

Feb. 7, 1928.

J. P. NEILSON, SR

1,658,535

DERRICK

Filed Dec. 11, 1926

2 Sheets-Sheet 1

Fig. 1.

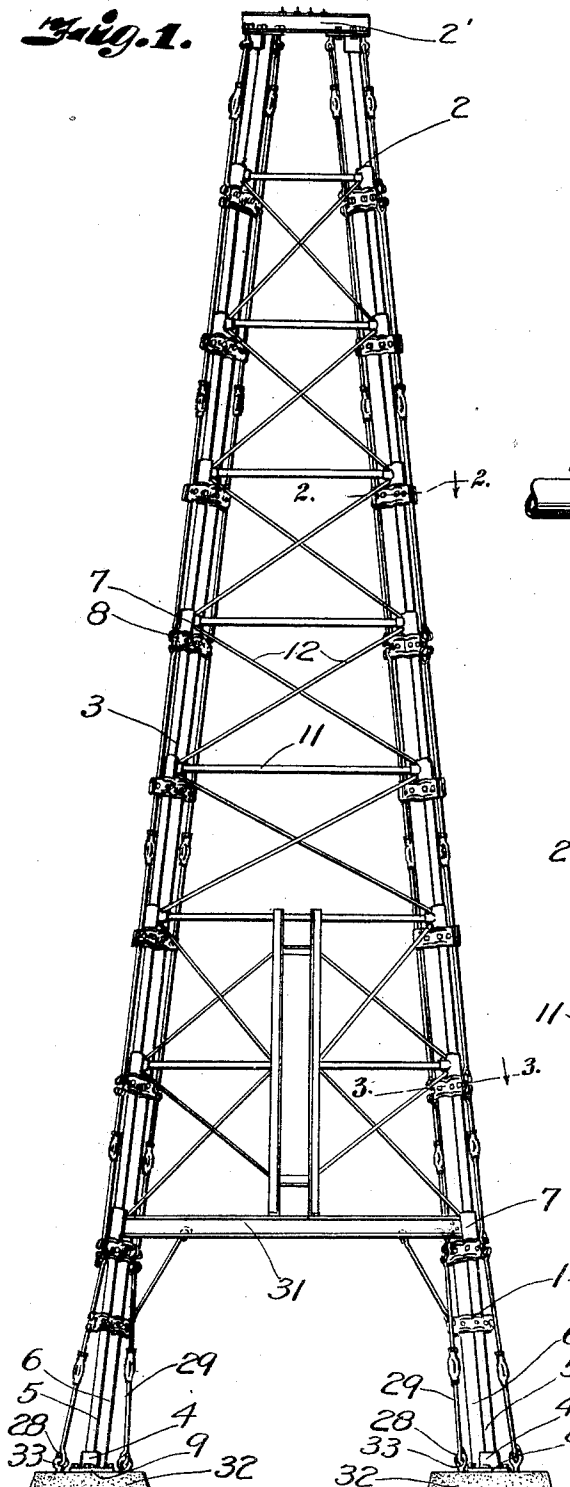


Fig. 2.

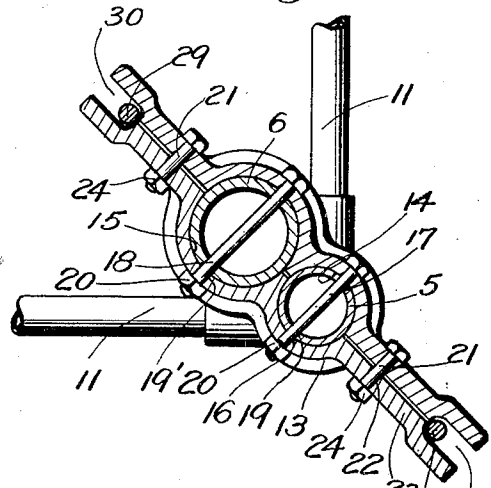
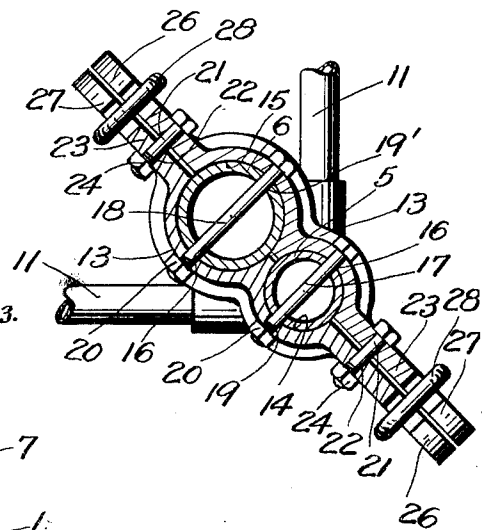


Fig. 3.



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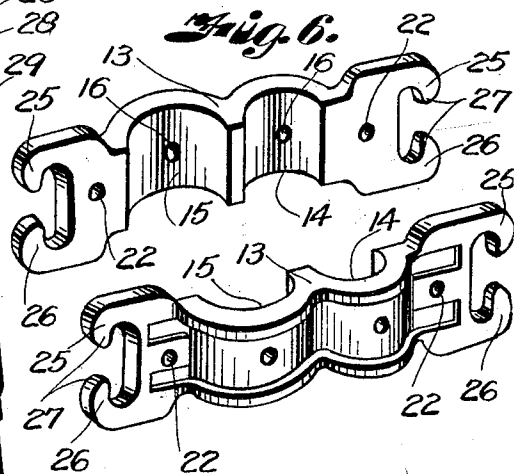
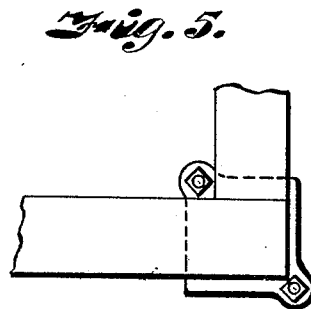
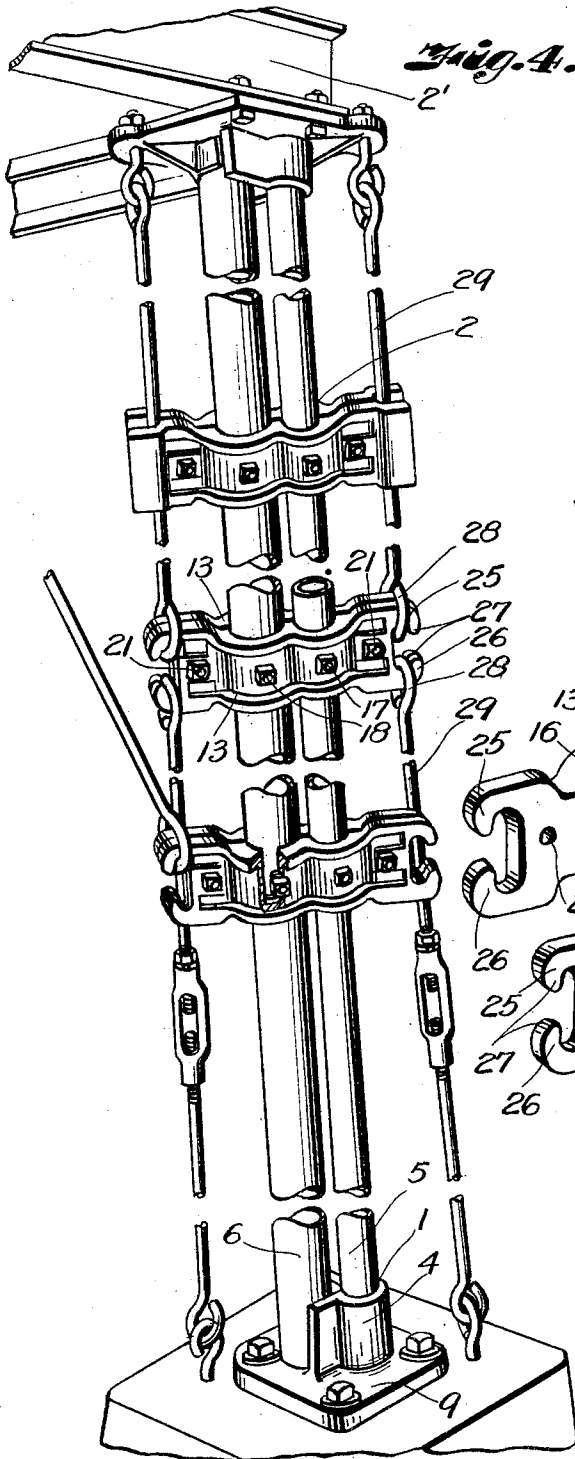
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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DERRICK.

Application filed December 11, 1926. Serial No. 154,144.

My invention relates to clamp brackets and more particularly to such brackets as may be applied to the legs of a skeleton structure, for example, an oil well derrick, as an important feature of the means whereby the structure is stabilized.

In the following description, oil well derricks of tubular construction will typify structures that are designed and erected primarily for comparatively light service but that may be converted or adapted to service under which they must sustain heavier and different strains. The description refers specifically to reenforced structures, my invention being especially adapted to the stabilization of such reenforced structures.

The term "standard" as herein used refers to the element comprising a derrick leg and its reenforcing releg attached to said leg by clamps. The "top" for the derrick is to be understood as referring to the plate on which the crown block rests.

An oil well derrick is usually designed for the comparatively light duty of pumping oil over a long period; a minimum amount of metal is used in it so that investments, wear and tear loss and wind strain are minimized. A derrick designed as suitable for drilling would be uneconomical and inappropriate for permanent use in pumping. In practice, derricks are erected that may remain in permanent use for pumping; and these are reenforced, strengthened and braced in various ways to meet the heavier stresses of various kinds of drilling operations or other duties.

One phase of reenforcement of a pumping derrick to give it strength to sustain the strain of drilling, of pulling casing, and similar work, is the installation of relegs which are additional and usually larger derrick legs attached, for example by clamps, to the legs of the structure. Such reenforcement provides three among several advantages; (1) additional resistance against the greater vertical strain due to the heavier pull of drilling, casing pulling and like duties as contrasted with oil pumping; (2) some additional rigidity as preventive of buckling, swaying, vibrating due to various and changing strains of the load, and (3) strength to meet the conditions of work on the derrick involved in installation of parts and equipment, and repairs. Conditions 2 and 3 are not fully provided for in the releg

installation, but are met by my invention. Twisting of the structure under various strains, and the additional wind pressure due to additional surface presented by the relegs, are further conditions which are met by my invention.

In the method of reenforcing on which the present invention is based, the legs and relegs are attached to each other by means of a clamp, the form and pressure of the halves of the clamp effecting the adequate permanency of attachment since the chief function of the clamp is to hold the legs and relegs together. Should any force be exerted for substantial time upon or against such clamp in any direction except perpendicularly to the line of parallel of the legs and relegs, such force would tend to disturb the effectiveness of the clamping function. My invention provides means for insuring the permanency of the clamp in position and for strengthening the clamp against such said persistent force, as for example, when the clamp is adapted for use as a bracket and as such is subjected to other than relatively horizontal strains.

One other condition created by the releg in installation and for which my invention provides the remedy, is the wiggling or shuffling of legs and relegs separately and upon each other, resulting in loosening of connections, wearing down of parts, and endangering of the structure.

The object of my invention is to provide means for preventing twisting, swaying and vibrating of a pumping derrick or similar structure, and erratic movement of its members, especially when such structure is subjected to unusual strain and specifically when the structure is a pumping derrick and is reenforced with relegs, equipped with drilling and casing pulling devices for heavier duties, such means being readily removable, such removal being desirable when the occasion for its use has passed.

More specifically the invention comprises an improvement in a clamp by the addition to it of a bracket element, by addition of means for attaching the clamp to the standards for obtaining desirable additional rigidity for the functioning of the clamp device as a clamp bracket, and the combination of the clamp bracket with other elements for providing additional strength to an oil well derrick; the clamp bracket being adapted for attachment to sections of the

legs and relegs of the derrick and thereby providing a means whereby relatively vertical sections throughout the height of the derrick may be connected by adjustable tie rods, thereby affording discontinuous but complete connection between the top of the derrick and the base upon which the legs and relegs are mounted. Downward stress exerted on the derrick by the adjustable tie rods will tend to prevent such excessive twisting, swaying and vibrating of the derrick as is common to light derricks and to reinforced derricks. The plurality of tie rods each with its turnbuckle connecting adjacent sections of the legs, provides a larger sum total of downward stress and less hazard than would be economically feasible in single and continuous connecting elements such as wires or rods. The form of the improved clamp brackets makes it possible to provide tension also at any location on the derrick in horizontal or angular directions for the bracing of the entire structure or any part of it to meet the normal or special conditions.

In the following description and the accompanying drawings, the improved details of structure are shown in the preferred form as applied to clamp brackets used in attaching relegs to the legs of a derrick as elements in means for stabilizing the structure.

In the drawings:

Fig. 1 is a side elevational view of a derrick showing the device as applied to the legs of a derrick.

Fig. 2 is a horizontal sectional view through one corner of a derrick frame, taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a detail perspective view of portions of one of the corner legs of the derrick illustrating the tie rod connection to the leg base and crown block.

Fig. 5 is a detail plan view of a part of the top of the derrick showing a tension rod connection.

Fig. 6 is a detail perspective view of one of the clamp brackets.

Referring in detail to the drawings:

1 designates the lower base section of an oil well derrick, 2 the upper section, 2' the top of the derrick, and 3 one of several intermediate sections. At the lower end of each of the four feet of the lower section 1 is a socket member 4 in which are mounted legs 5 and parallel reinforcing legs 6, each consisting in the examples illustrated, of sections of tubing. The sections of legs 5 are joined together by suitable means such as the leg joints 7 and the sections of a reinforcing leg 6 are joined by means of a clamp 8. Legs 5 and 6 mounted in the socket 4 fixed on a base mounting plate 9 extend upwardly to form rigid principal members or standards of the derrick structure.

Girts 11 are secured to the leg joints 7 serving to hold the legs in spaced relation and at their proper inclined angles. Sway braces 12 are likewise secured to the leg joints 7 and connect the lower ends of leg sections with the upper ends of sections of legs of other standards and thus contribute to strength and stability.

The clamp brackets 8 as applied to the legs 5 and 6 of a derrick consist of mated halves 13, each having a semi-circular leg grip 14 for engagement with a derrick leg 5 and a like grip 15 for engagement with a reinforcing leg 6. In order that the clamp 8 may be secured to the derrick leg, apertures 16 are provided in grips 14 and 15 and are adapted to receive the bolts 17 and 18. The bolts 17 and 18 also pass through circular openings 19 in the legs 5 and through similar openings 19' in the releg sections 6; and the nuts 20 are provided thereon so that pressure may be exerted on the clamp in its contact with the legs. Thus the halves of the clamp are connected with each other and are attached to the legs and the relegs of the derrick standard by the bolts 17 and 18 that pass through clamps and legs; and this attachment is made firm and the legs of the standard are integrated by the pressure of the clamp halves against the legs obtained by means of the nuts 20.

Further provision for securing the clamps to the legs is made by providing the bolts 21 which are inserted through the openings 22 in the bracket portion 23 of the clamp, and the nuts 24 on said bolts 21 by which pressure is applied to the clamps.

To stiffen the derrick and firmly anchor the crown block to its upper end I tie the crown block to the derrick base by turnbuckle rods and to prevent sway of the rods I divide the same into sections and connect the sections through clamp brackets at different heights in the derrick. For this purpose I provide the outer ends of some of the clamp brackets with downwardly directed hooks 25 and upwardly directed hooks 26, the points 27 of the oppositely directed hooks being spaced to receive eyes 28 on the ends of the rod sections 29. These hooked bracket clamps are spaced throughout the height of the derrick according to the length of the tie rods, and intermediate clamps are provided with rod guides formed by spreading the bracket portion 23 to provide the outwardly opening sockets 30.

I prefer to locate hook clamps on the legs immediately beneath the lower cross beam 31 and tie these clamps to the base 32 by rods 29, the eyes of which are attached to the clamp hooks and to hooks 33 anchored to the base. The clamps just mentioned are tied to similar clamps located slightly above the cross beam and the last named clamps are tied to other clamps higher up the derrick, the tie rods

connecting the clamps having greater spacing being seated in the anchoring sockets of intermediate clamps. The upper hook clamps are preferably located adjacent the crown block and tied thereto by short or stub rods.

To further stiffen the base of the derrick I prefer to locate a hook clamp on the legs between the cross beam 31 and the derrick base and to tie this clamp to the cross beam by diagonal tie rods. All of the tie rods, including the diagonals, but not necessarily the short or stub rods, are provided with turnbuckles for adjusting their tension.

It is apparent, therefore, that with the improvements above described, I not only provide for securely connecting the relegs with the main legs, but I further utilize such connections for anchoring the crown block to the derrick base and for stiffening the entire structure.

What I claim and desire to secure by Letters Patent is:

1. In a derrick structure comprising legs and relegs, clamps for securing the relegs to the legs and tensioning means connecting the clamps.

2. In a derrick structure comprising legs and relegs, clamps for securing the relegs to the legs, rods connecting the clamps and means for adjusting said rods.

3. In a derrick structure comprising legs and relegs, clamps for securing the relegs to the legs, hooks on said clamps, rods applied to said hooks to connect the clamps and means for adjusting said rods.

4. In a derrick structure comprising clamps for securing the relegs to the legs, oppositely disposed bracket arms on said clamps, hooks on said bracket arms, rods connecting the clamps through said hooks, and means for adjusting said rods.

5. In combination with the legs and relegs of a derrick structure, clamps comprising mated halves, said clamps having means for gripping the legs and the relegs of the derrick, bracket arms integral with said clamp, means for securing the mated halves together and to said legs and relegs, oppositely directed hooks on said bracket arms, tie rods connecting the hooks of successive clamps, and means for tensioning the rods.

6. In combination with the legs and relegs of a derrick structure, comprising mated halves, said clamps having means for gripping the legs and the relegs of the derrick, bracket arms integral with said clamps and comprising extensions thereof, means for se-

curing the mated halves together and to said legs and relegs, oppositely directed hooks on said bracket arms, the points of said hooks being spaced, bolts extending through said bracket arms and securing said arms together, tie rods applied to the hooks of said clamps, and means for tensioning the rods.

7. In a derrick structure comprising base standards, girts and sway braces connecting the standards, relegs extending along the standards, clamps attaching the relegs to the standards and having bracket arms provided with hooks, the rods having eyes engaging said hooks, eye bolts fixed in the base and the crown of the derrick for engagement of the tie rods, turnbuckles tensioning the tie rods and said tie rods thus engaged and tensioned providing multiple elements for equal downward stresses for stabilizing the structure.

8. In a derrick, a base and a crown block, legs and relegs supporting the crown block from the base, clamps connecting the legs and relegs, and rods co-operating with the clamps to tie the crown block to the base.

9. In a derrick, a base and a crown block, legs and relegs supporting the crown block from the base, clamps on the legs and relegs, rods co-operating with the clamps to tie the crown block to the base, and means in the rods for adjusting the tying connection.

10. In a derrick structure comprising legs and relegs, clamps connecting the legs and relegs, some of the clamps having end hooks and other of the clamps having rod sockets, and rods connected with the hooked clamps and seated in the sockets of the socketed clamps.

11. In a derrick structure comprising legs and relegs, clamps connecting the legs and relegs, some of the clamps having end hooks and other of the clamps having rod sockets, and rods connected with the hooked clamps and seated in the sockets of the socketed clamps, the rods being provided with turnbuckles for adjusting their tension.

12. In a derrick comprising a base, legs and relegs supported on the base, a crown block supported on the legs and relegs, clamps connecting the legs and relegs, tie rods connecting intermediate clamps with each other and other tie rods connecting upper and lower clamps with the crown block and base.

In testimony whereof I affix my signature.

JAMES P. NEILSON, Sr.