March 17, 1931. J. B. MERRITT 1,796,469

SPECIAL STANDPIPE REENFORCING FOR DERRICKS

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Fig. 1.

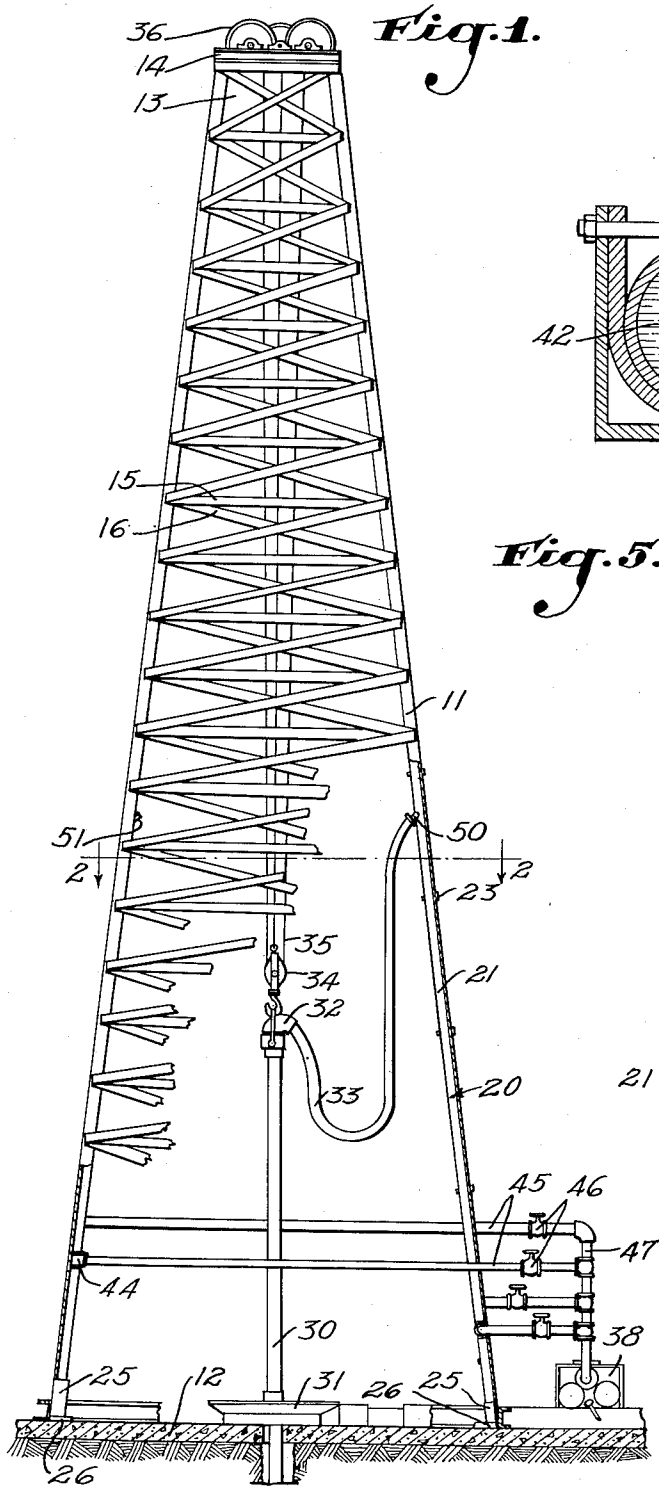


Fig. 4.

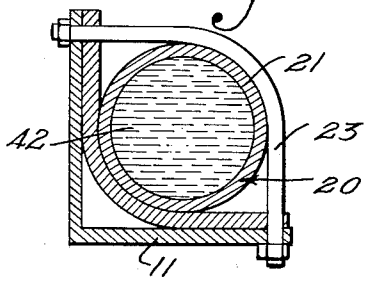
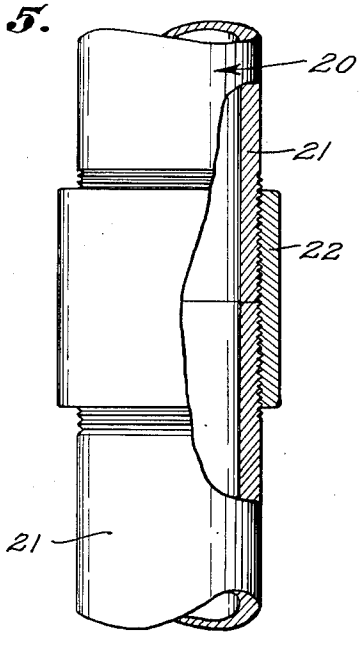


Fig. 5.



INVENTOR:
JOHN B. MERRITT,
BY
Fad A Lamb
ATTORNEY.

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Fig. 5.

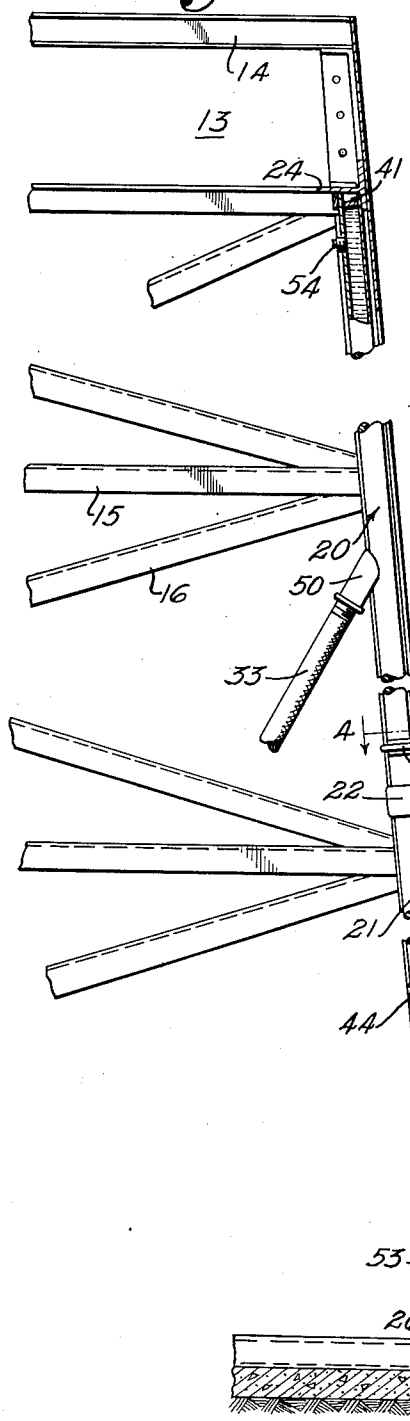


Fig. 2.

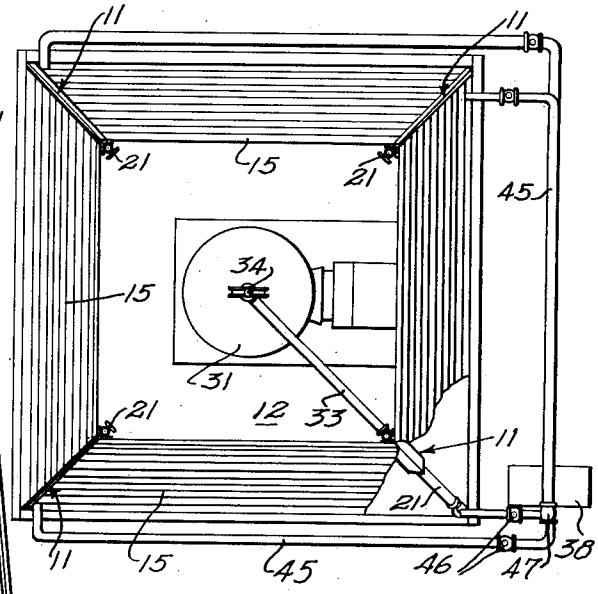
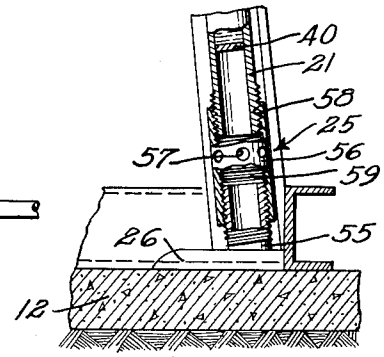


Fig. 6.



INVENTOR:
JOHN B. MERRITT,
BY
Fred W. Lamb
ATTORNEY.

Patented Mar. 17, 1931

1,796,469

UNITED STATES PATENT OFFICE

JOHN B. MERRITT, OF TAFT, CALIFORNIA, ASSIGNOR TO EMSCO DERRICK & EQUIPMENT COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA

SPECIAL STANDPIPE REENFORCING FOR DERRICKS

Application filed March 8, 1927. Serial No. 173,661.

My invention relates to derricks which are used in the oil producing industry.

An oil well is drilled, in the rotary system, by a bit which is screwed to the bottom end of a drill-pipe which extends to a point above the surface of the ground, being rotated by a rotary machine. A swivel-head supports the drill-pipe, being secured to the upper end of it, and a traveling-block supports the swivel-head. During drilling operations rotary mud is delivered to the bit, being forced through the drill-pipe. This rotary mud washes the cutting edges of the bit and carries the cuttings to the surface of the ground. This circulation is accomplished by a slush-pump located at one side of the well-derrick. Extending upward from the slush-pump along the side of the derrick is a standpipe about forty feet long. Connected to the upper end of the standpipe is a hose which is joined to the swivel-head. The hose and standpipe arrangement permits rotary mud to be supplied to the drill-pipe during the lowering of it, without having any hose on the floor of the derrick.

The derrick must endure enormous strains during drilling, but when this is finished and pumping is being done, the only work of the derrick is to carry the pump-tubing when it is "pulled" or replaced. In order to economize on material the Emsco Derrick and Equipment Company of Los Angeles, California, make a light-weight steel derrick which is provided with auxiliary reenforcing legs which are utilized only during the drilling of the well.

It is one of the main objects of this invention to utilize the interior of one of the auxiliary legs as a standpipe, thus eliminating a separate standpipe. Such an arrangement is advantageous because it is less expensive than it is to provide a separate standpipe, and it conserves space.

Another important object of the invention is to provide a steel derrick which, in event of fire, will not be liable to melt. This object is accomplished by filling the auxiliary legs with a liquid such as rotary mud.

Other objects and advantages of the invention will be made evident hereinafter.

Referring to the drawings:

Fig. 1 is an elevational view illustrating the utility of the invention.

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary view showing the invention.

Fig. 4 is a section taken on the line 4—4 of Fig. 3.

Fig. 5 is a fragmentary view showing a joint of the invention.

Fig. 6 is a fragmentary view showing a jack supporting one of the chambered legs of my invention.

The form of the invention illustrated in the drawings includes four main legs 11 which are preferably made of angle-iron and extend from a foundation 12 to an upper structure 13. The upper structure 13 includes the so-called water-table 14. The main legs 11 are connected together by cross members 15 and cross bracing 16, this construction being of the general form utilized in ordinary oil well derricks. The angle-iron legs 11 are made amply strong to take care of any strain which may be imposed on the derrick during the pumping period of the well, but they are not sufficiently strong to sustain the enormous loads necessary to placing or pulling casing, or other operations during the drilling period of the well.

For the purpose of reenforcing the main legs 11 so that the derrick may be used during drilling, auxiliary legs 20 are provided These auxiliary legs 20 preferably consist of heavy pipe sections 21 which are secured together by internally threaded collars 22 (see Fig. 5). The auxiliary legs 20 extend in the corner provided by the two legs of the angle-irons 11 as illustrated in Fig. 4, being retained in these positions by suitable straps 23. The upper ends of the auxiliary legs each extend into a cap or socket 24 which is secured to the upper structure 13 of the derrick. The lower ends of the auxiliary legs 20 are each engaged by a jack 25, which jack 25 has a foot 26 which rests on the foundation 12. Each jack 25 comprises a jack body 55 attached to the foot 26 and a sleeve 56 in which holes 57 are formed, as clearly shown in Fig. 6. The

sleeve 56 has in its upper half internal left handed threads 58 adapted to threadedly receive the lower end of the lowermost pipe section 21 of the auxiliary leg 20, and in its lower half internal right handed threads 59 adapted to threadedly receive the jack body 55. By inserting a bar in the holes 57 and turning the sleeve 56 the auxiliary legs 20 may be moved upward so that they carry any desirable proportion of the load placed on the legs by the upper structure. Extending through the floor of the derrick is a drill-pipe 30 which is rotated by means of a rotary machine 31. The upper end of the drill-pipe 30 is provided with a swivel-head 32 to which a flexible hose 33 is connected. The swivel-head is supported by means of a traveling-block 34, which traveling-block is in turn supported by cables 35 which extend over a crown-block 36 supported by the water-table 14 of the derrick. The derrick has a slush-pump 38 mounted on one side thereof. The construction which has just been described is the ordinary derrick equipment. My invention provides the following construction.

Referring particularly to Fig. 3 the lower ends of the auxiliary legs 20 are provided with lower heads 40 which are preferably welded in place so as to provide a fluid-tight joint. The upper ends of the auxiliary legs 20 are provided with upper heads 41 which are welded in place so as to be fluid-tight. The auxiliary lebs 20 are thus formed into tight liquid chambers 42. Fittings 44 are connected in the auxiliary legs 20 near the lower ends thereof so that feed pipes 45 having shut-off valves 46 may be connected thereto. Each of the feed pipes 45 connects to a main pipe 47 which is connected to the slush pump 38. In Fig. 1 four feed pipes 45 are shown, each extending to one of the auxiliary legs 20. These pipes may be extended as desired, and it should be understood that the illustrations in the drawings are principally diagrammatic.

About forty feet from the ground level nipples 50 are connected to the auxiliary legs 20, such as by welding, in communication with the chambers 42. One or more of the auxiliary legs 20 may be used for supplying rotary mud to the drill-pipe 30. In the drawings, however, only one of the auxiliary legs is being utilized; therefore, the flexible hose 33 is connected to only one of the nipples 50, the other nipples being closed by the pipe caps 51. Near the lower ends of the chambers 42 the auxiliary legs 20 are provided with drain plugs 53 whereby sediment may be drained from the chambers. The upper ends of the chambers 42 are connected to the exterior by means of openings in the auxiliary legs which are ordinarily closed by a plug 54. When first supplying fluid to the chambers 42 the plugs 54 are removed so that the air may escape from the upper ends of the chambers.

During drilling operations the drill-pipe 30 is rotated by the rotary machine 31, and the slush-pump 38 is set into operation. The valve 46 in the feed pipe 45 of the auxiliary leg which is being utilized as a standpipe is open, and rotary mud passes therethrough to the associated chamber 42. The rotary mud passes from this chamber 42 through the flexible hose 33 into the upper end of the drill-pipe 30.

The invention entirely eliminates the necessity of a separate standpipe which ordinarily is extended upward along the side of the derrick. This is somewhat of a saving, but most important of all it conserves space, the operator not having to worry about the standpipe when he is operating the different apparatus of the derrick.

It is desirable as a precaution against fire to keep all of the auxiliary legs filled with rotary mud, this being done by opening all of the valves 46 and removing all of the plugs 54 so that the chambers 42 may be filled with rotary mud. When the rotary mud begins to flow from the upper ends of the auxiliary legs the valves 46 may be closed and the plugs 54 replaced. This retains a body of cooling fluid in the legs at all times, and in case of fire the derrick is somewhat protected. If desired, the plugs 54, with the exception of the auxiliary leg which is being used as a standpipe may be removed, so that in case of fire the valves 46 may be open and rotary mud forced from the upper part of the derrick over the various structures to protect them as much as possible.

This feature of the invention is quite important and will prevent the derrick from melting, which sometimes occurs when there is a fire.

In the foregoing description the auxiliary legs 20 are used only to support a portion of the weight of the upper structure 13. It should be understood that my invention is not limited to a construction of this nature but may be embodied in a derrick having only single legs in which chambers may be provided. For this reason I wish my invention to be construed in the light of the following claims.

I claim as my invention:

1. In combination: a derrick having primary and secondary legs, one of said legs providing a chamber; a pump; means for connecting said pump to said chamber; a drill-pipe; and a flexible hose connected to said drill-pipe and said chamber.

2. In combination: a derrick having main legs, and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from pipe, and one of said auxiliary legs providing a closed chamber; a pump; means for connecting said

pump and said closed chamber; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose connected to said closed chamber and said swivel-head.

3. In combination: a derrick having main legs, and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from pipe, and one of said auxiliary legs providing a closed chamber; means for releasing air from the upper end of said closed chamber; a pump; means for connecting said pump and said closed chamber; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose connected to said closed chamber and said swivel-head.

4. In combination: a derrick having main legs, and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from pipe, and one of said auxiliary legs providing a closed chamber; means for draining sediment from the lower end of said closed chamber; a pump; means for connecting said pump and said closed chamber; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose connected to said closed chamber and said swivel-head.

5. In combination: a derrick having main legs, and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from pipe, and one of said auxiliary legs providing a closed chamber; means for releasing air from the upper end of said closed chamber; means for draining sediment from the lower end of said closed chamber; a pump; means for connecting said pump and said closed chamber; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose connected to said closed chamber and said swivel-head.

6. In combination: a derrick having main legs and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from lengths of pipe providing fluid receiving chambers therein; a pump; means for connecting said pump with said chambers; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose adapted for selectively connecting one of said chambers and said swivel-head.

7. In combination: a derrick having main legs and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs being formed from lengths of pipe providing fluid receiving chambers therein; means for releasing air from the upper end of said chambers; a pump for supplying fluid to said chambers; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; and a hose for connecting one of said chambers and said swivel-head.

8. In combination: a derrick having main legs and auxiliary legs for supporting part of the weight carried by said derrick, said auxiliary legs providing fluid receiving chambers; means for connecting together said chambers; a pump; means for connecting said pump and said chambers; a drill-pipe having a swivel-head supporting and connecting said drill-pipe and said derrick; a hose for connecting one of said fluid chambers and said swivel-head; and means for releasing fluid from said chambers in a manner to overflow a part of said derrick.

In testimony whereof, I have hereunto set my hand at Taft, California, this 28th day of February, 1927.

JOHN B. MERRITT.