THREE-POSITION CROWN BLOCK

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References Cited
UNITED STATES PATENTS
2,744,725 5/1956 Woolslayer et al. 254/190 B
2,146,360 2/1939 Shimer 254/190 B

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ABSTRACT
A derrick crown assembly in which without rethreading the fast line, rotating crown blocks or the like, the crown block assembly may be shifted to a multiplicity of positions to drill multiple wells without moving the derrick.

6 Claims, 5 Drawing Figures
THREE-POSITION CROWN BLOCK

This invention relates to drilling rigs and more particularly to crown block assemblies for drilling rigs. It is sometimes desirable to drill two or more wells without moving the derrick. If the derrick size is sufficient that the crown block assembly can be skidded across the top of the derrick, the traveling block can be correctly positioned to drill more than one well. However, care must be exercised to insure that the flight angle between the fast line and the drawworks remains the same. If the flight angle is not maintained substantially constant, excess wear may occur.

In the past, movable crown blocks which maintain the flight angle of the fast line constant have been proposed. See for instance the U.S. Pat. to Woolslayer No's. 2,744,725 and 3,042,377. It will be noted in the earlier patent that only two wells can be drilled from a single location. In the latter patent it is necessary to restring the fast line to drill a third well. By this invention an apparatus is provided for drilling at least three wells without restringing the fast line. In all drilling positions the flight angle of the fast line remains approximately the same.

It is an object of this invention to provide a drilling rig for drilling at least three wells without moving the derrick in which the flight angle of the fast line remains constant, and there is no need for restringing of the fast line or making other major changes in the crown block assembly.

Another object is to provide a drilling rig having a crown block assembly which will drill in at least three positions in which the cluster sheave is movable across the derrick header beam to at least three wells without moving the derrick. A fast line sheave is rotated to properly position the fast line, and in which an auxiliary sheave is utilized in one position so that the flight angle of the fast line will always be substantially constant.

Other objects, features and advantages of the invention will be apparent from the drawings, the specification and the claims.

The drawings wherein like reference numerals indicate like parts and wherein an illustrative embodiment of this invention is shown;

FIG. 1 is a schematic drawing of the upper section of a derrick and drawworks therefor showing the three positions of the cluster sheave and the constant fast line flight angle;

FIG. 2 is a schematic top plan view illustrating the manner in which the fast line sheave is rotated relative to the cluster sheave;

FIG. 3 is a diagrammatic illustration of the three positions which the cluster sheave may assume in the derrick and showing the constant fast line flight angle as well as the deadline angle;

FIG. 4 is a top plan view of the cluster sheave, the fast line sheave, and associated auxiliary sheave assembly showing in dashed outline two additional positions for the fast line sheave;

FIG. 5 is a view in side elevation of the entire crown assembly viewed from the drawworks side.

The upper section of a derrick may take on various conventional construction as illustrated in FIG. 1 at 10. At the upper extremity of the derrick header beam 11 is provided. Diagrammatically illustrated is a cluster sheave 12 shown in solid lines as well as in two dotted line positions 12a and 12b. A drawworks is indicated generally at 13 having a fast line 14 thereon. As indicated in FIG. 1 the fast line flight angle remains substantially constant for all positions of the crown block assembly. While three positions are shown it will be possible utilizing this invention to drill four wells without moving the derrick.

Referring now to FIG. 3, the header beams 11 and 15 at the upper end of the derrick are shown. The sheave cluster 12 is shown in three positions with the sheave at 12, 12a and 12b. The sheave cluster is supported by a pair of structural members 16 and 17 which extend across between the two header beams. They are shown broken in FIG. 3 for clarity of drawings.

The fast line sheave is represented by the lines 18. It will be noted that in the cluster sheave position 12a and 12b the fast line sheave position is rotated through an angle of approximately 90°. In the position 12 the fast line sheave position is rotated still further, and an auxiliary sheave represented by the line 19 is utilized to carry the fast line over to the center of the derrick so that with the cluster sheave in any of the three different positions the flight angle of the fast line remains substantially constant as it goes down to the drawworks.

Referring to FIGS. 2 through 5, the manner in which the fast line sheave and auxiliary sheave are handled is illustrated.

The cluster sheave 12 is supported on a crown block frame indicated generally at 21. On top of the frame 21 a fast line sheave frame indicated generally at 22 is provided. As shown in FIG. 2, the frame 22 is rotatable to desired selected positions on top of the crown frame 21 as the crown frame is skidded to different positions on the derrick header beams. In one of these positions, being the position shown in FIG. 2, the fast line sheave is in alignment with an auxiliary sheave shown generally at 23. This sheave could be carried by either the crown frame or by the fast line sheave frame. For ease in lifting and training the fast line over the auxiliary sheave, it is preferred that it be carried by the crown block frame when only three drilling positions are to be utilized. When a fourth drilling position is desired the auxiliary sheave 23 may be positioned on the opposite side of the crown block frame but still on the drawworks side of the derrick and fastened to the crown block frame. Alternatively, it may be carried by the fast line sheave frame if desired.

The crown block frame 21 includes I-beams 16 and 17 which extend across from derrick header beam to derrick header beam and are fastened thereto at selected positions along these beams. As shown, the I-beams 16 and 17 are interconnected by suitable I-beams 24 and 25. The I-beams 24 and 25 support trunnions 26 and 27 in which the cluster sheave is journaled. The crown block frame includes a plurality of upstanding posts 28 and 29. A pair of these posts extends upwardly from the I-beam 16, and another pair extend upwardly from the I-beam 17. Supported on top of the posts 28 and 29 is a rectangular frame 30 for supporting the fast line sheave.

The fast line sheave frame is provided by a pair of I-beams 31 and 32 which are held in spaced relationship by suitable spacers 33 and 34 at each end thereof.

The fast line sheave 35 is supported on its frame by suitable journals 36 and 37.

It will be noted that the fast line sheave is positioned above the cluster sheave. The fast line extends down to the traveling block (not shown) and passes adjacent to the line receiving groove of the sheave 36 at one end of the sheave cluster. This relationship is retained as the fast line sheave is rotated about the vertical axis of the fast line running downwardly from the fast line sheave 35.

An auxiliary fast line sheave is provided for one position of the crown assembly. While it might be carried by either the crown block frame or the fast line frame, it is preferred that it be carried by the crown block frame as illustrated. A pair of beams 37 and 38 are attached to the crown block frame and support the auxiliary sheave journals 39 and 41, which in turn support the auxiliary fast line sheave 42. The auxiliary fast line sheave may rotate about a horizontal axis or at an angle thereto. It will be noted from FIG. 4 that in the illustrated embodiment the auxiliary sheave 42 actually rotates about an axis which is tilted slightly relative to the horizontal. In any event the line receiving groove of the auxiliary sheave 42 is aligned with the groove of the fast line sheave so that the cable when extended from the fast line sheave over the auxiliary sheave will lie snugly in the grooves in such manner that undue wear will not result.

In FIG. 4 the fast line sheave frame 22 is shown to be held in position by a plurality of bolts 43 and 44. When it is desired to reposition the crown block frame, the fast line sheave frame is released from the crown block frame and rotated to one of the dotted line positions and again bolted to the crown block frame.
In changing the position of the crown assembly the traveling block (not shown) is either laid on the derrick floor or suitably hung in the derrick. The crown block frame is then released from the derrick header beams and skidded over to the new desired position. A plurality of eyes 45 are provided for lifting the crown block frame to facilitate its movement. While the crown block frame is in elevated position relative to the derrick header beam, the fast line is moved past the appropriate support beam 16 or 17 to position it for the next drilling location. For instance, if drilling has been carried out with the fast line sheave in a position shown in FIG. 4 and it is desired to move to the position 12a, the fast line will be lifted from the auxiliary sheave 42 and carried past the support beam 17 so that it will be between the two supporting members 16 and 17. The supporting beams are then secured to the derrick header beams and the fast line sheave frame 22 rotated to the position 12a. This will bring the fast line to the same original position in the derrick. Of course, it will be necessary that the spreader 34 be removed to permit the fast line to drop down between the fast line sheave frame members 31 and 32. The spreader 34 is then resecured to the t-beams. Also the retainers or guides 45 and 46 will need to be removed before the fast line is lifted from the auxiliary sheave 42.

From the above it will be seen that the objectives of this invention have been obtained. The fast line is always outside of the crown block frame, and thus there is no problem of restringing the crown block when repositioning the fast line sheave. The fast line sheave may merely be rotated to the desired rotative position with the line being passed over the support members 16 and 17 as required. Where the auxiliary sheave 42 is employed, the fast line is merely lifted up and trained over the auxiliary sheave.

It will be appreciated that while only three positions have been illustrated, other rotative positions of the fast line sheave could be utilized to give different spacing. Also additional auxiliary sheaves could be utilized to give additional drilling positions. Such sheaves could be carried by either the crown block frame or by the fast line sheave frame.

As there is no need to restring the crown block, the crown block assembly may be quickly shifted to a new drilling position and the fast line sheave rotated to the proper orientation for drilling the next well.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. An assembly comprising, a derrick, header beams at the upper end of said derrick for supporting a crown assembly in at least three selected positions along a line generally parallel to the drawworks side of the derrick, a crown block frame adapted to be fastened to the derrick header beams at said positions, a main sheave cluster in said frame, a fast line sheave frame having a fast line sheave thereon supportable in at least two selective rotative positions on the crown block frame, and an auxiliary fast line sheave carried by one of the fast line sheave frame and the crown block frame in alignment with said fast line sheave when said fast line sheave is in one of said positions, the fast line position in said derrick being substantially identical when the crown block frame is in said different positions and the fast line sheave is in its respective positions with the fast line trained over the auxiliary fast line sheave in one position of the crown block frame.

2. An assembly comprising, a derrick, header beams at the upper end of said derrick for supporting a crown assembly in three selective positions along a line generally parallel to the drawworks side of the derrick, a crown block frame adapted to be fastened to the derrick header beams at said positions, a main sheave cluster in said frame, a fast line sheave frame having a fast line sheave thereon supportable in three selective rotative positions on the crown block frame, and an auxiliary fast line sheave carried by the crown block frame in alignment with said fast line sheave when said fast line sheave is in one of said positions, the fast line position in said derrick being substantially identical when the crown block frame is in said different positions and the fast line sheave is in its respective positions with the fast line trained over the auxiliary fast line sheave in one position of the crown block frame.

3. The assembly of claim 2 wherein said fast line position is exterior of the crown block frame in all three positions.

4. A crown assembly comprising, a crown block frame adapted to be fastened to the derrick header beams of a derrick, a main sheave cluster in said frame, a fast line sheave frame having a fast line sheave thereon supportable in at least two selective rotative positions on the crown block frame, and an auxiliary fast line sheave carried by one of the fast line sheave frame and the crown block frame in alignment with said fast line sheave when said fast line sheave is in one of said positions, the fast line position in said derrick being substantially identical when the crown block frame is in said different positions and the fast line sheave is in its respective positions with the fast line trained over the auxiliary fast line sheave in one position of the crown block frame.

5. A crown assembly comprising, a crown block frame adapted to be fastened to the derrick header beams of a derrick in three selected positions, a main sheave cluster in said frame, a fast line sheave frame having a fast line sheave thereon supportable in three selective rotative positions on the crown block frame, and an auxiliary fast line sheave carried by the crown block frame in alignment with said fast line sheave when said fast line sheave is in one of said positions, the fast line position in space being substantially identical when the crown block frame is in any of said positions and the fast line sheave is in its respective positions with the fast line trained over the auxiliary fast line sheave in one position of the crown block frame.

6. The assembly of claim 5 wherein said fast line position in space is exterior of the crown block frame in all three positions.  

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