April 22, 1930. E. W. GOESER 1,755,253

U-BOLT CONSTRUCTION

Filed Dec. 27, 1927

Fig. 1.

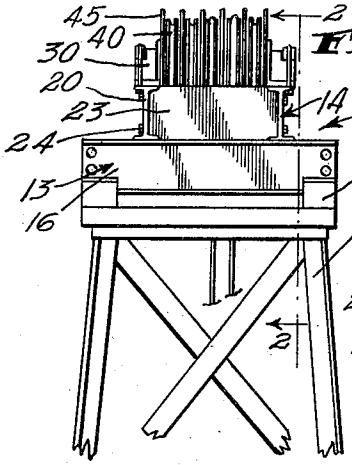


Fig. 2.

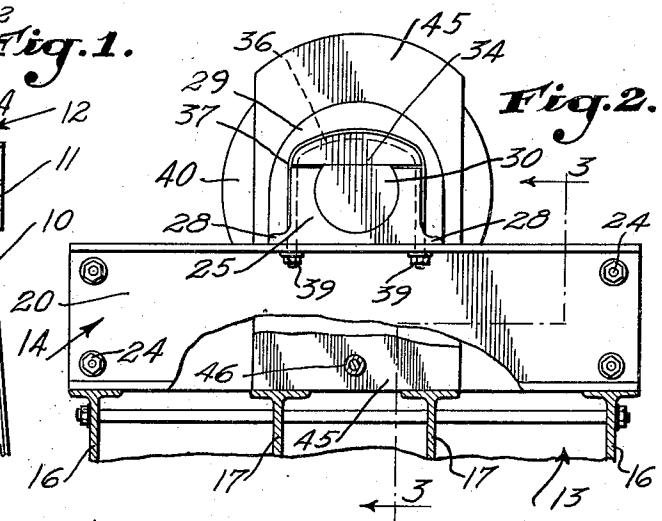
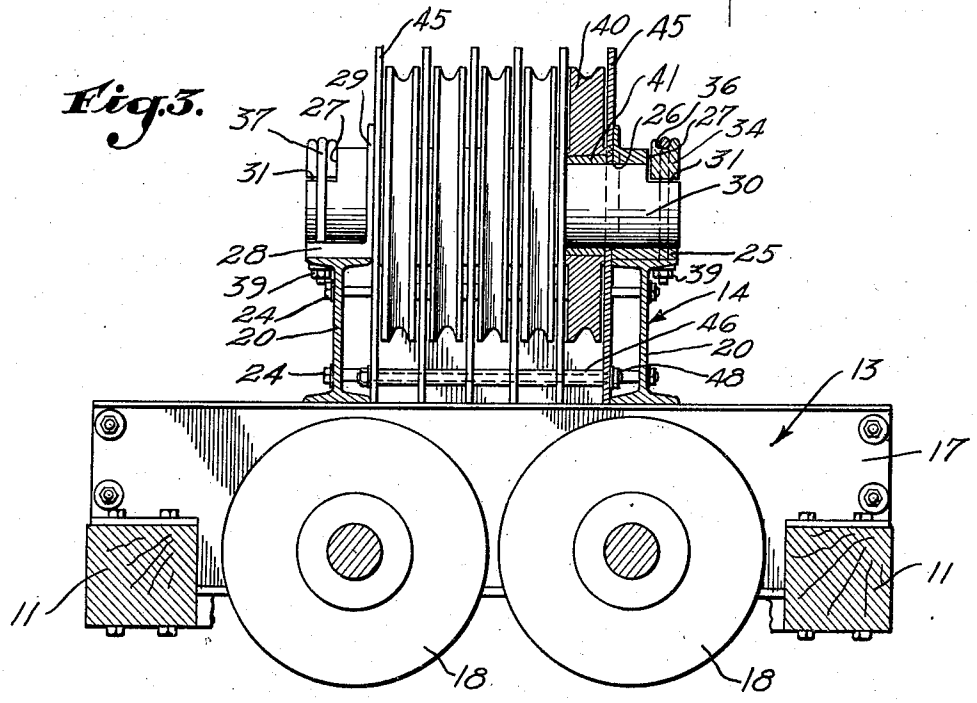


Fig. 3.



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U-BOLT CONSTRUCTION

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My invention relates to deep well drilling equipment and more particularly to crown blocks employed therein.

In drilling a deep well, a derrick is set up with its vertical axis in alignment with the proposed well. The tools and casing used in the drilling of the well are handled by a derrick tackle including a crown block mounted on the top of the derrick, a traveling block adapted to move vertically between the floor of the derrick and the crown block, and a cable wound about the sheaves of the crown block and traveling block, and reeled up by a power-operated draw works drum.

In the crown blocks in common use, the sheaves are mounted upon a single shaft which is supported at its opposite ends where slightly flattened portions of the shaft rest upon upper edges of supporting frame members. The shocks and strains imposed upon the crown block shaft during the operation of the derrick tackle, in handling the excessively heavy lengths of drill pipe and casing used in deep well drilling, frequently cause the crown block shaft to crystallize and break when it is most necessary that the derrick tackle be kept working. When a fracture of the shaft occurs in the old style crown block, the end portions of the shaft incline towards each other so as to draw the sheaves out of alignment with the corresponding sheaves of the traveling block and render the tackle inoperative.

It is correspondingly an object of my invention to provide a crown block construction in which the derrick tackle may be kept in operation even though a fracture of the crown block shaft may have occurred.

It is usually necessary that a crown block have five or more sheaves. These sheaves are uniformly bushed, but, on account of the difficulty of lubricating the sheaves uniformly, one or more of the sheave bushings always wears out while the others are in good condition. It is, therefore, necessary to replace the sheave with the worn bushing, which is accomplished by slipping the crown block shaft longitudinally through the sheaves until the worn sheave may be removed. As this work must be carried on at the top of the derrick, it has been made exceedingly difficult by the fact that the entire body of sheaves and axle must be raised a distance of an inch or so to free the shaft from the support members on which it rests before the shaft may be longitudinally moved.

It is a further object of my invention, therefore, to provide a crown block in which replacement of one or more sheaves of the block is relatively easy.

Another object of my invention is to provide a novel bearing block which rests on the support means or frame of the crown block and supports one end of the sheave shaft.

It is also an object of my invention to provide a bearing block of this character having a means which clamps the shaft from rotation and also restrains the shaft from axial movement.

It is another object of my invention to provide a bearing block of the character mentioned in which the block is provided with a cavity into which the end of the shaft may extend, and in which a key block is clamped in the cavity against the end of the shaft for preventing rotation and axial movement of the shaft.

Further objects and advantages will be made manifest in the following description and accompanying drawings in which a preferred embodiment of my invention is illustrated. In the drawings:

Fig. 1 is a fragmentary view of the upper end of the well drilling derrick showing the crown block of my invention mounted thereon.

Fig. 2 is a view taken on the line 2—2 of Fig. 1.

Fig. 3 is a view taken on the line 3—3 of Fig. 2.

Referring specifically to the drawings:

A derrick 10 has a water table 11 constructed upon its upper end, which water table supports a crown block 12 embodying the features of my invention. The crown block 12 includes a lower frame 13 and an upper frame 14. The lower frame 13 includes outer beams 16 and inner beams 17 which rest upon the

water table 11. Rotatably mounted between the inner beams 17, in any preferred manner, is a pair of sheaves 18 which are used in light hoisting.

The upper frame 14 includes a pair of I-beams 20 which are disposed in crossing relation relative to the beams 16 and 17 and rest upon and are secured in any suitable manner to these beams. The ends of the beams 20 are held in spaced relation by suitable spanner plates 23 against which the beams 20 are drawn by bolts 24. Adapted to rest upon the upper edges of the I-beams 20 are bracket blocks 25 which have sheave shaft bores 26 which are adapted to be placed in alignment when the blocks 25 thus rest upon the beams 20. Formed in the upper outer portion of each of the blocks 25 is a cavity 27, for a purpose to be described later. Formed about the lower and inner portions of each block 25 are bottom flanges 28 and an inner flange 29.

Adapted to extend into the bores 26, when these are aligned, is a sheave shaft 30 which has key-ways 31 formed in the opposite ends thereof. The sheave shaft 30 is retained against endwise movement in the blocks 25, and also against rotation in these blocks by key-blocks 34 which fit into the cavities 27 of the blocks 25 and the key-ways 31 of the shaft 30. Each of the key-blocks 34 and the bracket blocks 25 have shallow channels 36 into which a U-bolt 37 extends downward so that its opposite ends pass through suitable holes in the bottom flanges 28 and through holes aligned therewith which are formed in an upper flange of a beam 20 upon which that bracket block is resting. Screwed upon the ends of this U-bolt are nuts 39 which are tightened up so as to rigidly force the key-block 34 against an upper face of the key-way 31 into which that block fits. This exerts a pressure directly downward against the shaft 30, which pressure is transmitted to the bracket block 25 at that end of the shaft so as to rigidly secure that bracket block against the beam 20 on which it rests. Each U-bolt 37 is therefore seen to have three functions, to wit: holding the shaft 30 against endwise movement, holding the shaft 30 against rotation, and rigidly securing a bracket block 25 to one of the beams 20.

Rotatably mounted on the shaft 30, so as to be disposed between the beams 20, is a series of sheaves 40, each of which is provided with a bushing 41. Disposed between each of the bracket blocks 25 and the outermost sheave 40 adjacent thereto, and disposed between each adjacent pair of the sheaves 40, is one of a series of auxiliary shaft supporting plates 45. The plates 45 have openings through which the shaft 30 passes, and the lower ends of these plates rest upon the beams 17 of the lower frame 13, as clearly shown in Figs. 2 and 3. The lower ends of these plates are held rigidly in spaced relation by spacer tubes 46, placed between each adjacent pair of plates 45, and a bolt 48 which extends through the tubes 46 and holes in the plates 45 aligned therewith.

The plates 45 serve two functions, that of centrally supporting the shaft 30 in case this should fracture, and also providing a barrier between the upper portions of adjacent sheaves 40 so as to prevent the cable of the derrick tackle jumping from one sheave to the other, as sometimes happens when the traveling block is unduly twisted during the hoisting.

While the plates 45 are relatively thin, so that they do not separate the sheaves 40 an undue distance, yet they contain sufficient material that when this is a high grade steel they will unite to support the shaft 30 in case this fractures when it would be practically impossible to stop working to make repairs until a suitable point in the drilling operations has been reached, where time can be taken for dismantling the crown block 12 and replacing the broken shaft 30. The mounting of the shaft 30, so that this may be slipped out of the bearing blocks without bodily lifting the sheave and shaft assembly, is of great merit as the replacing of the shaft 30 or any of the sheaves 40 may be accomplished merely by driving wedges between the spacer tubes 46 and the bottom of the sheaves 40 so as to lift the weight of these sheaves. When this has been done, and the nuts 39 loosened, so that the key-blocks 34 may be removed from the positions in which they are shown, the shaft 30 may be easily slipped in one direction or the other so as to accomplish the desired repairs.

I claim as my invention:

1. In a crown block construction the combination of: a frame providing a pair of horizontally spaced supports; a normally stationary sheave shaft; means for positioning end portions of said shaft upon said supports; a plurality of sheaves rotatably mounted upon said shaft; and means rigidly supported upon said frame and engaging said shaft between adjacent pairs of said sheaves to support a portion of the load imposed upon said shaft through said sheaves.

2. In a crown block construction the combination of: a frame providing a pair of horizontally spaced supports; a normally stationary sheave shaft; means for positioning end portions of said shaft upon said supports; a plurality of sheaves rotatably mounted upon said shaft; and relatively thin plates rigidly supported upon said frame and engaging said shaft between adjacent pairs of said sheaves to support a portion of the load imposed upon said shaft through said sheaves.

3. In a crown block construction the combination of: a frame providing a pair of horizontally spaced supports; a normally stationary sheave shaft; means for positioning

end portions of said shaft upon said supports, said shaft being longitudinally slidable in said means when so positioned; means preventing endwise movement of said shaft in said means; a plurality of sheaves rotatably mounted upon said shaft; and means rigidly supported upon said frame and engaging said shaft between adjacent pairs of said sheaves to support a portion of the load imposed upon said shaft through said sheaves.

4. In a crown block construction the combination of: a frame providing a pair of horizontally spaced supports; a normally stationary sheave shaft; means for positioning end portions of said shaft upon said supports, said shaft being longitudinally slidable in said means when so positioned; means preventing endwise movement of said shaft in said means; a plurality of sheaves rotatably mounted upon said shaft; and relatively thin plates rigidly supported upon said frame and engaging said shaft between adjacent pairs of said sheaves to support a portion of the load imposed upon said shaft through said sheaves.

5. A shaft support for crown blocks comprising: a block having a bore for receiving a shaft, said block having a cavity connecting to said bore; a key block adapted to rest in said cavity; and a U-shaped member extending over said key block and downward therefrom for clamping said key block in said cavity.

6. A shaft support for crown blocks comprising: a block having a bore for receiving a shaft, said block having a cavity connecting to said bore; a key block adapted to rest in said cavity; and a U-shaped member extending over said key block and downward through the opening in said block for clamping said key block in said cavity.

7. A shaft support for crown blocks comprising: a block having a bore for receiving a shaft, said block having a cavity connecting to said bore; a key block adapted to rest in said cavity, said key block having an external channel; and a U-shaped member extending over said key block in said channel and downward through the opening in said block for clamping said key block in said cavity.

8. In a crown block construction, the combination of: a frame; a shaft carried by said frame; sheaves rotatable on said shaft; and means rigidly secured to said frame and extending between said sheaves in a manner to form partitions.

9. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; and partitions arranged between said sheaves.

10. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; and partitions arranged between said sheaves, said partitions having openings through which said shaft extends.

11. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; partitions arranged between said sheaves; and spacing means for fixedly spacing said partitions between said sheaves.

12. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; partitions arranged between said sheaves, said partitions having openings through which said shaft extends; and spacing means for fixedly spacing said partitions between said sheaves.

13. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; and partitions arranged between said sheaves, said partitions being supported by said frame and assisting said means to support said shaft.

14. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; and partitions arranged between said sheaves, said partitions having openings through which said shaft extends and said partitions being supported by said frame and assisting said means to support said shaft.

15. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizontally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; partitions arranged between said sheaves, said partitions being supported by said frame and assisting said means to support said shaft; and spacing means for fixedly spacing said partitions between said sheaves.

16. In a crown block construction, the combination of: a frame adapted to be positioned on a derrick, said frame providing horizon-

tally spaced supports; a shaft extending across said supports; means for connecting said shaft to said supports; sheaves on said shaft; partitions arranged between said sheaves, said partitions having openings through which said shaft extends and said partitions being supported by said frame and assisting said means to support said shaft; and spacing means for fixedly spacing said partitions between said sheaves.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 21st day of December, 1927.

EDWIN W. GOESER.