UNITED STATES PATENT OFFICE

2,420,803

MOVABLE COMBINATION DERRICK FLOOR
AND ENGINE BASE

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Application April 29, 1946, Serial No. 665,836

3 Claims. (Cl. 189—21)

1. This invention relates to means whereby an entire derrick, together with its various appurtenances, rotary machine, drilling engine, drawworks, slush pumps, etc., may be readily moved from one location (at which a well has been drilled) to another location (where drilling of another well may be immediately commenced) without the necessity of dismantling the rig.

As is well known, the drilling of oil and other deep wells involves the use of large and heavy machinery. Heavy duty, rotary derricks, for example, may weigh from thirty thousand to one hundred thousand pounds, and this does not take into consideration the weight of the equipment such as rotary machine, drawworks, drilling engine, slush pumps, mud tanks, mud screens, etc., which are ordinarily employed with a derrick during drilling. In the past, drilling derricks have been moved by being skidded from their foundations on to another not distant location, but the skidding of a one hundred twenty foot derrick is a dangerous and unsatisfactory method and requires the separate movement or transportation of most of the equipment ordinarily used with a derrick.

Because of the tremendous weights involved, the height of a derrick, and the numerous forces which are set up in the derrick structure, transportation of a complete derrick, together with its floor, drawworks, and normally employed machinery, has not been deemed possible heretofore. As a matter of fact, the normal construction includes foundations which are fixed, the derrick corners being generally made of concrete, the legs of the derrick being suitably bolted to the concrete. As a result, no one has previously contemplated moving an entire derrick together with its floor and sub-floor.

The present invention is directed to a grillage frame or base movably supported upon parallel, horizontally extending rails, the rails straddling the normal cellar above which drilling operations are usually conducted. The grillage frame includes a floor or support upon which the entire derrick is mounted and also includes adequate provision for the support of the necessary equipment, such as rotary machine, draw works, drilling engines, etc. The grillage frame may extend rearwardly for a sufficient distance to accommodate not only the drill engine but also mud tanks, mud pumps and mud screens so that all of the equipment employed in rotary drilling is mounted upon the movable frame. The frame is of sufficient height so that adequate room is left beneath the derrick for control gates, the Christmas tree and its accompanying valve and fittings within the cellar. The entire base frame or grillage is movably mounted upon the rails so that the entire derrick, together with its equipment may be moved along the rails from a location above one cellar to another location where the forward progress of the derrick is stopped in position above a previously prepared cellar and conductor pipe therein so that drilling may be initiated at the new location without waste of time.

In order to permit movement of this tremendous mass of equipment in a controllable and efficient manner, means have been provided whereby the load is distributed effectively and the entire derrick may be moved with but a slight expenditure of power without skidding or appreciable loss of power due to friction.

It is an object of the present invention, therefore, to disclose and provide a movable, combination derrick floor and engine base by means of which a complete drilling rig, together with its appurtenances, may be moved from one location to another.

A further object of the invention is to disclose and provide means for movably supporting a complete derrick and its appurtenant machinery without undue frictional loss.

These and other objects of the invention will become apparent to those skilled in the art from the following detailed description of an illustrative embodiment of the invention. For purposes of illustration, reference will be had to the appended drawings, in which

Fig. 1 is a side elevation.
Fig. 2 is a rear elevation.
Fig. 3 is an enlarged perspective view of a section of a lower bearing beam or sill.
Fig. 4 is a transverse section taken through the means illustrated in Fig. 3.

By referring to Figs. 1 and 2, it will be noted that the entire combination derrick floor and engine base supports a derrick generally indicated at 1, a rotary table indicated at 2, a draw works, schematically shown at 3, a drilling engine indicated at 4, mud tanks indicated at 5, a suitable mud screen indicated at 6, and slush pumps 7. In the preferred form of construction, the movable base, generally indicated at 8, consists of a lower grillage 11 of structural steel and an upper grillage 12, the entire assembly being supported upon rails 13 and 14, the rails being parallel and suitably mounted upon concrete or other footings so as to straddle the cellar 16.

The lower grillage 11 includes a plurality of longitudinally extending, parallel, spaced, load-
bearing beams or sills such as 17, 18, 19, and 20. The outer load-bearing beams 17 and 18 (adja-
cent the sides of the assembly) are directly above and parallel to the rails 13 and 14 and suitable roller, anti-friction means 23 and 24 are carried by the lower surfaces of these load-bearing beams so as to permit the entire assembly to move along the rails 13 and 14.

The longitudinally extending, load-bearing beams are connected by a plurality of transverse-
ly extending members such as 22, 28, and the like. The interconnected between the longitudinal and transverse elements of the grillage may be accomplished by the use of welding, fish plates, angles, or in any other suitable manner well known to structural engineers.

The upper grillage 12 also includes parallel, spaced, longitudinally extending beams such as 27 and 28 interconnected by transversely extending members. The upper surface of the upper grillage may carry floor beams such as 30 and 31 adapted to adequately support the weight of the casing, drill pipe, drill stem and tools.

Vertical columns such as 32, 33, 34, and 35 connect the longitudinal members of the upper grillage with the bearing beams such as 17 and 18 of the lower grillage. In addition, truss mem-
bers such as 37 may connect the upper and lower grillages and give stability to the structure. The total height of the base frame from the head of the rail 14 to the floor beams 30 may be six to eight feet, thereby affording adequate room between the drilling floor and the top of the collar.

In the central portion of the combined grillage means are provided for supporting the rotary mechanism. Such means may, for example, include the very heavy channel or I-beam members such as 39 and interconnecting members 49 so that the weight of the drill stem and the rotary table may be adequately supported in position above the conductor pipe. The lower grillage may extend forwardly so as to form a support for the floor 41, thereby permitting the mud tanks to be carried by the grillage at a lower level than the derrick floor, thereby allowing the circulating mud to be screened and returned by gravity to the mud tanks before being pumped back into the well.

This complete derrick support, floor, and engine base are carried upon a multiplicity of anti-fric-
tion means such as 23 and 24 interposed between outer longitudinally extending bearing beams or sills 17 and 18 and the spaced, parallel rails 13 and 14. Details of construction of an illustrative form of such anti-friction means are shown in Figs. 2 and 4, and attention will be drawn to certain im-
portant relationships which must be maintained in order to permit successful movement of the entire derrick and its equipment from one loca-
tion to another.

In the first place, the rail 14 should be heavy so as to adequately support the weight and must be firmly fixed to the device or concrete upon which the rail is supported. The lower face of the load-bearing beam 18 should be appreciably wider than the head width of the rail 14 and it has been found that the lower face of the beam 18 should be not less than twice as wide as the head of the rail and preferably three or four times as wide.

Each of the anti-friction means, such as the one indicated in general by the numeral 24, comprises a bearing block 44 attached to the lower surface of the load-bearing beam 18 in any suitable manner, as for example, by the machine screws 45. The lower surface of the bearing block 44 is provided with a plurality of semicircular, transverse recesses such as the one indicated at 46, such recesses extending from side to side of the bearing block. Each of these recesses is adapted to receive a solid roller 47 and each roller has a length of not less than twice and preferably three or four times the width of the head of the rail 14. As best shown in Fig. 4, the roller 47 extends beyond the head of the rail 14 on both sides. It is to be understood that where reference is made to "semicircular" this reference is made to any recess having a curvature adapted to readily receive and contact a roller such as 47, whether the center of curvature of such recess is coincident with the roller surface of the block 44 or slightly outside such surface.

The block 44 is also provided with channels or passageways 48 leading to the semicircular re-
cesses 46. Endwise movement of the rollers 47 within the recesses of the bearing block 44 is restrained by means of restraining members 50 and 51 attached to the sides of the bearing block as by means of bolts or machine screws 52. The restraining members 50 and 51 are provided with apertures in alignment with the passageways 48, the apertures being provided with lubrication fittings 53 into which grease or other lubricant may be introduced under pressure from the passageways 48 and thereby lubricate the surfaces of the roll-
ers 47 in contact with the recess 46.

Each bearing block 44 is also provided with an end piece or pieces 54 and 55, these end pieces being connected to the bearing block 44 as by means of bolts 56. The lower edge of each end block, such as 54, is provided with a recess 57 adapted to loosely receive the head of the rail 14, is being understood that the end plates 53 and 55 extend downwardly below the head of the rail 14. Transverse movement of the entire as-
sembly is therefore prevented or limited by these end plates 54, 55, etc.

The description given heretofore is applicable to each of the anti-friction means carried by the longitudinally load-bearing means or sills 17 and 18, and, as previously stated, a multiplicity of such means is provided, it having been found desirable to use one of such means under each of the vertical columns connecting the lower and upper grillage above the rails 13 and 14.

It will be noted from a consideration of Fig. 4 that the total load is transmitted to the upper surfaces of the rollers 47. The entire semi-circu-
lar recess 46 is subject to the load. This load is transferred by the roller to a rather limited area on the head of the rail. As previously stated, the head width of the rail is not less than one half and preferably one third or one fourth the length of each recess or roller. As a result, the rollers 47 will readily rotate within their re-
cesses since the recesses are well lubricated and the pressure per square inch is relatively low. Since the rotation of the rollers 47 is facilitated in this manner, the entire assemblage, including derrick, draw works and all other equipment, may be readily pulled along the rails 13 and 14 by any relatively small prime mover as soon as the blocks or other aggs employed in anchoring the derrick upon its rails have been removed.

I claim:

1. A movable, combination derrick floor and engine base comprising: a structural steel grillage of a width adapted to receive and support a derrick and drilling machinery, said grillage in-
cluding parallel, longitudinally extending bot-
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5 tom bearing beams adjacent its sides; a pair of horizontal, parallel rails having a head width smaller than the width of the longitudinally extending bearing beams, said rails being in alignment with and beneath each of the bottom bearing beams; a plurality of bearing blocks carried by the bottom of each of the outer bearing beams, each bearing block being not less than twice the width of the head of the rail, the lower surface of each bearing block including a plurality of semicircular, transverse recesses; a roller in each recess and in contact with the head of the rail, each roller having a length of not less than twice the width of the rail head; means for restraining longitudinal movement of each roller in its recess; and means for supplying lubricant to each recess.

3. A movable, combination derrick floor and engine base comprising: a structural steel grillage of a width adapted to receive and support a derrick and drilling machinery, said grillage including parallel, longitudinally extending bottom bearing beams adjacent its sides; a pair of horizontal, parallel rails having a head width smaller than the width of the longitudinally extending bearing beams, said rails being in alignment with but beneath each of the bottom bearing beams; a plurality of bearing blocks carried by the bottom of each of the outer bearing beams, each bearing block being not less than twice the width of the head of the rail, the lower surface of each bearing block including a plurality of semicircular, transverse recesses; a roller in each recess and in contact with the head of the rail, each roller having a length of not less than twice the width of the rail head.

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