a pressure test and pronounced free from flaws, are comparatively expensive, much more so, in fact, than ought to be necessary for the production of a structure of this kind, in which the mechanical strength of the tube, and not its freedom from leaks or cracks, is the desirable feature.

According to my invention I form each of the several leg sections of a plurality of tubes concentrically arranged, that is, located one within the other. The leg sections usually employed heretofore have been about three inches, more or less, in external diameter, and weigh about ten pounds per linear foot. Only first grade tubes can be

used. In the present tower or derrick the leg sections are each formed of a plurality of concentrically arranged tubes. The leg section shown consists of an outer tube 10, indicated in Fig. 4, which may be of the same external diameter as the tubes commonly employed heretofore, say about three inches, or of any other size, depending upon the size of the derrick and the particular use for which it is designed. Said tubes, however, will be of slightly thinner gage than heretofore, weighing only about seven pounds per foot length. Within the outer tube 10 is located inner tubes 11, which in the present embodiment is about two and one-half inches in external diameter, weighing about five pounds per linear foot, and which is a loose or easy fit in the outer tube. After the inner tube is introduced into the outer tube a suitable expanding tool is thrust into the inner tube, and it is then expanded outwardly at one or more points, as at 12, so as to secure a tight fit between the two tubes, making them act practically as a unit. In the form shown in Fig. 4, the tube is expanded outwardly at three points, at its ends and in the middle, although it may be expanded elsewhere and at as many places as desired.

The leg sections, formed as described and in the manner indicated in Fig. 4, are used in the ordinary way, that is, they are placed end to end or in abutting relation and secured together by means of the clamps or sockets 4, as shown in Fig. 1. They have the advantage, however, that a lower grade of tube can be used than according to prior practice. The inner tubes in the concrete example referred to weigh about five pounds per linear foot, and the outer tubes about seven pounds per foot, making an increase in weight of only about two pounds per foot over the higher grade tubes used for prior towers or derricks. This increase in the weight of the tubes results in an increase of about 20% in strength. Moreover, the total cross sectional area of the metal in the two tubes is greater than that of the single tube, thus decreasing the liability of two leg sections telescoping each other when they are not of exactly the same size or gage. In addition, there is a decrease in cost of 25%, due to the lower quality of tubes that can be used, which is considerably more than the slight additional cost of expanding the inner tubes outwardly.

The additional strength obtained by the inner reinforcing tube is so material that it is not always necessary to use inner tubes of full length. For example, in some cases it will be sufficient if only the middle portions of the outer tubes are reinforced, since it is at this point that failure most often occurs. Such an arrangement is shown in Fig. 5, where the outer tube 10 is reinforced with an inner tube 11^a of only half length, with its end portions expanded outwardly at 12, so that the tubes act as a single unit.

It is of course to be understood that the invention is not limited to the particular sizes of tubes and derricks referred to above, but includes any and all sizes and designs thereof so long as they come within the scope of the claims appended hereto.

What I claim is:—

1. A leg section for towers, derricks and the like, comprising two tubes concentrically disposed about a common axis and also symmetrically disposed with reference to a plane normal to said axis midway between the ends of the outer tube, the outer diameter of the inner tube being less than the inner diameter of the outer tube, and the inner tube at intervals along its length having portions of its wall expanded outwardly into close contact with the wall of the outer tube to secure said tubes to each other.

2. A leg section for towers, derricks and the like, comprising two tubes concentrically disposed about a common axis, the inner tube being shorter than the outer tube and being symmetrically disposed with reference to a plane normal to said axis midway between the ends of the outer tube, the outer diameter of the inner tube being less than the inner diameter of the outer tube, and the inner tube at intervals along its length having portions of its wall expanded outwardly into close contact with the wall of the outer tube to secure said tubes to each other.

In testimony whereof, I have hereunto set my hand.

LEE C. MOORE.

Witnesses:
ELBERT L. HYDE,
WILLIAM P. LARKIN.