Feb. 24, 1925. 1,527,323

L. C. MOORE

METAL DERRICK AND THE LIKE

Filed July 10, 1922

FIG.1.

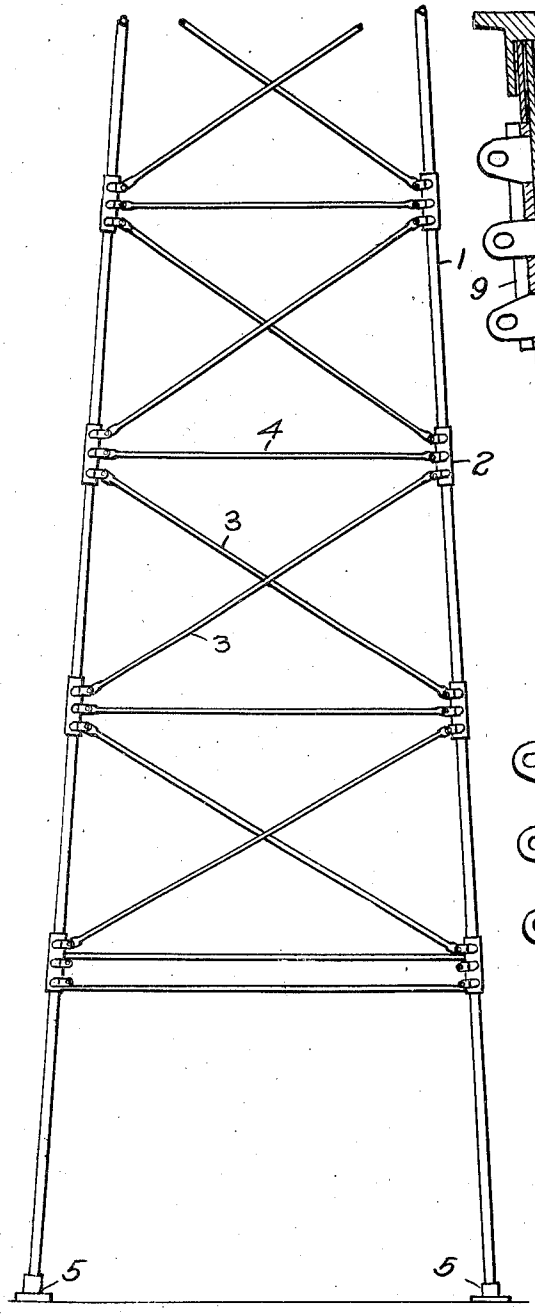


FIG.2.

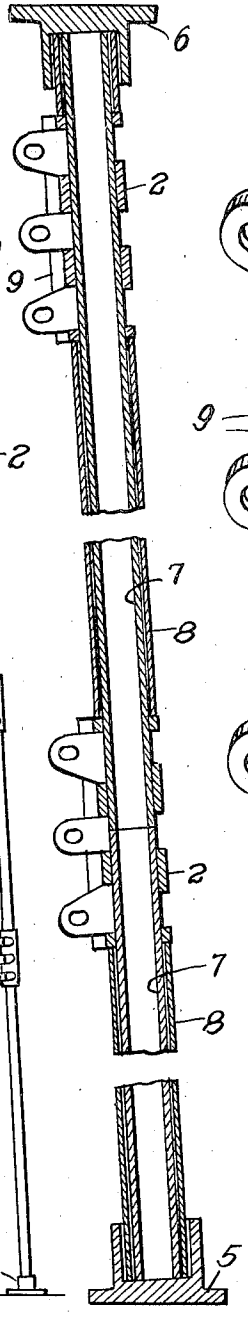
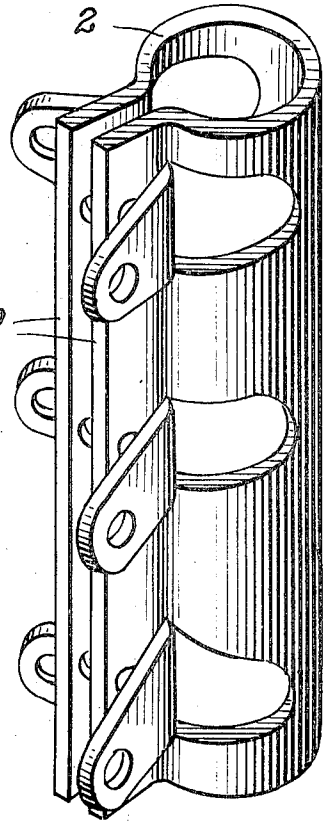


FIG.3.



WITNESSES

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INVENTOR

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Patented Feb. 24, 1925. 1,527,323

UNITED STATES PATENT OFFICE.

LEE C. MOORE, OF TULSA, OKLAHOMA, ASSIGNOR TO LEE C. MOORE & COMPANY, INC., OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METAL DERRICK AND THE LIKE.

Application filed July 10, 1922. Serial No. 573,975.

To all whom it may concern:

Be it known that I, LEE C. MOORE, a citizen of the United States, and a resident of Tulsa, in the county of Tulsa and State of Oklahoma, have invented a new and useful Improvement in Metal Derricks and the like, of which the following is a specification.

The invention relates to metal towers, derricks and the like, and although unlimited to any particular use, it is especially applicable to derricks for oil and gas wells.

The object of the invention is to provide leg or column portions for towers, derricks and the like, which may be economically manufactured and easily erected, and which are capable of effectively resisting the various stresses to which they are subjected when in service.

The invention is illustrated in the accompanying drawings of which Fig. 1 is a side view of a derrick, the intermediate portion being broken away; Fig 2 a longitudinal central sectional view to enlarged scale of a leg section of the derrick of Fig. 1; and Fig. 3 a perspective view of a clamp for connecting adjacent sections of the leg to each other.

The tower or derrick illustrated is of the same general design and arrangement as that shown in Patent No. 933,386 to Neill and in Patent No. 1,151,810 granted to me. It comprises a plurality of legs, of which there may be three, four or more, as desired, each being formed of a plurality of tubular sections 1, which terminate at the panel points. Clamps 2 engage the ends of the leg sections at the panel points and are provided with lugs for the attachment of diagonals 3, and struts 4. At the bottom of each leg there is usually a base 5 having a cup shaped member to receive the end of the leg, and at the top of the leg there is a cap 6 for supporting certain parts of the rigging.

According to this invention the legs of the tower are formed of inner and outer concentric tubes of unequal length, the inner tubes of the sections being longer than the outer tubes and having their ends projecting beyond the outer tubes. The framing clamps are attached to the projecting ends of the inner tubes, and stiffen the legs at the panel points without the necessity of continuing the outer tubes until the ends abut against each other, thereby effecting a saving of material. The tubular leg sections may be variously constructed. For example they may be formed of concentric tubes connected to each other in the manner disclosed in my above mentioned Patent No. 1,151,810, or they may be otherwise attached one to the other for the purpose of causing the two pipes to reenforce each other whether subjected to large or small stresses. However, in the preferred embodiment of the invention the inner tube is arranged rather loosely within the outer tube, sufficient clearance being allowed to permit the tubes to be readily placed one within the other. This preferred arrangement is clearly seen in Fig. 2 which shows inner tubes 7 having their ends abutting against each other at the center of clamps 2, and outer tubes 8 fitting loosely about the inner tubes and terminating at the upper and lower edges of the clamps. If desired, a third tube may be placed within and be coextensive with the inner tube, forming a triple tube leg as is occasionally done in forming derrick legs of the general character contemplated herein.

In forming a tower leg according to the preferred embodiment of the invention, the lower ends of the inner and outer tubes of the bottom leg section are flush and both rest upon and are supported by a base 5. The inner tube 7 projects beyond the top of the outer tube 8 a distance equal to half the length of the framing clamp, and upon this projecting end the framing clamp is placed and permitted to rest upon the upper end of the outer tube. Of the next leg section the lower end of the inner tube rests upon the upper end of the inner tube of the lower leg section, and the lower end of the outer tube rests upon the upper edge of the framing clamp. This construction is continued to the top of the leg except that at the upper end of the short top leg section both the inner and outer tubes are cut flush to conform to the required dimensions and to afford a seat for a cap 6. The upper section is cut in the field to compensate for variations in the length of the lower sections so that each leg may be the exact required or desired length. This is a practical advantage of considerable importance.

The framing clamps 2 at the panel points may be of the general form illustrated in my above mentioned patent, or of any other suitable form. However, the clamps are

preferably of increased length for the purpose of increasing the strength and rigidity of the structure and also to facilitate the erection of the derrick. The clamps illustrated in the drawings are formed of rolled or forged metal of sufficient resiliency to permit them to be tightened upon the projecting ends of the inner tubes of the leg sections. The outstanding edges or lugs 9 for attaching the clamps to the leg sections preferably have only a small space between their adjacent faces so that the same length bolts may be used for attaching the clamps to the leg sections as for attaching the struts and braces to the clamps, thereby facilitating the erection of the derrick.

While the invention is not limited to the dimensions of tubes used to form the legs, the legs may, for example, be formed of three-inch outer tubes and two and a half inch inner tubes with about one sixteenth of an inch clearance between them. When a leg, or a portion of it, is under tension, as it may be in a wind storm, the tensile strain is resisted by the inner tubes which are firmly connected to each other by the framing clamps. In resisting compression, which is the normal and by far the greatest stress to which the leg section is subjected, the inner tube of the leg carries a portion of the load and the outer tube another portion of it. At the panel points vertical loads are carried from the clamps to the upper ends of the outer tubes beneath them, and vertical loads carried by outer tubes in one leg section are carried directly through the clamp below such outer tube. The inner and outer tubes reenforce each other against lateral deflection intermediate of the panel points when the legs are subjected to sufficient compression to cause one or the other of the tubes to deflect laterally a slight distance so that the walls of the tubes are in contact with each other. Such deflection is within the elastic limit of the tube, and hence the tubes act together in resisting buckling.

The economy in manufacturing and the ease in erection of the derrick are manifest from the description of its construction. It is only necessary to cut the tubes to the proper length and attach the clamps to the projecting ends of the inner tubes. Cutting the outer shorter than the inner tubes has the further advantage of a saving in material without in any way sacrificing the strength of the derrick. A further advantage of the invention is that the clamps are held against longitudinal movement upon the leg sections by other than their frictional engagement with the legs. While this is of advantage at all panel points, it is particularly advantageous at the lower panel point, to the clamps of which there are usually attached girts in the form of beams on which there are vertical thrusts of considerable intensity caused by various wheels and other rigging attached to the struts. By arranging the clamp between the ends of the outer tubes, the tendency of the clamps to move longitudinally upon the legs is effectively resisted. These and numerous advantages of the invention will be readily apparent to those skilled in the art. A still further advantage of the invention is that in the preferred form illustrated in the drawings it is not necessary to connect by expansion or otherwise the inner to the outer tubes, nor is it necessary to cut the intermediate leg sections to exact size.

According to the provisions of the patent statutes, I have described the principle and operation of the invention together with what I now consider to represent the best embodiment thereof. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced by other forms of construction than that particularly shown and described.

I claim:

1. A leg for a tower, derrick and the like, formed of sections comprising inner and outer concentric tubes, the inner tubes projecting beyond the ends of the outer tubes at the panel points, and framing clamps engaging said projecting ends of the inner tubes, the ends of said outer tubes abutting against the ends of said clamps, and the adjacent ends of the inner tubes abutting against each other substantially midway between the ends of the clamps.

2. A leg for a tower, derrick and the like, formed of sections comprising inner and outer concentric tubes, the inner tubes fitting loosely within the outer tubes and having their ends projecting beyond the ends of the outer tubes, and framing clamps engaging said projecting ends of the inner tubes, the ends of said outer tubes abutting against the ends of said clamps, and the adjacent ends of the inner tubes abutting against each other substantially midway between the ends of the clamps.

In testimony whereof, I sign my name.

LEE C. MOORE.

Witnesses:

C. R. KRAUSE,

F. D. HARRIS.