Aug. 12, 1924. 1,504,299

J. M. WOLFE

OIL WELL PUMPING JACK

Filed Sept. 5, 1922 3 Sheets-Sheet 1

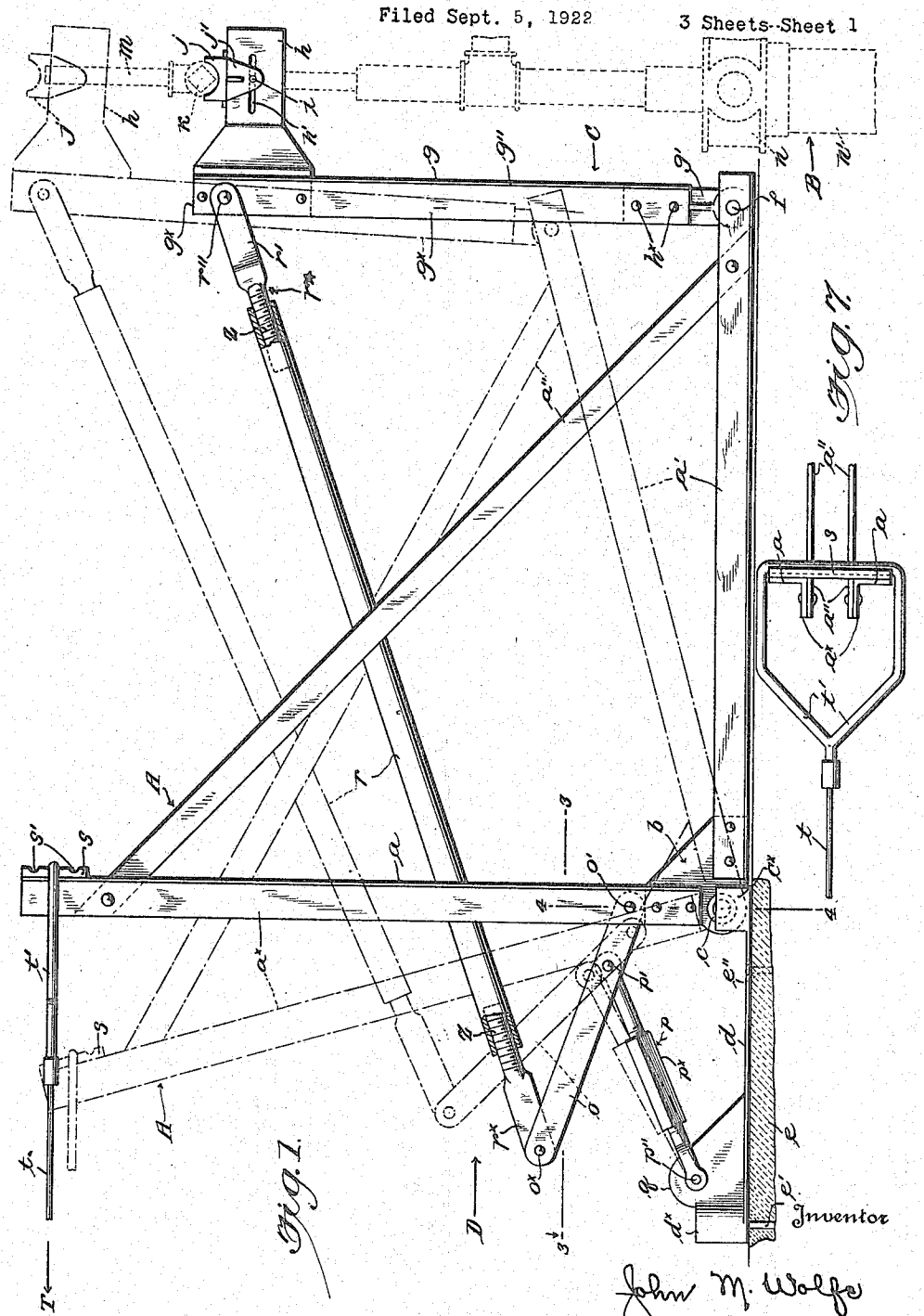


Fig. 1.

Fig. 2.

Inventor
John M. Wolfe
By
James Hamilton
Attorney

Aug. 12, 1924. 1,504,299

J. M. WOLFE

OIL WELL PUMPING JACK

Filed Sept. 5, 1922 3 Sheets-Sheet 2

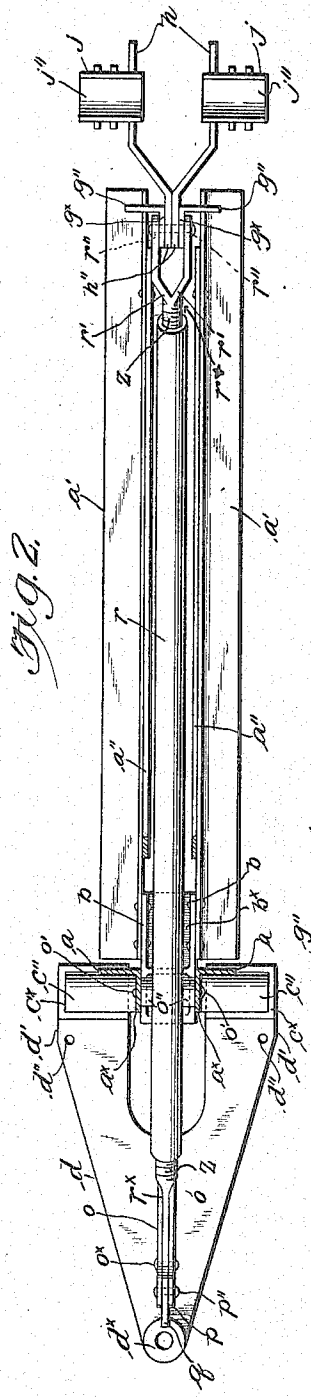


Fig. 2.

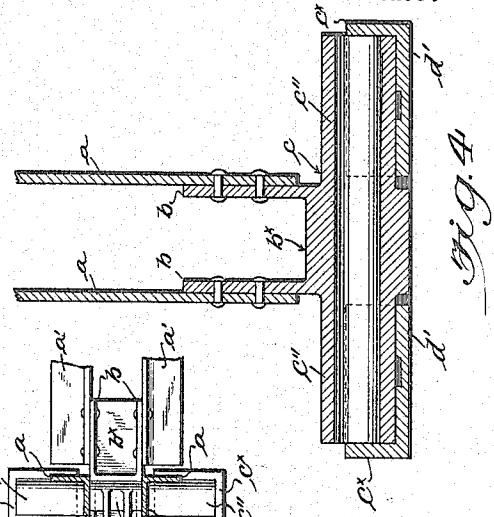


Fig. 4.

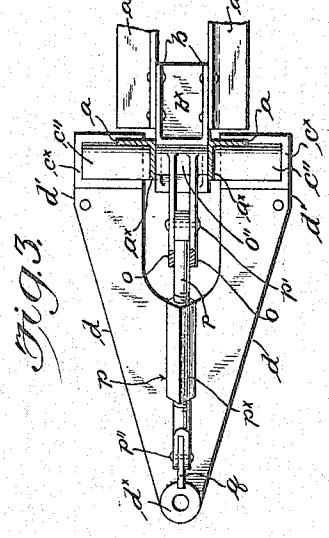


Fig. 3.

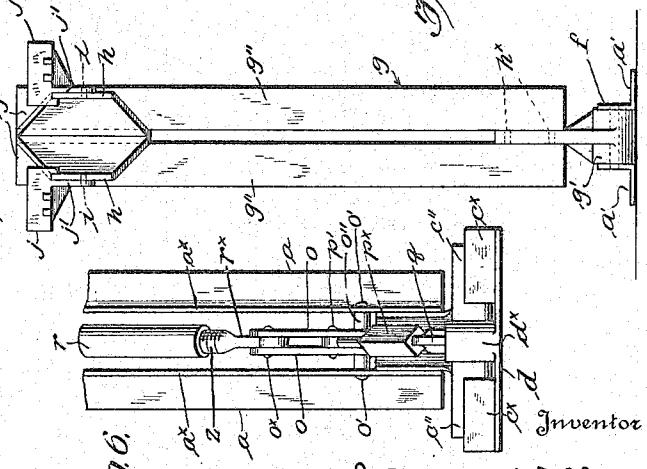


Fig. 5.

Fig. 6.

Inventor

John M. Wolfe

by his attorney

James Hamilton

Attorney

By

Aug. 12, 1924. 1,504,299

J. M. WOLFE

OIL WELL PUMPING JACK

Filed Sept. 5, 1922 3 Sheets-Sheet 3

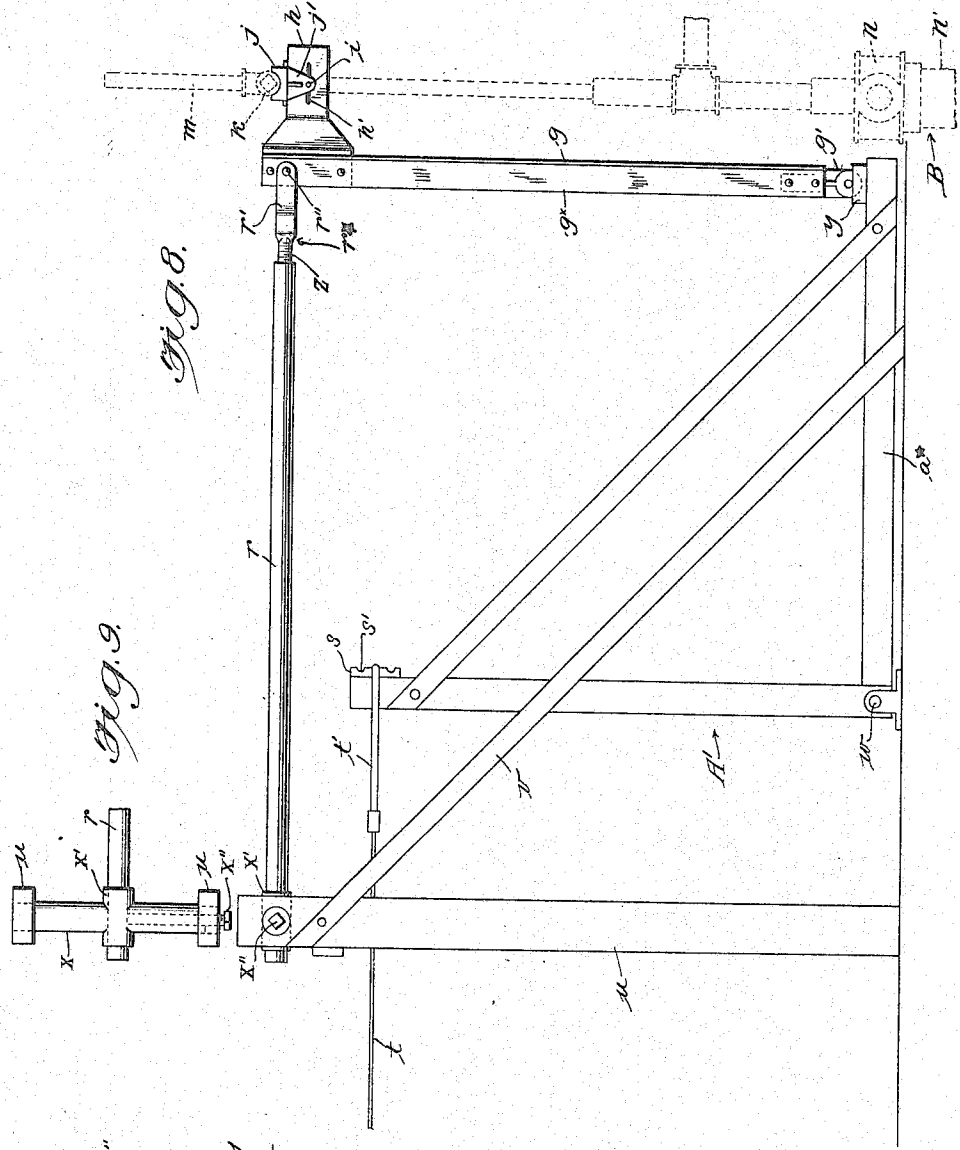


Fig. 8.

Fig. 9.

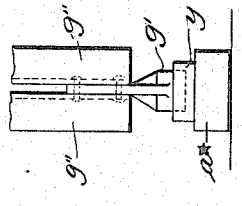


Fig. 10.

Inventor
John M. Wolfe

By James Hamilton
Attorney

Patented Aug. 12, 1924. 1,504,299

UNITED STATES PATENT OFFICE.

JOHN M. WOLFE, OF OIL CITY, PENNSYLVANIA.

OIL-WELL PUMPING JACK.

Application filed September 5, 1922. Serial No. 586,276.

To all whom it may concern:

Be it known that I, JOHN M. WOLFE, a citizen of the United States of America, and a resident of Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Oil-Well Pumping Jacks, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in oil-well pumping apparatus, and particularly to improvements in what are commonly called "pumping-jacks." Heretofore it has been common, in the construction of pumping-rigs for oil-wells, to erect a pair of uprights or standards, which are known, among oil-producers and others engaged in the operation of pumping machinery in the oil regions, as samson-posts, and in the upper ends of which there is supported, free to rock or swing, a beam designated as the kick-beam and pivotally fastened to the upper end of the polish-rod-carrying pitman. It is an object of this invention to simplify pumping-jack construction by the elimination of such samson-posts and kick-beam, that is, to provide a pumping-rig that will be both post-free and beam free. Another feature of this invention resides in the provision of a support in the form of a plate (hereinafter called the sole-plate or base-plate) upon which the pumping-jack V is mounted, free to rock, and to which the pitman is connected by a system of links and levers. The point of attachment of the latter system to the sole-plate is maintained at a given predetermined distance from the axis of rotation of the V, whereby it is ensured that the arrangement of parts will remain as fixed upon initially. Still another feature of this invention lies in the provision of a novel and much simplified arrangement of parts by means of which the polish-rod is given a reciprocating motion in the vertical or a true perpendicular. Other features of this invention will appear hereinafter as the description of the novel oil-pumping apparatus proceeds, and they will be particularly pointed out and set forth in the claims that form a part of this specification.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle, Fig. 1 is a side elevation of the pumping-jack; Fig. 2 is a plan thereof; Fig. 3 is a detail in section on the line 3—3, of Fig. 1, and illustrates, in plan, the sole-plate and parts therewith connected; Fig. 4 is a detail in section on the line 4—4, of Fig. 1, on an enlarged scale, and illustrates the pivot of the V; Fig. 5 is a front-end view of the pumping-jack, looking in the direction of the arrow C in Fig. 1; Fig. 6 is a rear-end view of the pumping-jack, looking in the direction of the arrow D in Fig. 1; Fig. 7 is a detail showing the pull-rod loop in plan; Fig. 8 is a side elevation of an old-style pumping-jack structure in which are embodied parts of the pumping-jack disclosed herein and hereby; Fig. 9 is a detail that illustrates in plan the cross-support for the kick-beam shown in Fig. 8; and Fig. 10 is a detail that illustrates, in front elevation, the manner in which the lower end of the pitman is supported in Fig. 8.

As is common in this type of pumping apparatus, there is provided a double (or two-section) frame A having a triangular shape and known, in the parlance and nomenclature of oil-producers, as a vee (or V). Each section of the frame A comprises a post or upright a, a base-member a', and a brace a'' that extends obliquely and downwardly from the upper end of the post or leg a to the outer (or well) end of the base-member a', and is fastened to each of the members a, a'. The lower end of each of the upright members a is firmly fastened to one of a pair of rocker-arms b (Figs. 1 and 4) that are carried by and extend from a rock-shaft c; and the inner end of each of the horizontally-disposed base-members a' is similarly secured to one of the same pair of rocker-arms b, which are flat or plate-like in shape and form lateral walls or cheeks of a socket-like member b^x, from which the ends c'' of the rock shaft c project after the manner of trunnions (see Figs. 1 to 4, both inclusive, in Figs. 1 to 3 of which the uprights a and base-members a' are shown to be angle-iron parts). These rockshaft ends or trunnions c'' rest in shaft-bearings c^x that are formed in the bifurcated end d' of the sole-plate d, in the other end of which there is formed an eye d^x through which a pin e' is passed into the foundation e of concrete or other prepared material that underlies the sole-plate d and supports the structure. Other pins

e'' passed through holes d'' in the sole-plate d serve to secure the same firmly in its place on the prepared foundation e.

The outer ends of the base-members a' carry a pivot-pin f (Figs. 1 and 5), upon which rocks the lower end g' of a pitman g, the body-portion of which comprises a pair of angle-iron uprights g'', the lower part of the latter being riveted or otherwise secured at h^x to the end g' of the pitman g. At the top of the latter, there are inserted, between the webs g^x of the angle-iron uprights g'' (Figs. 1, 2 and 5), the vertical rear edge-portions h'' of a pair of bent plates h, which edge-portions lie pressed tightly together. As these plates h extend outwardly (that is, towards the oil-well B), they are bent so that they diverge or flare away from each other and then are bent again so they extend parallel to each other (Figs. 2 and 5). Together the plates h form a bracket or support for the polish-rod adjuster k, as will presently be described. Each plate h is formed with a slot h' through which passes an adjusting bolt i that holds in place the downwardly extending flange j' of a recessed adjuster-bearing j. In the semicircular seats or hollows j'' of these adjuster-bearings j, which together constitute a sort of a saddle, there rides a polish-rod adjuster k through which passes the polish-rod m of the oil-well pumping mechanism. The adjuster k, polish-rod m, casing-head n and well-casing n' are so well known to all persons skilled in this art as to make utterly unnecessary a more detailed reference to these parts.

Between the upright members a of the V A, there is mounted, free to swing, a pair of lever-arms or crank-arms o that extend side by side and upwardly and rearwardly, from a common hollow rock-shaft o'' that turns between the webs a^x of the angle-iron uprights a and upon the pivot-pin o' that passes transversely therethrough and serves as a fulcrum for the rocker-arms or lever-arms o swinging on the pivot-pin o'. See Figs. 1 and 6. Pivotally fastened at p' between the crank-arms o, is one end of a turnbuckle p the other end of which is bifurcated or clevis-like and is pivotally fastened at p'' to an upstanding rib or flange q that projects vertically from the sole-plate d and extends centrally and lengthwise thereof. The upper, rear ends of the lever-arms o are pivotally fastened, by a pin o^x, to the lower, rear end r^x of a link-rod or connecting-rod r that lies between them. This end r^x is in the form of a connection-piece or coupling that is threaded at z and is screwed into the body of the rod r (Fig. 1). Screwed into the other end of the latter is another coupling or connection-piece r^*, the shank of which is threaded at z' and the bifurcated end r' of which is pivotally fastened, as at r'', to the webs g^x of the angle-irons g'' that form the body-part of the pitman g. The screw-threads z, z', are reverse with relation to each other, so that, by turning the rod r, its effective length between the pivots r'', o^x, may be changed, after the manner of a turnbuckle.

Mounted upon the upper ends of the uprights a of the V A is a pull-block s (Figs. 1 and 7) formed with horizontally-extending grooves s' in its front face. These grooves s' are adapted and designed to receive a loop t' that is attached to one end of the pull-rod t commonly used in pumping-rigs.

When, by means of any power apparatus commonly used to drive oil-well pumping-jacks (*e. g.*, the common eccentric apparatus), a pull is exerted, in the direction of the arrow T of Fig. 1, upon the pull-rod t, the V A will be swung rearwardly into the position indicated in Fig. 1 by the dot-and-dash lines; and the pitman will move upwardly, into the position indicated by like lines in the same figure. Owing to the guiding action of the system of elements comprising the rod r, the crank-arms o and the turnbuckle p, the path of travel of the pivot-pin r'' will coincide almost exactly with the the perpendicular or vertical, as will also the path of movement of the polish-rod m. By changing the effective lengths of the turnbuckle p and rod r, by turning their body-parts on their longitudinal axes, in a manner well understood, a fine adjustment of the movement of the pin r'' in the vertical may be effected. When the pull on the rod t ceases, the V A and the parts therewith connected will be restored to their initial position (shown by full lines in Fig. 1), by reason of the weight of the long pump-rod and of other pump-parts and of the oil in the well-casing, which weight acts to pull the polish-rod m downwardly towards the well-tubing n'.

I regard the provision of the sole-plate d as an important feature of this invention. For any given length of stroke of the pitman g, the distance between the turnbuckle-pivot p'' and the V-pivot bearings c^x, at the axis of the same, may be figured and accurately determined, and the dimension so determined may be embodied in the sole-plate d, in such manner that the dimension is fixed absolutely beyond possibility of change due to the vicissitudes of service or any other cause, with the result that the pumping-jack will operate just as designed and planned, the paths of travel of the pitman g and the polish-rod m being parallel and coinciding substantially with the perpendicular.

The pitman g and the connecting-rod r of the pumping-jack herein and hereby disclosed may be used with advantage for the replacement, respectively, of the pitman and

the so-called "kick" beam (otherwise known as the walking-beam and as the rock-beam) of a well-known and very old type of pumping jack. Such a substitution or replacement is illustrated in Figs. 8 to 10, wherein there are shown (in somewhat lighter lines than are used for the illustration of the substituted pitman *g* and connecting-rod *r*) the old-time samson-posts *u*, and the braces *v* therefor, there being a pair of such posts *u* and braces *v*; and, between the braces *v*, there is shown, mounted free to rock on its pivot *w*, the old-time V A′, and the pull-rod *t*. Between the tops of the samson-posts *u*, there is mounted a tubular cross-support *x* that is horizontally disposed and extends transversely and is formed with a central guide-channel *x′* the axis of which lies at right angles to the axis of the cross-support (Fig. 9) and which is adapted and designed, and serves, to receive the rear end of the connecting-rod *r*. In the arrangement of parts shown in Fig. 8, the connecting-rod *r* serves as the kick-beam of the pumping-jack, and it is held in its adjusted position by reason of its being engaged by the inner end of the adjustment screw *x″*, which acts after the manner of a set-screw and passes into the cross-support *x* from one end thereof (Fig. 9). The lower end *g′* of the pitman *g* rides in a saddle-block *y* that is carried by the outer front end of the base-member *a** of the V A′. The rod *r* and pitman *g* being of metal construction, they are naturally much more durable and lasting than are the wooden members of the old-time structure that perform the same functions therein.

In accordance with the patent statutes, I have shown and described the preferred form of this invention. However, I desire it to be distinctly understood that I fully realize that changes may be made in the structure herein disclosed and that I intend to include within the scope of the claims that follow hereinafter, all modifications of the preferred form disclosed that do not depart substantially from the spirit thereof. For example, the ends *r*×, *r**, of the rod *r* may be fitted and attached thereto in any suitable way, instead of being screwed thereon in the manner hereinbefore described.

I claim:

1. A post-free and beam-free oil-well pumping-rig devoid of support by the oil-well casing and including a V; a polish-rod-actuating pitman carried by the V; a lever fulcrumed on the V; a link that connects the lever with the pitman; a sole upon which the V is mounted free to rock; and a second link that connects the lever and the sole; the sole being provided with pivot-bearings for the V and the last-named link, and such pivot-bearings being fixed at a predetermined distance apart.

2. A post-free and beam-free oil-well pumping-rig devoid of support by the oil-well casing and including a V; a polish-rod-actuating pitman carried by the V; a lever fulcrumed on the V; a link that connects the lever with the pitman; a sole upon which the V is mounted free to rock; and a second link that connects the lever and the sole and that is provided with means for varying its effective length; the sole being provided with pivot-bearings for the V and the last-named link at a fixed interval apart.

3. A post-free and beam-free oil-well pumping-rig devoid of support by the oil-well casing and including a V; a polish-rod-actuating pitman carried by the V; a lever fulcrumed on the V; a link that connects the lever with the pitman and that is provided with means for varying its effective length; a sole upon which the V is mounted free to rock; and a second link that connects the lever and the sole; the sole being provided with pivot-bearings for the V and the last-named link, and such pivot-bearings being fixed at a predetermined distance apart.

Signed at Oil City, in the county of Venango and State of Pennsylvania, this twenty-fourth day of August, 1922, in the presence of the two undersigned witnesses.

JOHN M. WOLFE.

Signed in the presence of—

H. T. PARKER,

WINIFRED REID.