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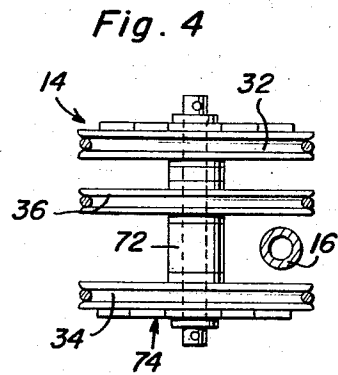
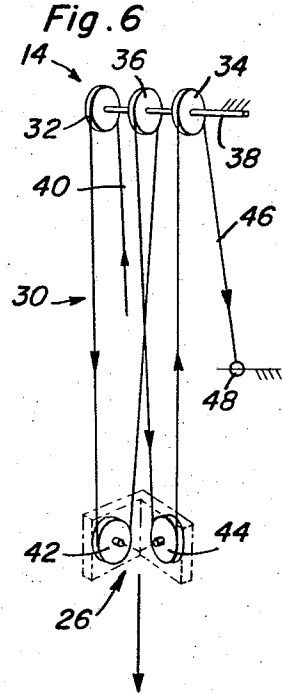
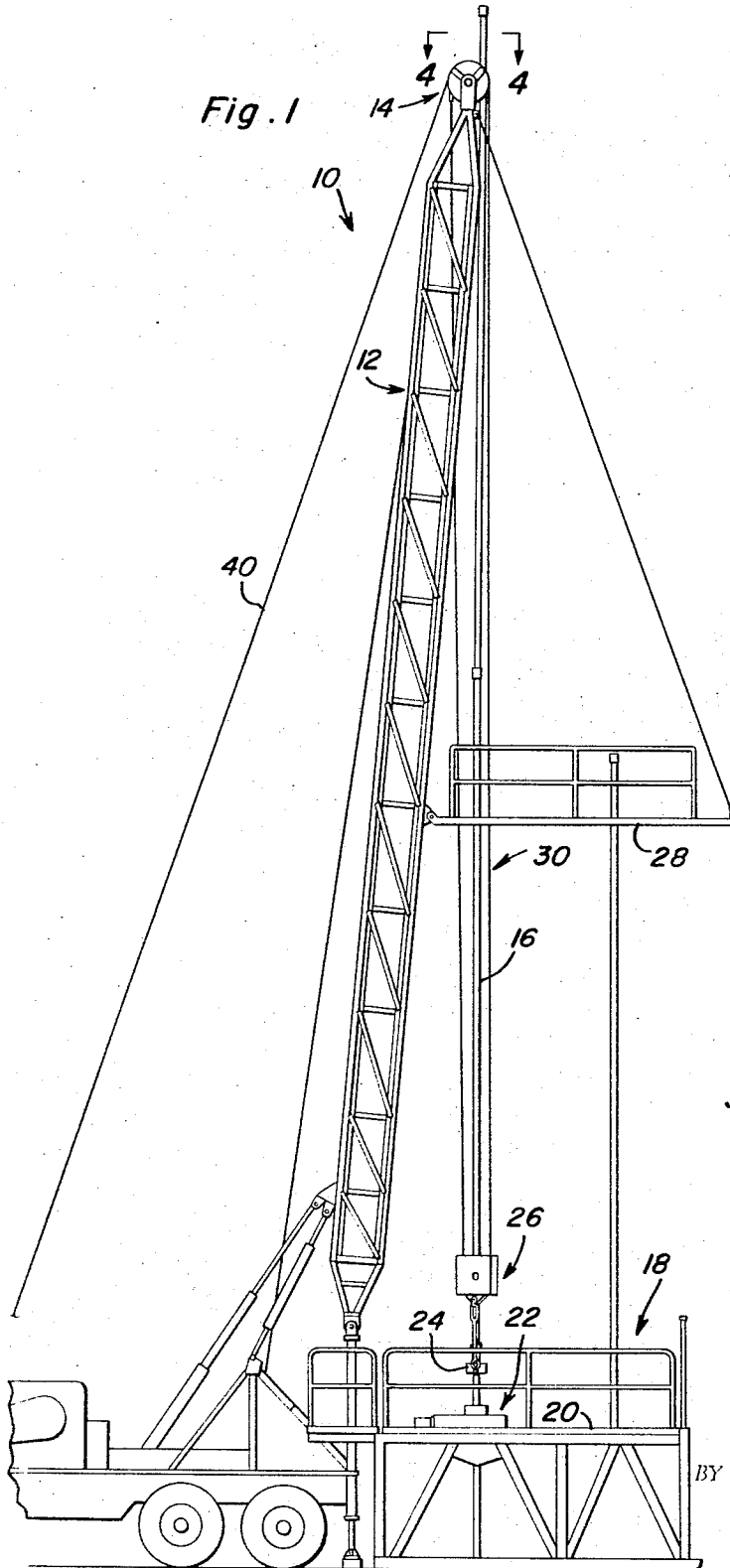
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TRAVELING BLOCK FOR DRILLING RIGS OR THE LIKE

Filed Nov. 10, 1966

2 Sheets-Sheet 1



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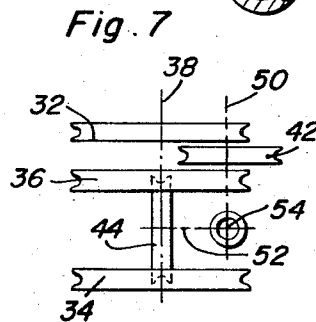
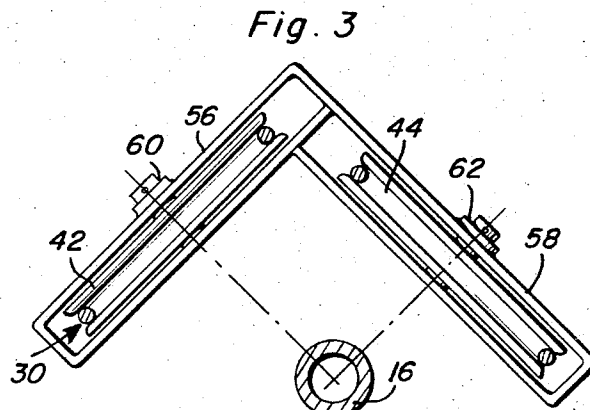
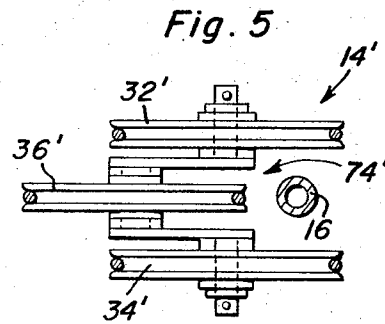
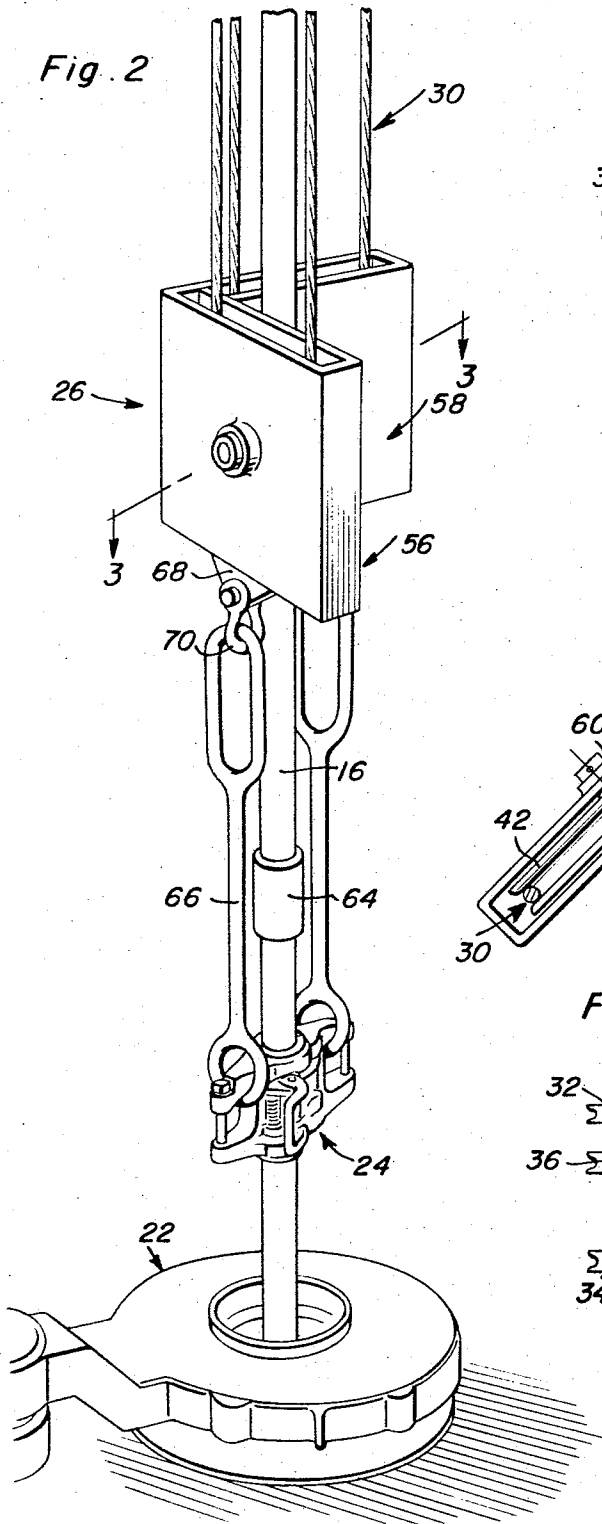
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TRAVELING BLOCK FOR DRILLING RIGS OR THE LIKE

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2 Sheets-Sheet 2



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3,366,366

TRAVELING BLOCK FOR DRILLING RIGS OR THE LIKE

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ABSTRACT OF THE DISCLOSURE

A conventional crown block having only parallel pulley sheaves fixedly mounted on top of a derrick and cooperating with a travelling block having perpendicular pulley sheaves associated with a cable system to handle pipe strings which extend upwardly from an elevator, suspended by the travelling block, between the sheaves of the crown block.

This invention relates to the handling of drill string pipe sections and more particularly to a novel type of traveling pulley block associated with drilling rigs through which pipe sections are inserted or withdrawn from a well bore.

The present invention is concerned with the rapid installation or withdrawal of pipe sections at a drilling installation. Derricks are usually erected at such installations in order to insert or withdraw pipe sections from the well bore in accordance with well known procedures utilizing pipe holding slips and elevator clamps suspended by the traveling block. It is therefore an important object of the present invention to provide a traveling block associated with a derrick through which the handling of vertical pipe sections is facilitated in order to effect a more rapid insertion or withdrawal of pipe sections utilizing presently available derrick equipment.

In accordance with the foregoing object, the traveling pulley block associated with the present invention embodies at least two pulleys rotatable about perpendicular axes which intersect the pipe section suspended from the traveling block whereby the pipe section may extend vertically upwardly through the traveling block frame. Accordingly, the height to which the pipe section may be elevated by successive engagement thereof by the traveling block suspended elevator, will not be limited because of interference with the traveling block. While traveling block constructions have heretofore been proposed through which pipe sections may extend, they have required corresponding modification of the crown block from which the traveling block is suspended by the cable in order to avoid fouling of the cable. The traveling block construction of the present invention however does not require such modification of the crown block and more particularly avoids cross-mounted pulley sheaves in the crown block while at the same time affords greater clearance for the pipe section when extending upwardly past the traveling block aligned above the bore hole.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numeral refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of a drilling rig installation embodying the principles of the present invention.

FIGURE 2 is a perspective view of a portion of the drilling rig installation shown in FIGURE 1, illustrating in particular the traveling block.

FIGURE 3 is a transverse sectional view taken sub-

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stantially through a plane indicated by section line 3-3 in FIGURE 2.

FIGURE 4 is an enlarged top section view taken substantially through a plane indicated by section line 4-4 in FIGURE 1.

FIGURE 5 is a top section view similar to FIGURE 4 but showing a modified form of crown block.

FIGURE 6 diagrammatically illustrates the traveling block and crown block combination associated with the present invention.

FIGURE 7 diagrammatically shows the relative spatial disposition of the crown and traveling blocks in accordance with the present invention.

Referring now to the drawings in detail, FIGURE 1 illustrates a typical drilling rig installation generally denoted by reference numeral 10 wherein a derrick 12 is vertically erected so that the crown block 14 fixedly mounted on top thereof is aligned above a well bore into which pipe sections 16 are inserted or withdrawn. A substructure 18 is erected above the bore hole providing a working platform 20 on which the pipe holding slip 22 is mounted in order to controllably clamp and hold pipe sections while a pipe joint is being rotated in order to couple or uncouple two pipe sections in accordance with well known procedures. The pipe section 16 may therefore be engaged by an elevator 24 for either lowering or raising it in vertical position as shown. The elevator is therefore suspended from a traveling block generally referred to by reference numeral 26 through which the pipe section 16 may extend upwardly while it is being guided by workmen on a derrick racking platform 28 mounted by the derrick 12. Where two pipe sections are either being coupled or uncoupled from the pipe section as shown in FIGURE 1, the upper pipe section may also extend upwardly beyond the crown block 14 as shown in FIGURE 1. The pipe sections are thus either lowered or raised by steps wherein the elevator 24 is engaged with the pipe section and then vertically displaced by means of the traveling block 26 a predetermined vertical distance before the pipe section is axially clamped by the slip 22 and held in this position until the elevator is released and returned to its initial position by the traveling block for reengagement with the pipe section. This procedure is repeated until a predetermined length of pipe sections are either inserted or withdrawn from the bore hole. The traveling block 26 is therefore suspended from the crown block by a cable assembly generally referred to by reference numeral 30 including a plurality of cable lines the number of which depends upon the mechanical advantage desired in raising or lowering the load suspended from the traveling block.

Referring now to FIGURES 6 and 7, diagrammatically illustrating the crown block and traveling block combination of the present invention, it will be observed that the crown block includes a plurality of pulley sheaves consisting of a fast line sheave 32, a dead line sheave 34 and one or more cross-over sheaves 36. All of the pulley sheaves associated with the crown block are rotatable in parallel planes and in the illustration shown in FIGURES 6 and 7, are rotatable about a common rotational axis 38 which is maintained stationary on top of the derrick which mounts the crown block. A fast cable line 40 which extends from the power winch (not shown) is entrained about the fast line sheave 32 and extends downwardly therefrom toward the traveling block 26. The cable line is then extrained about pulley 42 associated with the traveling block from which it extends upwardly back toward the crown block. The cable line is then entrained about the cross-over sheave 36 and extends downwardly once again for entrainment about the other pulley 44 associated with the traveling block as diagrammatically

shown in FIGURE 6. The cable line then extends upwardly from the pulley 44 and is entrained about the dead line sheave 34 of the crown block from which the anchored dead line portion 46 of the cable line extends to an anchor point 48. It will also be observed from FIGURE 7, that the pulleys 42 and 44 associated with the traveling block are rotatably mounted about angularly related axes 50 and 52 which intersect on a vertical axis 54 along which the load or pipe sections are vertically displaced for insertion into or withdrawal from the bore hole. It will be apparent therefore, that the perpendicular spaced relationship between the pulleys 42 and 44 as shown in the illustrated embodiment, permits the pipe sections to extend upwardly between these pulleys with maximum clearance. Furthermore, because of the angular relationship of the pulleys in the traveling block, the sheaves 32, 34 and 36 associated with the crown block may be rotatably mounted about parallel axes thereby avoiding the cross mounting of any pulley sheaves. In the example illustrated in FIGURE 7, the sheaves 34 and 36 are axially spaced apart by a greater amount than the axial spacing between the sheaves 32 and 36 in order to accommodate upward extension of a pipe section therebetween.

Referring now to FIGURES 2 and 3, it will be observed that the traveling block 26 includes a pair of frame sections 56 and 58 within which the pulleys 42 and 44 are respectively enclosed. The frame sections are interconnected at a right angle to each other so that the axes extending through the pulley journal assemblies 60 and 62 associated with the frame sections may substantially intersect with each other on the vertical axis along which the pipe sections 16 are displaced. The pipe sections are displaced by vertical movement of the traveling block 26 when the fast line 40 of the cable assembly 30 is being either wound up or unwound from the power winch. The pipe sections are suspended from the traveling block when the elevator 24, of well known construction, is engaged therewith below the pipe joint 64 as shown in FIGURE 2, the elevator being suspended from the frame sections 56 and 58 of the traveling block by the elevator links 66. Each of the frame sections is therefore provided with a downwardly projecting ear 68 pivotally mounting a loop 70 from which an elevator link 66 is suspended.

As shown in FIGURE 4, the crown block 14 rotatably mounts the sheaves 32, 36 and 34 about a common axis by means of the shaft assembly 72 rotatably mounted by the crown block frame 74 fixed to the top of the derrick 12. A pipe section 16 may therefore project upwardly between the sheaves 34 and 36. FIGURE 5 shows an alternative arrangement for the sheaves of the crown block generally referred to by reference numeral 14'. In this crown block, the cross-over sheave 36' is rotatably mounted by the frame 74' about an axis in parallel spaced relation to the common axis extending through the fast line sheave 32' and the dead line sheave 34'. Accordingly, the pipe section 16 may then extend upwardly between the sheaves 32' and 34' in view of the lateral spacing between these sheaves and the cross-over sheave 36'.

From the foregoing description, the construction, operation and utility of the crown and traveling block combination of the present invention will be apparent. It should be appreciated, that crown and traveling blocks embodying the principles of the present invention may be constructed with as many pulley sheaves as desired as long as all of the sheaves associated with the crown block are rotatably mounted about parallel axes and at least two of the pulleys associated with the traveling block are rotatably mounted about axes substantially intersecting the pipe section vertically aligned with the bore hole. Because of the foregoing arrangement of the invention, crown blocks may be utilized without the necessity of having cross-mounted sheaves and a greater amount of

leeway in the positioning of the traveling block relative to the pipe sections will be permitted. Thus, withdrawal of pipe sections or insertion thereof into the bore hole may be effected more rapidly.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In combination with a derrick mounted crown pulley block having at least a fast line sheave, a cross-over sheave and a dead line sheave all of which sheaves are mounted about parallel axes, a traveling pulley block, an elongated load suspended from said traveling pulley block and cable means operatively interconnecting said pulley blocks for displacing said load along a vertical axis extending through both of said pulley blocks in close perpendicular spaced relation to the parallel axes of said sheaves in the crown block, and said traveling pulley block including at least two pulleys about which the cable means is entrained and frame means from which the load is suspended rotatably mounting said pulleys about angularly spaced axes substantially intersecting the load.

2. The combination of claim 1 wherein said frame means includes a pair of frame sections respectively enclosing the pulleys and interconnected only along a vertical corner spaced from the vertical axis in non-interfering relation to the load.

3. The combination of claim 2 wherein said sheaves in the crown block are axially spaced from each other by unequal amounts, said vertical axis of the load extending between the sheaves that are axially spaced apart the greatest amount.

4. The combination of claim 1 wherein said sheaves in the crown block are axially spaced from each other by unequal amounts, said vertical axis of the load extending between the sheaves that are axially spaced apart the greatest amount.

5. The combination of claim 1 wherein one of said pulleys of the traveling block is disposed substantially perpendicular to the parallel sheaves of the crown block.

6. In combination with a drilling derrick fixedly mounting a crown block having only parallel pulley sheaves, a cable entrained about said pulley sheaves and a traveling block from which a vertical pipe section is suspended, said traveling block including at least two pulleys about which said cable is entrained and frame means rotatably mounting the pulleys in fixed spaced relation to each other about axes substantially intersecting the pipe section.

7. The combination of claim 6 wherein said frame means includes a pair of frame sections between which the pipe section extends, said frame sections being interconnected at an angle to each other and respectively supporting said pulleys in perpendicular relation to each other.

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