July 26, 1966 C. JENKINS ETAL 3,262,237

OIL WELL DRILLING APPARATUS WITH HIGH FLOOR IN MAST AND GIN POLE

Filed Feb. 12, 1964 2 Sheets-Sheet 1

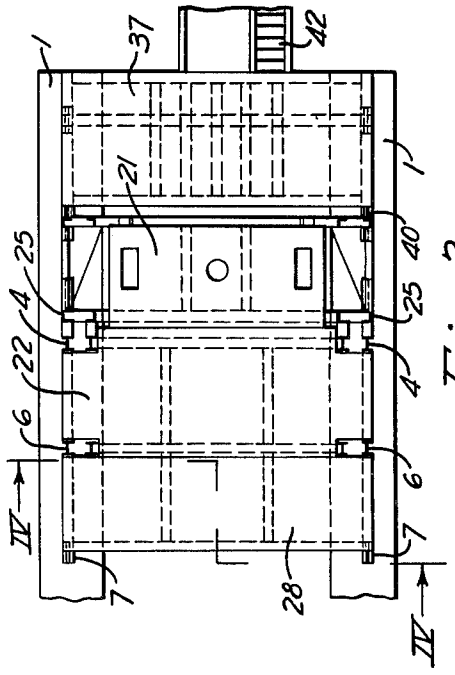


Fig. 3

Fig. 1

Fig. 4

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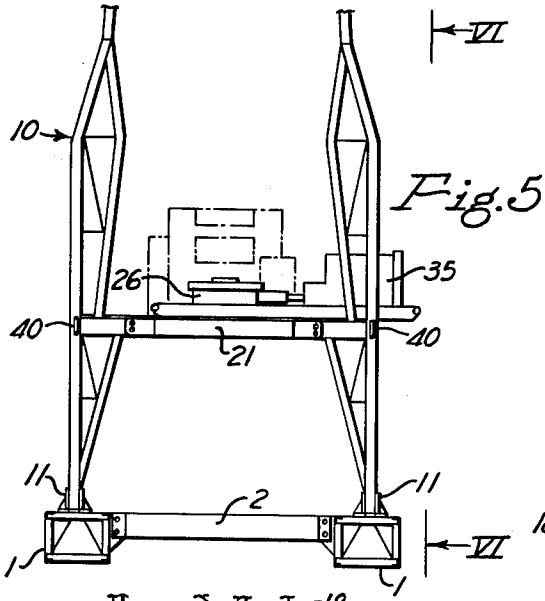


Fig. 5

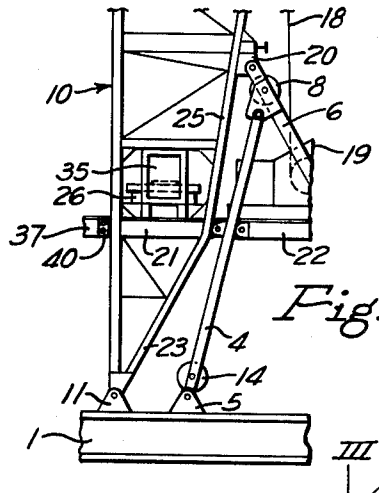


Fig. 6

Fig. 2

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OIL WELL DRILLING APPARATUS WITH HIGH FLOOR IN MAST AND GIN POLE

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5 Claims. (Cl. 52—116)

This invention relates to oil well drilling apparatus, and more particularly to the gin pole and pivoted mast type of apparatus where the drawworks and rotary table are supported at a high elevation.

Masts that are hinged at their lower ends to bases to permit them to be swung up from a reclining to an erect position against gin poles are well known. For drilling deep wells, it is customary to use a tall substructure so that the rotary table and drawworks can be supported at a high elevation. Such substructures are massive affairs that are very expensive to construct, and in most cases the gin pole and mast must be lifted to the top of the substructure and seated thereon, which adds to the cost and labor involved.

It is among the objects of this invention to provide oil well drilling apparatus, in which the drawworks and rotary table can be located many feet above the ground even though the mast and gin pole are mounted on a relatively inexpensive low base instead of a tall substructure, in which the drawworks and rotary table can be supported by the mast and gin pole, in which the mast is suitable for use with a rotary table drive independent of the drawworks, and in which a pipe setback support can be raised into position by the travelling block.

In accordance with this invention, an upwardly tapered gin pole is mounted on a base having front and rear ends. Disposed above the base in front of the gin pole is an upright mast, the lower end of which is pivotally supported on the base so that the mast can be swung forward and down to reclining position in front of the gin pole after the two have been disconnected from each other. The mast is so arranged that a floor can be disposed inside of it and supported by it in an elevated position above the base, while a floor may be carried by the gin pole itself behind the mast floor for supporting the drawworks. A tall substructure therefore is unnecessary. The bracing at one side of the mast is arranged to leave an open bay for reception of a power unit to drive the rotary table. The pipe setback support is lifted into place by the travelling block after the mast has been erected.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a side view of our apparatus with the mast in reclining position;

FIG. 2 is a similar view but with the mast raised and the pipe setback added;

FIG. 3 is a horizontal section taken on the line III—III of FIG. 2;

FIG. 4 is a fragmentary vertical section taken on the line IV—IV of FIG. 3;

FIG. 5 is a fragmentary front view of the mast taken on the line V—V of FIG. 2 and showing the rotary table in place; and

FIG. 6 is a fragmentary side view of the lower portion of the mast viewed from the side opposite to that shown in FIG. 2; likewise with the rotary table in place.

Referring to the drawings, a base or low substructure is formed from laterally spaced parallel base members **1** constructed from structural steel. Each base member may be an elongated box-like structure. The base members may be rigidly connected by suitable cross members **2**. Mounted on the substructure is a gin pole **3**, which tapers upwardly as viewed from the side. The two sides

of the gin pole are independent of each other, each being mounted on a different base member. Each side of the gin pole is formed from a pair of legs that are inclined upwardly toward each other. The lower ends of the front legs **4** are supported in shoes **5** mounted on the substructure, while their upper ends are connected to the upper ends of the rear legs **6**. The lower end of each rear leg is supported by a shoe **7** mounted on the substructure. Journaled on a horizontal axis in the top of each side of the gin pole is a sheave **8**.

As shown in FIG. 1, a cantilever type drilling mast **10** reclines in front of the base and has its feet pivotally mounted in shoes **11** supported by the base. In order to swing the mast from its reclining position up to an upright position against the gin pole, the ends of a cable forming a sling **12** are detachably connected to brackets **13** mounted on the upper side of the reclining mast. The sling extends backward and down around gin pole sheaves **8** and then down around the back of a lower pair of sheaves **14** supported by the lower ends of the front legs of the gin pole. From these sheaves the sling extends forward into the mast and is looped over the hook of the travelling block **15**. The travelling block is connected by the usual lines **16** to the crown block **17** (FIG. 2) at the head of the mast, and the fast line **18** from the crown block extends back over the reclining mast to suitable drawworks **19**, to which the line is attached. When the drawworks is operated to reel in the fast line, the travelling block will be pulled toward the head of the mast to cause the sling to swing the mast upward and backward to upright position against the gin pole, the upper end of which then is detachably connected to brackets **20** projecting from the back of the mast as shown in FIG. 2. The sling is then disconnected from the travelling block and mast and put aside until it is time to swing the mast down to the ground again.

One of the features of this invention is that a floor and rotary table support **21** can be permanently mounted inside the mast itself the desired distance from the mast shoes so that the floor will be lifted to the proper height when the mast is swung upwardly. In this particular case it is desirable to locate the floor below the level of the top of the gin pole so that the apparatus can incorporate another feature, which is a supporting floor **22** for the drawworks supported by the gin pole itself behind the mast floor. However, in the ordinary cantilever mast construction known heretofore the foot of the mast generally is connected to the same shoes that support the front feet of the gin pole, so the lower portions of the rear legs of the mast are inclined in a straight line from the heel of the mast, which is at the top of the gin pole, forward and down to the lower ends of the front legs of the mast. This leaves very little depth from front to back in the mast at levels below the top of the gin pole, so there would not be enough room in the mast to support a rotary table.

It is therefore another feature of this invention that the depth of the mast is increased at the level of the floor **21** sufficiently to accommodate a rotary table. Accordingly, the shoes **11** that support the mast are disposed several feet in front of the front shoes of the gin pole, and the rear legs of the mast are formed from three different sections. As shown in FIG. 2, the lowest rear leg sections **23** are inclined from the mast shoes upwardly and rearwardly across the space between the shoes and the gin pole to about the level of the mast floor. The long upper rear leg sections **24** start several feet above the top of the gin pole and extend straight up to the top of the mast. The intermediate rear leg sections **25** are inclined from the lower ends of the upper sections downwardly and forwardly to the upper ends of the lowest

sections. This construction fattens the mast at the level of its floor so that a rotary table **26** can be mounted inside the mast.

Since the distance from front to back of the elevated floor **22** in the gin pole will necessarily be relatively short, due to the taper of the gin pole, a floor extension **28** is added in order to provide sufficient area for supporting the drawworks. The front end of the extension is secured to the rear gin pole legs and floor **22**, while its rear end is mounted on vertical posts **29**, the lower ends of which are connected to the lower ends of the rear legs of the gin pole. Consequently, the floor extension overhangs the back of the gin pole.

Since the working floor in the gin pole is never likely to be large enough to accommodate engines for driving the drawbacks, this invention may be limited to situations in which the drawworks is to be located at a height that is close enough to the base to permit the drawworks to be operatively connected by a mechanical drive **30** to engines **31** mounted on the base behind the gin pole. For greater heights, a tall substructure is recommended. Of course, in any event, in the apparatus disclosed herein the supports for the drawworks and rotary table must be some distance below the head of the gin pole, regardless of how tall the gin pole may be. It should be clear that supporting the working floor by means of the mast and gin pole themselves is much simpler and cheaper than constructing a separate tall substructure and then mounting the gin pole and mast on it.

As it sometimes is desirable to drive the rotary table from its own power supply rather than from the drawworks, either continually or in emergencies when the drawworks may be out of operation temporarily, the mast has at only one side the usual inclined brace **33** (FIG. 2) extending across the bay formed between the mast floor and the horizontal brace **34** above it. Such an inclined brace is omitted at the opposite side of the mast, as shown in FIG. 6, so that an open unobstructed bay is provided, through which an independent rotary table power plant **35** on floor **21** beside the table can extend as shown in FIG. 5.

After the mast has been raised and attached to the gin pole, the travelling block can be used to raise into place the pipe setback support **37** that is mounted on legs **38** shown in FIG. 2. This setback support, while still on the ground, may be attached to the front ends of legs **38**, which will be in a reclining position at that time with their rear ends detachably pivoted to shoes **39** on the front end of the substructure. A line (not shown) from the travelling block then is hooked onto the setback support to swing it upward and backward until its rear end can be fastened to brackets **40** projecting from the front of the mast. The mast and the legs **38** will support the pipe setback support at the level of the rotary table support **21**. The working floor of the mast thus extends from the front of the setback support to the back end of floor extension **28**.

A stairway **42** may be erected at the front of the pipe setback support, either by lifting it by the travelling block after the setback support has been raised, or by hinging it to that support and pulling them up together.

We claim:

1. Oil well drilling apparatus comprising a base having front and rear ends, a gin pole mounted on the base having upwardly tapered sides, an upright mast disposed above the base in front of the gin pole, means pivotally supporting the lower end of the mast on the base so that the mast can be swung forward and down to reclining position in front of the gin pole, means detachably fastening the upright mast to the gin pole, a floor mounted in and supported by the gin pole a considerable distance above said base and having a machinery-receiving area between said gin pole sides, and a floor mounted in and supported by the mast in front of said gin pole floor.

2. Oil well drilling apparatus comprising a base having front and rear ends, an upwardly tapered gin pole mounted on the base having rearwardly inclined front legs, mast shoes mounted on said base in front of the gin pole and spaced therefrom, an upright mast having substantially vertical front legs pivotally mounted at their lower ends in said shoes, the mast having lower rear leg sections inclined from said shoes upwardly and rearwardly across the space between the shoes and gin pole to points adjacent the central portions of the front legs of the gin pole, the mast having upper rear leg sections extending upwardly above the top of the gin pole to the top of the mast, the mast having inclined intermediate rear leg sections connecting said upper and lower leg sections, means detachably fastening the mast to the gin pole, and a rotary table support built into the mast at substantially the level of the upper ends of said lower rear leg sections.

3. Oil well drilling apparatus according to claim **2**, in which an elevated floor is built into the gin pole directly behind said rotary table support.

4. Oil well drilling apparatus according to claim **2**, including an elevated floor supported by the gin pole behind said rotary table support and overhanging the back of the gin pole.

5. Oil well drilling apparatus comprising a base having front and rear ends, an upwardly tapered gin pole mounted on the base, an upright mast disposed above the base in front of the gin pole, means pivotally supporting the lower end of the mast on the base so that the mast can be swung forward and down to reclining position in front of the gin pole, means detachably fastening the upright mast to the gin pole, a rotary table support disposed inside the mast and supported thereby in an elevated position above said base, a horizontal brace extending across each side of the mast several feet above said support, and an inclined brace extending diagonally across the space between one of the horizontal braces and said support, the space between the other horizontal brace and the rotary table support being open to accommodate a rotary table power plant.

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