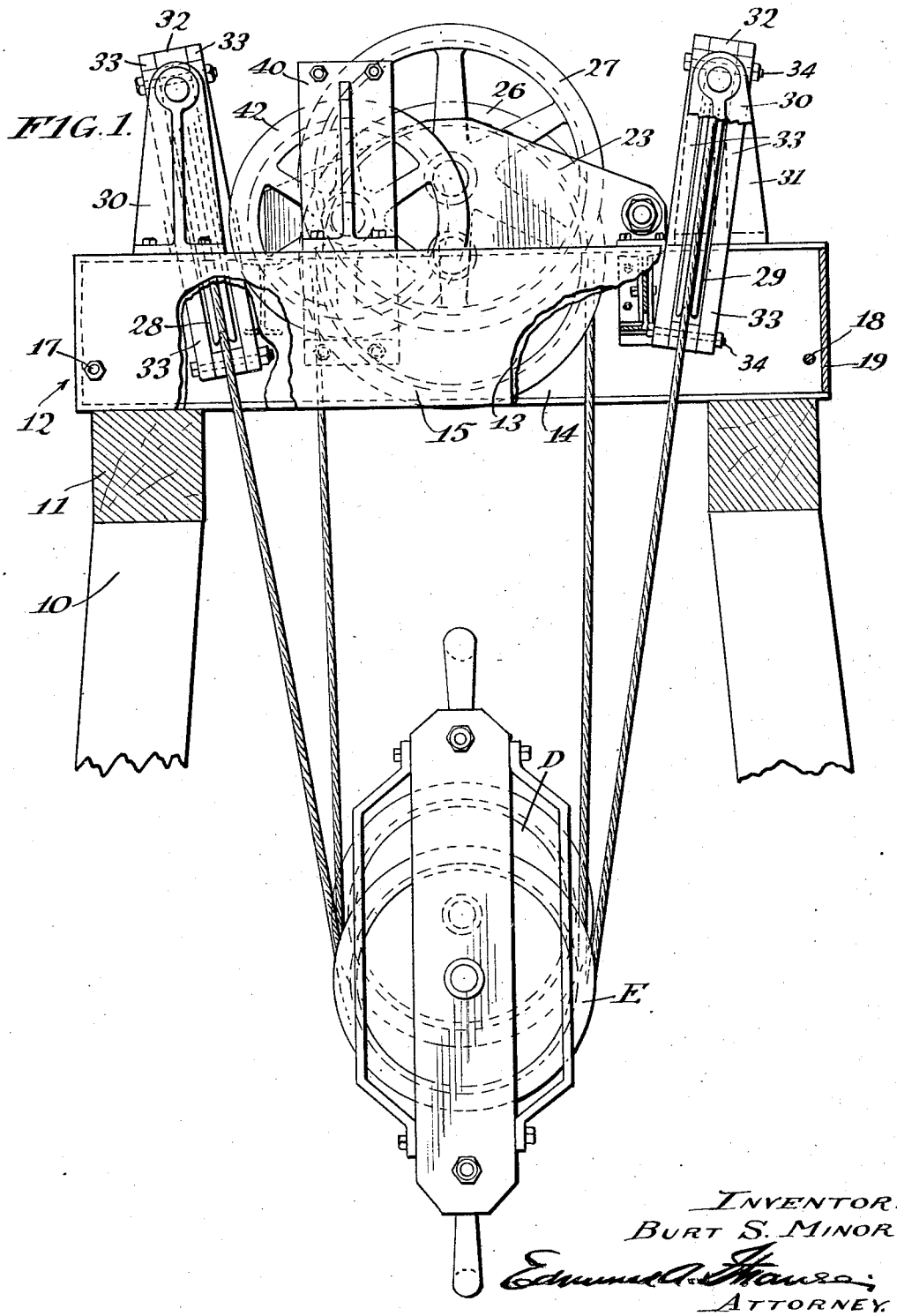
Nov. 24, 1931. B. S. MINOR 1,833,172

CROWN BLOCK

Filed Sept. 26, 1928 4 Sheets-Sheet 1

FIG. 1.



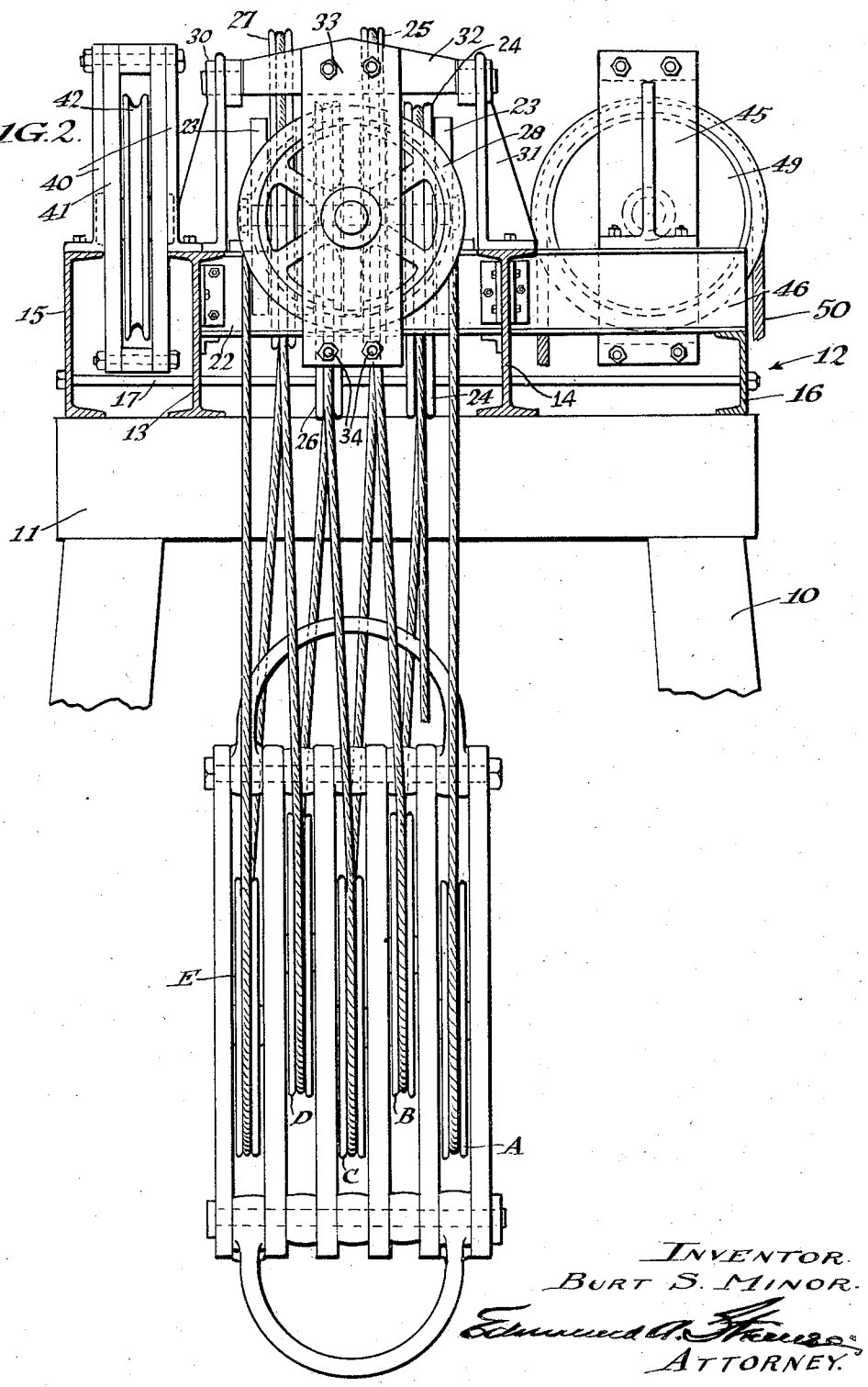
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CROWN BLOCK

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FIG. 2.



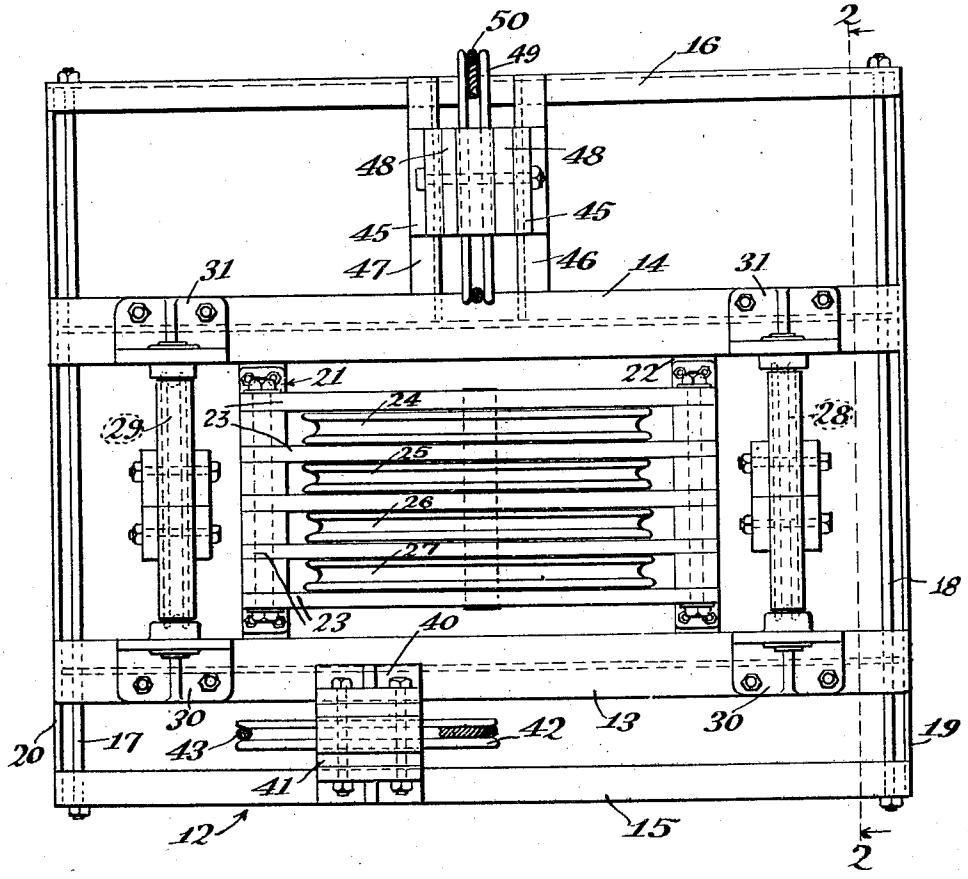
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CROWN BLOCK

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FIG. 3.



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CROWN BLOCK

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FIG. 4.

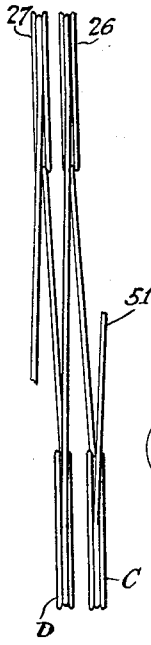


FIG. 5.

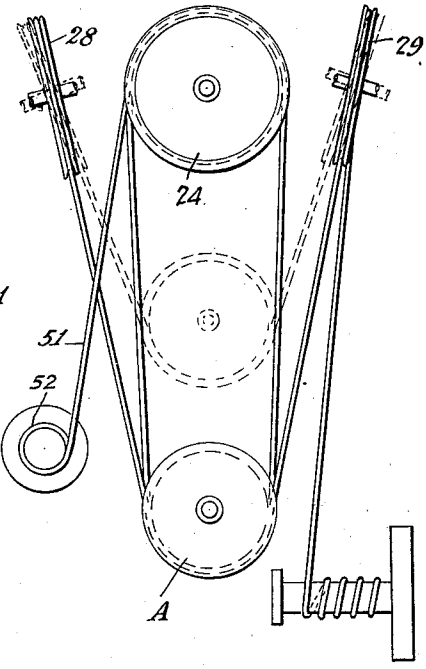


FIG. 6.

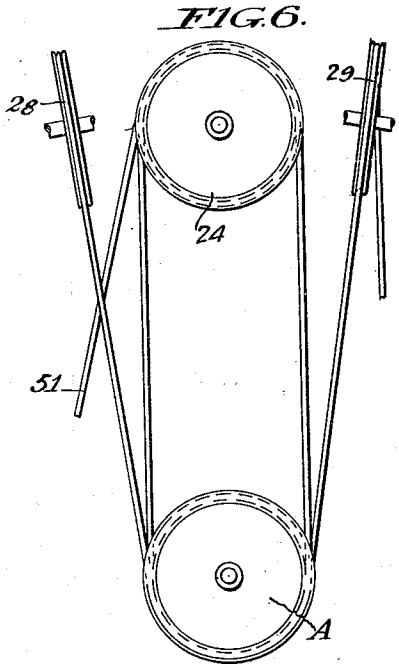
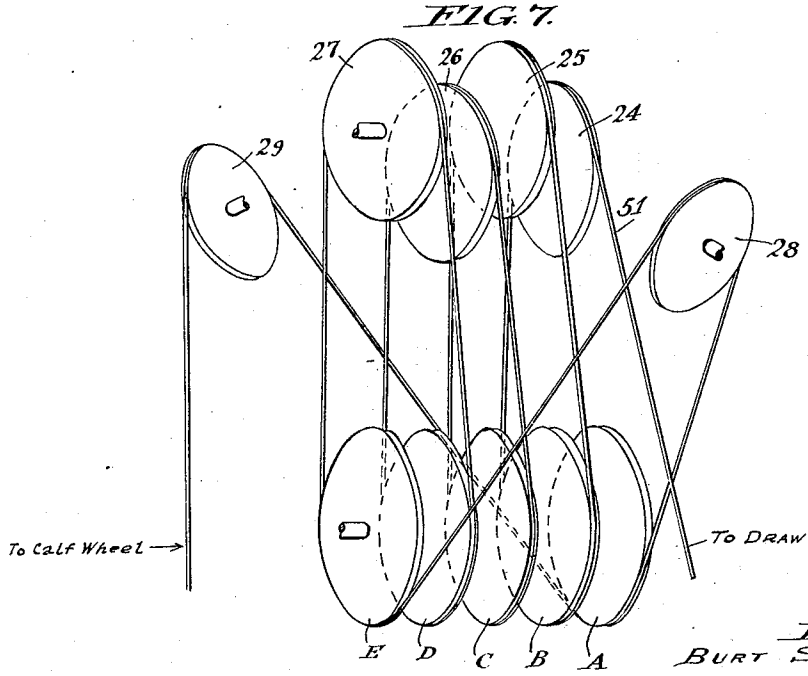


FIG. 7.



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UNITED STATES PATENT OFFICE

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CROWN BLOCK

Application filed September 26, 1928. Serial No. 308,520.

This invention pertains to crown block constructions employed in connection with oil well drilling operations.

Heretofore in earlier types of crown block constructions the cable line sheaves have been arranged in a single deck or frame. Such an arrangement was found to be somewhat unsatisfactory owing chiefly to the fact that it was almost impossible to effectively arrange or mass the large number of sheaves now required in modern drilling operations so that the cable lines leading to the travelling block would track in a more nearly vertical direction. In order to counteract such untoward conditions many manufacturers have substituted for the single deck crown blocks, "double" and even "triple" deck constructions, in an endeavor to provide a more compact arrangement of the sheaves for vertically directing the cable lines leading therefrom to the travelling block. While such improved method of sheave assemblage has proven extremely satisfactory in eliminating line and sheave wear, yet such constructions have proven anything but economical in manufacture over the earlier single deck constructions.

In the present invention the old single deck construction is utilized by grouping the majority of casing line sheaves directly in the center of the crown block frame, and then disposing the remaining sheaves (in this instance two) at right angles to the grouped sheaves, one on either side, and pivotally mounting the same, it being apparent that the sheaves of the crown block will line up with the sheaves of the travelling block independently of the elevation of said block, thus correcting all the disadvantages of the single deck constructions, and at the same time attaining economy of manufacture.

It is therefore a chief object of the invention to provide a crown block that may be effectively used with various types of travelling blocks having sheaves of different sizes without increasing the minimum angle of the lines leading from the crown to the travelling block.

Another important object is to provide a construction in which all the sheaves are mounted in a single plane, thereby reducing the height of the block, means being provided for lining up the sheaves of the crown block with the sheaves of the travelling block independently of its elevation.

A further object is to provide a crown block construction in which the lines leading therefrom to the travelling block will enter and leave the various sheaves at the minimum angle from the vertical.

A still further and important object is to provide a sheave mounting for crown blocks in which the lines leading therefrom to the travelling block disposed therebelow can be threaded in such manner that the fast rotating sheave will be disposed next to the slow sheave and on one side of the travelling block, in order that the block will always assume a vertical position when the same is raised or lowered.

The above and other objects are accomplished by the construction herein described, a single embodiment being shown by way of illustration.

In the drawings hereto annexed;

Fig. 1 is a side elevation of the crown block showing its sheaves connected to the travelling block therebelow, parts being broken away to more clearly disclose the construction.

Fig. 2 is a sectional elevation taken on line 2—2 of Fig. 3 looking in the direction of the arrows.

Fig. 3 is a plan view of the crown block.

Fig. 4 is a diagrammatic view illustrating the minimum angle of the cable lines that may be attained between the crown and travelling blocks.

Fig. 5 is a diagrammatic view showing the movement of the pivoted casing sheaves with relation to the sheaves of the travelling block during its vertical movement.

Fig. 6 is a view similar to the above, illustrating how the cable lines from the pivoted casing sheaves line up when the sheaves of the travelling block are of larger diameter.

Fig. 7 is a diagrammatic view illustrating the method of "stringing up" the blocks in order to effect the desired combination of

having the fast and slow sheaves travelling next to each other.

Referring now to the drawings and particularly to Figures 1, 2, and 3, 10 indicates the uprights of the derrick, connected together at their upper ends by the usual cross timbers 11 all bolted together in the usual manner. The crown block frame or deck 12 is composed in this instance of steel channel and I-beams all bolted together to form a rigid structure.

These beam members preferably consist of I-beams 13, 14, and channel beams 15, 16, disposed in parallel relation and spaced apart suitable distances from each other to permit of the convenient mounting of the sheave wheels therebetween. Both ends of these beams are secured together by means of bolts 17, 18, and separating plates 19, 20. Secured to the oppositely disposed faces of I-beams 13, 14, and just below the upper flanges of said beams are I-beams 21, 22, spaced apart, to the upper flanges of which is secured in any suitable manner a plurality of sheave bearing or strap plates 23, in which are rotatably mounted a number of the crown block casing sheaves 24, 25, 26, and 27.

The arrangement of the grouped sheaves in this construction is exactly similar to the arrangement of the sheaves in my travelling block construction for which I was granted U. S. Patent No. 1,570,271, of January 19, 1926. In said patented construction the sheaves are rigidly mounted on independent pins and rotate in antifriction bearings, the construction being so arranged that the sheaves may be grouped so closely together that the cable lines leading therefrom to the crown block thereabove would track in a more nearly vertical direction, thus eliminating undue or excessive wear on the lines and sheaves during their operation.

In the present invention as the casing sheaves are of greater number than the sheaves of the travelling block above referred to, it becomes necessary to arrange the sheaves in a different formation to accomplish the desired results as set forth in my patented construction, and to the accomplishment of this end, four of the sheaves 24, 25, 26, and 27, as heretofore noted, are mounted in grouped formation in substantially the center of the crown block frame or deck, thus enabling the cable lines leading downwardly therefrom to track vertically to the travelling block.

The two remaining casing sheaves 28, 29, are arranged alongside the outer faces of I-beams 21, 22, at substantially right angles to the grouped casing sheaves. These sheaves are mounted in bearing structures, each of which preferably consists of a pair of vertically disposed bearing standards 30, 31, bolted at their lower ends to the upper flanges of the I-beams 13, 14. Pivotally mounted in the upper ends of these standards is a bar 32 having cylindrical end pins. Bolted to the side faces of bar 32 are downwardly depending plates 33, their lower ends having spacing bars therebetween, bolts 34 securing their ends in rigid relation. Mounted in each pair of plates 33 are the casing sheaves 28, 29, mounted in the same manner as the grouped sheaves heretofore described.

By pivotally mounting the casing sheaves 28, 29, it will be apparent that the cable lines running therefrom to the travelling block will "line up" with the sheaves of said travelling block independently of its elevation as clearly shown in Figure 5 of the drawings.

By means of the above described arrangement of the casing sheaves the lines from the crown block to the travelling block can be threaded in such manner that the fast rotating sheaves will be disposed next to the slow sheave and on one side of the travelling block (see Fig. 7), thus enabling the travelling block to assume a substantially vertical position when the same is raised or lowered.

Beams 13 and 15 carry on their upper flanges a pair of bearing standards 40 between which is secured a downwardly extending frame 41 in which is rotatably mounted a sheave 42 over which passes the cat line 43 which is employed in hoisting various tools from the derrick floor, the power being utilized from the cat head of the draw works. Mounted in bearing standards 45, secured to the upper surfaces of the flanges of channel beams 46 and 47 of the crown block frame is a downwardly extending frame 48 similar to frame 41 in which is rotatably mounted a sand line sheave 49 over which passes the cable or sand line 50 from the sand reel on the derrick floor (not shown), utilized in connection with the operation of swabbing and similar tools.

In crown block constructions heretofore employed it has been customary to mount all the casing lines sheaves in a single group in order to accomplish the vertical trackage of the cable lines from the crown to the travelling block, but in said constructions they have been unable to place the fast moving sheave of the travelling block next to the slow moving sheave with the result that the travelling block does not always hang in a vertical position when raised or lowered.

In the present invention by means of my arrangement of the sheaves of the crown block, i. e. a number of sheaves in group formation with a pair of sheaves pivotally mounted one on either side of said formation and at an angle thereto, I am enabled to string the lines so that the fast line sheave of the travelling block can be mounted next to the slow moving casing sheave, thus enabling me to counteract the difference in friction between the two rotating sheaves that permits the travelling block to always main-

tain a nearly vertical position when it is raised or lowered in drilling operations. This manner of threading the lines from the crown to the travelling block is considered an extremely important feature of the invention disclosed herein.

In the present invention as illustrated the crown block is shown with six casing line sheaves mounted therein, while the travelling block therebelow has five operating casing line sheaves, the manner of threading from the crown to the travelling blocks being as follows:

From the draw works 52 the main operating cable 51 passes upwardly and around sheave 24 of the crown block, thence downwardly to sheave —B— of the travelling block, and thence upwardly over sheave 25 of the crown, downwardly to sheave —C— of the block, again upwardly over sheave 26 of the crown and thence downwardly to sheave —D— of the block, upwardly to sheave 27 of the crown and thence downwardly to sheave —E— of the block, upwardly to sheave 28 of the crown and downwardly to the opposite side and around sheave —A— of the block, then upwardly and around sheave 29 of the crown block and thence downwardly to the calf wheel (not shown) where it is made fast.

In Figure 4 is illustrated a diagram showing the minimum angle of the cable lines that may be attained between the crown and travelling blocks.

Figure 5 illustrates diagrammatically the positions assumed by the pivoting sheaves 28 and 29 during the operation of the travelling block in hoisting and lowering operations. In this figure the angle assumed by the pivoting sheaves 28 and 29 when the travelling block is raised is shown in dotted lines.

Figure 6 illustrates diagrammatically the positions assumed by the pivoting sheaves 28 and 29 when used in combination with travelling blocks having sheaves of different diameters.

From the above description it will be clearly apparent that I have embodied in a single deck crown block construction all the valuable and desirable features that are now only attainable by means of double or triple deck constructions, thus eliminating undue expense in the installations of blocks, and effecting substantial economies in manufacture.

I claim:

1. In a crown block construction for well derricks, a frame, a plurality of casing sheaves mounted in said frame in grouped formation and substantially in the center of said frame, and a pair of casing sheaves pivotally mounted in said frame.

2. In a crown block construction for well derricks, a frame, a plurality of casing sheaves disposed in substantially the center of said frame and rotating in the same direction, and a pair of pivoted casing sheaves mounted in said frame one at either end of said plurality of sheaves and rotating at substantially right angles thereto.

3. In a crown block construction for well derricks a frame, a plurality of sheaves mounted on said frame, and other sheaves rotatably mounted in bearing frames, said frames being pivotally mounted in bearings secured to the frame of the crown block.

4. A crown block construction for well derricks comprising a frame, a plurality of casing sheaves mounted on said frame in grouped formation, and other casing sheaves swingingly mounted in said frame and in angular relation to said grouped sheaves.

5. A crown block construction for well derricks comprising a frame, a plurality of casing sheaves mounted in grouped formation, the fast line sheave of the group mounted alongside the slow line sheave, a pair of casing sheaves tiltingly mounted at an angle to the grouped sheaves, and a sand line and a cat line sheave mounted in said frame one on either side of the grouped sheaves.

6. The combination with a travelling block, of a crown block construction of the single deck type comprising a plurality of grouped casing sheaves, and a pair of casing sheaves mounted on said deck to oscillate during the operation of the cable lines thereover, the fast rotating sheave of the travelling block being disposed next to the slow sheave and on one side of the travelling block, whereby the cable lines from the crown block to the travelling block may be threaded so that said travelling block will always assume a vertical position when raised or lowered.

7. In a crown block construction for oil well derricks, the combination with a travelling block, of a crown block frame disposed thereabove, a plurality of casing sheaves rotatably mounted in grouped formation in said crown block frame, a plurality of bearings arranged in pairs secured to the upper portion of said crown block frame, and a sheave mounted to oscillate in each of said bearings with their axes disposed substantially at right angles to the axes of the grouped sheaves.

8. In a crown block construction for oil derricks, the combination of a single deck frame, a plurality of sheaves rotatably mounted in the frame, a plurality of bearings arranged in pairs mounted on said frame, a sheave pivotally supported by each pair of the bearings with their axes disposed substantially at right angles to the axes of said first named sheaves.

9. In a crown block construction for oil well derricks, the combination with a travelling block, of a crown block frame disposed thereabove, a plurality of casing sheaves rotatably mounted in grouped formation in

said crown block frame, a plurality of bearings arranged in pairs secured to the upper portion of said crown block frame, and a sheave mounted to oscillate in each of said bearings with their axes disposed substantially at right angles to the axes of the grouped sheaves, the fast rotating sheave of the travelling block being disposed next to the slow sheave and on one side of said block, whereby the cable lines from the crown block to the travelling block may be threaded so that the travelling block will always assume a vertical position when raised or lowered.

10. In a crown block construction for oil well derricks, a framework, a plurality of cable sheaves mounted in fixed bearings secured to said framework, and other cable sheaves mounted alongside said first named sheaves in bearings swingingly mounted in said frame.

In testimony whereof I affix my signature.

BURT S. MINOR.