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2,293,958

NARROW BOTTOM TILTABLE MAST

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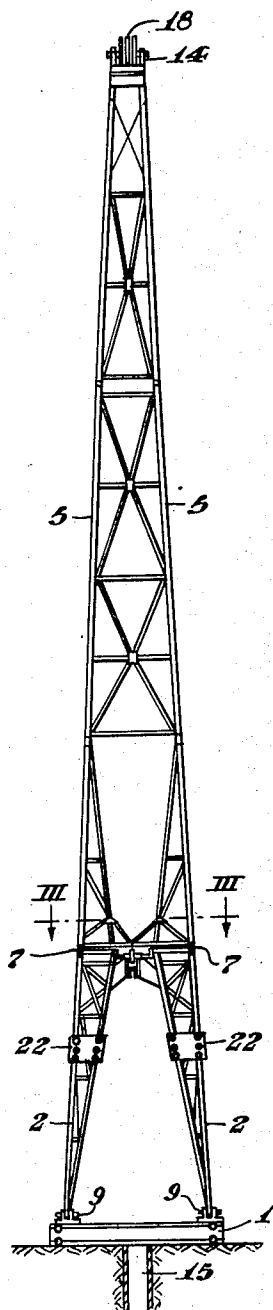


Fig. 2

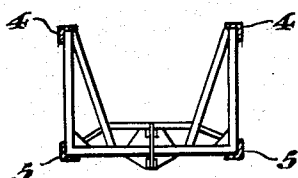


Fig. 3

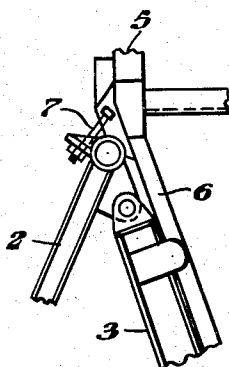


Fig. 4

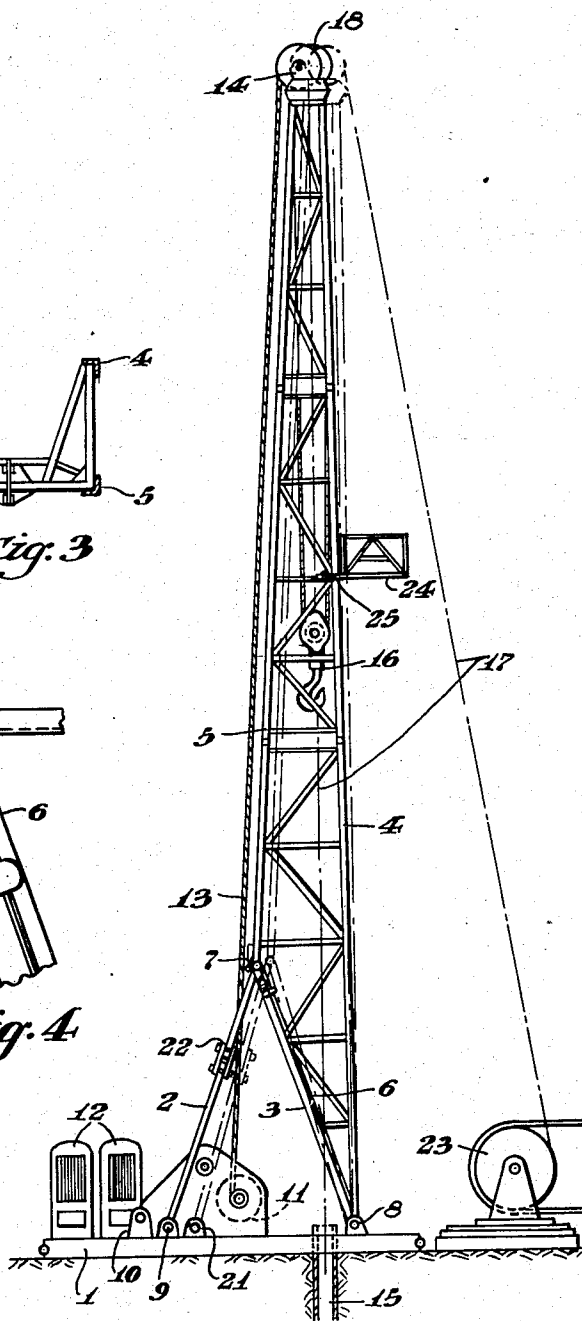


Fig. 1

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NARROW BOTTOM TILTABLE MAST

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4 Claims. (Cl. 189—15)

This invention relates to oil well masts or derricks, and more particularly to the general type shown in Patent No. 2,225,561 to Charles L. Henry.

The bottom of the ordinary oil well derrick or mast is relatively wide and the draw-works is located between its two rear legs so that the driller, who stands at one end of the draw-works, can operate the draw-works controls and see up through the mast to the top. A practical portable mast, on the other hand, should have a relatively narrow bottom so that it can be readily transported from one well to another, but this presents a problem because there is not sufficient room between the draw-works and rear legs of the mast for the driller to stand at one end of the draw-works, and there even may not be enough room for the draw-works itself. Another difficulty with the conventional mast is that it is sometimes desirable or necessary after drilling with rotary equipment to change over to reciprocating impact drilling to bring the well in, but in such a case the crown-block first must be changed or its position shifted in order to bring the drilling cable into line with the center of the well because that cable extends down from the periphery of a sheave of the crown-block while the traveling block that supports the drill stem of the rotary equipment hangs beneath the axis of the sheave.

It is among the objects of this invention to provide an oil well derrick structure having a narrow bottom which is formed to accommodate draw-works of various sizes and the driller in their customary locations, and which is suitable for both rotary and impact drilling without requiring the crown-block to be changed or moved relative to the mast.

In accordance with this invention a mast, preferably formed of two independent complementary overlapping sections of different heights detachably connected together, is mounted on a working platform. The bottom of the mast is relatively narrow and its front legs are hinged to the platform. To permit the draw-works to be mounted in its customary position with room at the end of it for the driller to stand, the lower portions of the rear legs extend rearwardly at an oblique angle to their upper portions so that the downwardly diverging front and rear sides of the short section of the mast are wide apart at their lower ends with no mast obstruction between them. The draw-works sits in this space beneath the back side of the tall section of the mast. To change from rotary to impact drilling

the lower ends of the short section's rear legs, which are pivoted where they join the tall section of the mast, can be swung forward and attached to the working platform at points nearer the front legs. Or, the lower portions of the rear legs can be made extensible. In either case the top of the mast is swung forward the amount necessary to bring the impact drilling line in the mast into line with the center of the well. If extra large draw-works is being used the lower ends of the short section's rear legs can be swung rearwardly to provide more room between them and the front legs.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which Fig. 1 is a side view of our derrick structure; Fig. 2 is a view of the derrick from the draw-works side; Fig. 3 is a horizontal section taken on the line III—III of Fig. 2; and Fig. 4 is an enlarged fragmentary side view of the connection of the top of the short section to the tall section of the mast.

Referring to Figs. 1 and 2 of the drawing, the bottom of an oil well derrick or mast is shown mounted on a working platform 1 so formed as to be slidable along the ground or transportable from one location to another if desired. The mast is made in two independent structural sections detachably connected together. One of these sections is relatively short and includes the lower portions 2 of the two rear legs of the mast with suitable bracing members connected thereto. As seen in Fig. 1 these short legs 2 are supported by inclined braces 3 connected to the working platform. The upper ends of the braces 3 and legs 2 are pivotally connected together as shown in Fig. 4.

The other or tall section of the mast consists of the remaining portion thereof and includes the front legs 4 which are mounted on the working platform, and the upper portions 5 of the rear legs. To help support and brace these rear legs diagonal braces 6 are connected thereto and to the lower ends of the front legs. The adjacent ends of the rear legs 2 and 5 are connected together in any suitable manner, such as by swinging eye-bolts 7 permanently connected to the tall section of the mast and detachably connected to the top of the short section as shown in Fig. 4. Due to the formation of the mast in the two independent but detachably connected sections just described it can be erected by fabricating or assembling it along the ground and then raising it to upright position. For this purpose the lower ends of the front legs and braces 3 are detachably

connected to the working platform by hinges 8 to permit them to be swung in a vertical plane when the two sections are not connected together and when the short rear legs 2 are disconnected from hinges 9 by which they normally are attached to the platform. After the short section has been swung up into upright position and legs 2 connected to hinges 9, the tall section can be swung upwardly in any suitable manner for attachment to the short section, but preferably in the manner disclosed in our copending application Serial No. 407,923, filed August 22, 1941; now Patent No. 2,271,578.

The draw-works for the well is shown mounted on the working platform and includes a hoisting drum 11 which is rotated by suitable engines 12. A cable 13 extends from the drum up over the crown-block 14 and down into the mast where it suspends directly over the well 15 a traveling block 16 for supporting the drill stem used in rotary drilling.

It is a feature of this invention that although the bottom of the mast is not much wider than the draw-works, there is plenty of room for the driller to stand in his usual position at one end of drum 11. This is because the lower portions 2 of the rear legs that form the rear side of the short section of the mast extend rearwardly at an oblique angle to their upper portions 5 so that those legs are behind the position occupied by the driller which is just about where the rear legs would be if they were straight from top to bottom of the mast as in conventional oil well masts. Our construction gives the driller a relatively large unobstructed space in which to work.

Another feature of this invention is that the outwardly extending rear legs 2 and the hinge connections of the mast to the platform permit the mast to be quickly and easily changed from rotary to impact drilling. This is accomplished by tilting the mast forward to the broken line position of Fig. 1 to bring a drilling cable 17 (in broken lines) hanging from one of the center sheaves 18 of the crown-block in vertical alignment with the center of the well. For this purpose the working platform is provided with brackets 21 between hinges 8 and 9 for receiving the lower ends of the rear legs at points a short distance in front of hinges 9 in which they are normally mounted. When legs 2 are swung forward to brackets 21 they necessarily swing the entire mast forward. Another way of tilting the mast for this purpose or for merely adjusting the position of the crown-block relative to the center of the well, is to make the short rear legs 2 in two sections so that they can be lengthened. This can be done in many different ways, the drawing showing merely for the purpose of illustration the two sections of each leg detachably connected by plates 22 bolted through the leg.

The drilling cable 17 extends down from the crown-block to a bull wheel 23 mounted in front of the mast. Due to the small cross-sectional area of the mast the tubing platform 24 is mounted outside of the mast and the front side of the mast is open, as shown in Fig. 3, so that tubing and the like can be swung out of the mast and racked in the tubing platform. This platform preferably is pivotally attached to the front legs of the mast at 25 so that it can be folded

up against the mast when the mast is lowered.

A still further feature of the invention is that if it is desired to use an extra large draw-works that would not fit between the front and rear legs of the mast, the lower ends of the short rear legs 2 can be swung rearwardly to increase the space between front and rear legs. The rear legs are then fastened to brackets 18 behind hinges 9.

According to the provisions of the patent statutes, we have explained the principle and construction of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. An oil well derrick structure comprising a narrow working platform, a mast mounted on the platform and having front and rear legs, means hinging the front legs to the platform, the lower ends of the rear legs being pivoted relative to their upper portions and being attached to said platform at points spaced rearwardly of the plane of said upper portions, and means on said platform for attaching said rear legs thereto at points closer to the front legs whereby to swing the top of the mast forward.

2. An oil well derrick structure comprising a narrow working platform, a mast mounted on the platform and having front and rear legs, means hinging the front legs to the platform, the lower ends of the rear legs being pivoted relative to their upper portions and being attached to said platform at points spaced rearwardly of the plane of said upper portions to provide adequate working space in the bottom of the mast for draw-works rotary drilling, the lower portions of said rear legs being extensible whereby to swing the top of the mast forward for impact drilling.

3. An oil well derrick structure comprising a narrow working platform, a mast mounted on the platform and having front and rear legs, means hinging the front legs to the platform, the lower ends of the rear legs being pivoted relative to their upper portions and being attached to said platform at points spaced rearwardly of the plane of said upper portions, and means on said platform for attaching said rear legs thereto at points farther from the front legs whereby to provide more space for draw-works between the front and rear legs.

4. An oil well derrick structure comprising a narrow working platform, a mast mounted on the platform and having front and rear legs, the lower ends of the rear legs being pivoted relative to their upper portions, and means on said platform for attaching said rear legs thereto at a plurality of predetermined points spaced different distances rearwardly of the plane of said upper portions of the rear legs, whereby to permit the distance between the lower ends of the front and rear legs to be varied.

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