

Jan. 30, 1951

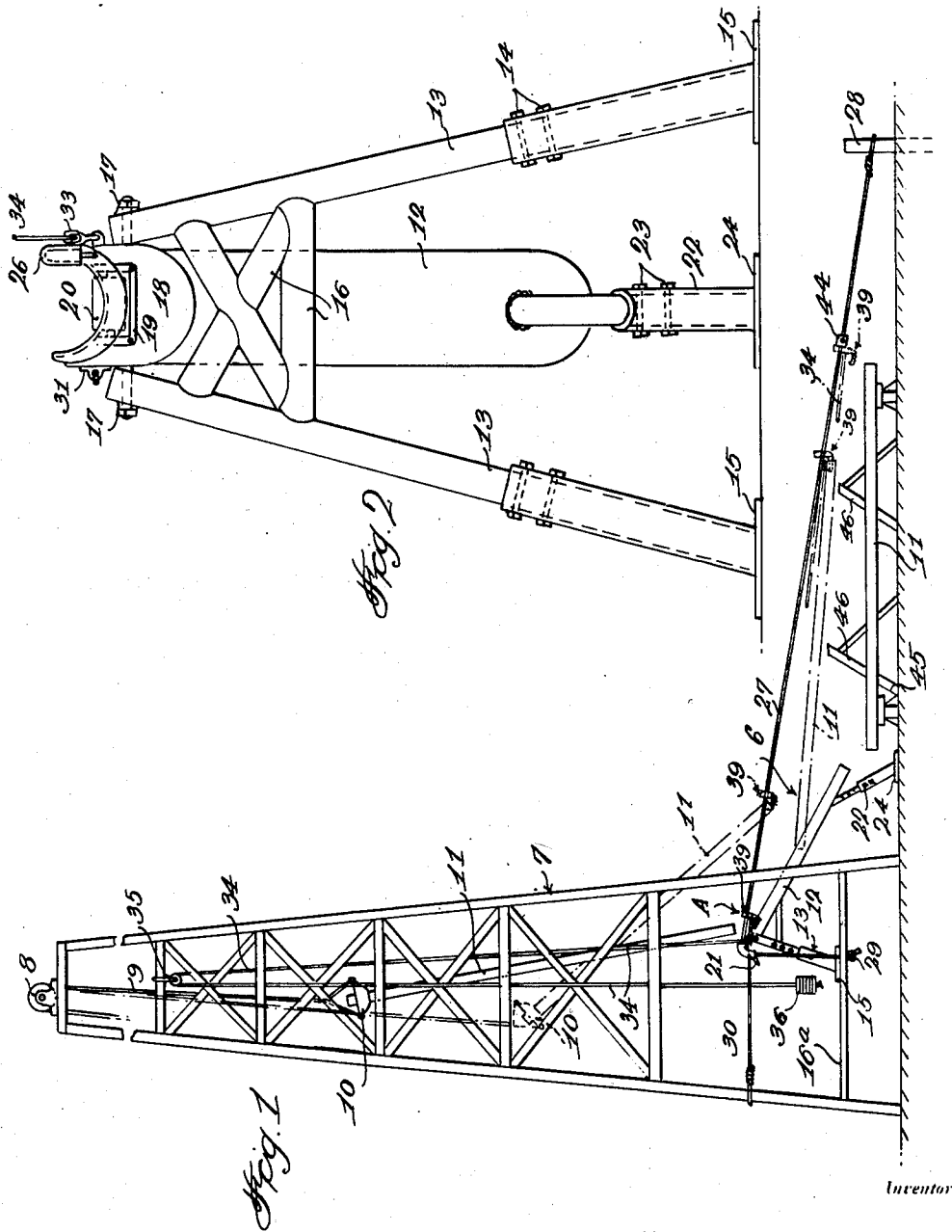
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2,539,751

DRILL PIPE HANDLING AND RACKING APPARATUS

Filed July 25, 1947

2 Sheets-Sheet 1



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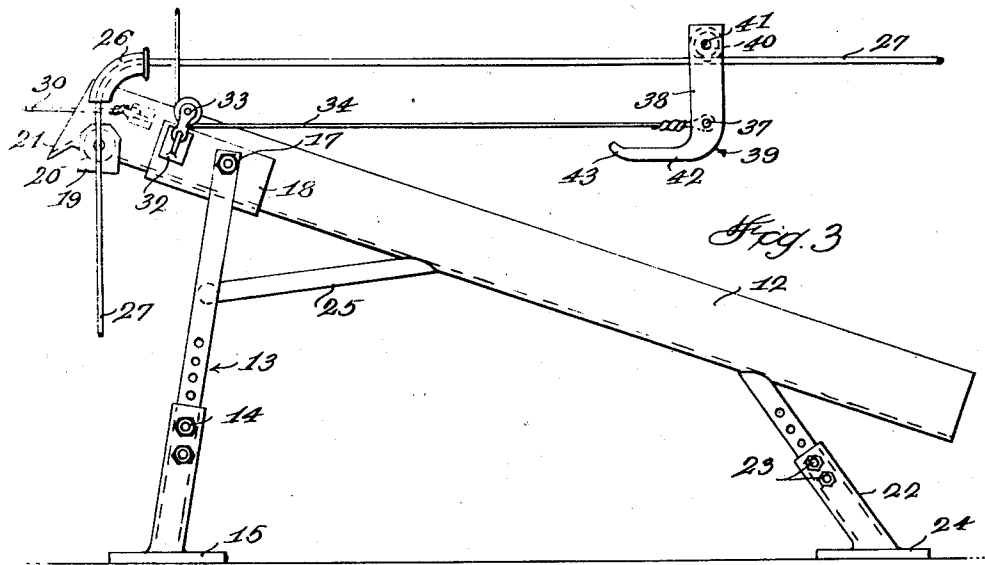
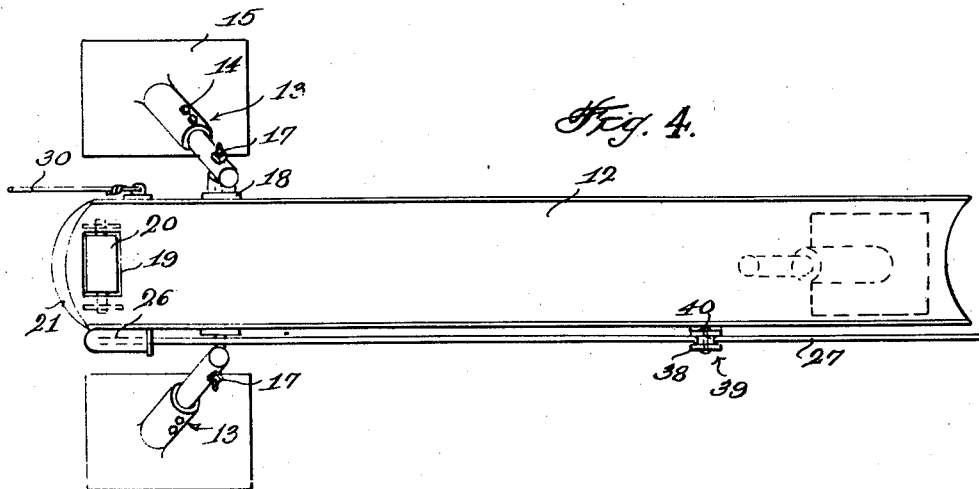
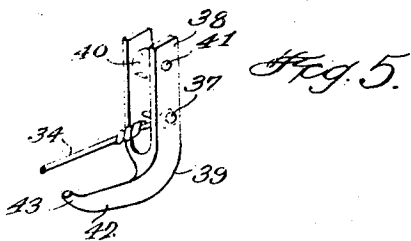
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DRILL PIPE HANDLING AND RACKING APPARATUS

Filed July 25, 1947

2 Sheets-Sheet 2



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2,539,751

DRILL PIPE HANDLING AND RACKING
APPARATUSEarl W. Olsen, Ventura, Calif., assignor of forty-
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Application July 25, 1947, Serial No. 763,649

3 Claims. (Cl. 214—1)

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This invention relates to drill pipe equipment generally and more particularly to an apparatus for use in conjunction with a conventional elevator of a derrick for racking drill pipe in a horizontal position as it is elevated from a well and disconnected from a string.

Among the primary advantages of the invention is to provide an apparatus which will enable drill pipes or tubes to be racked in horizontal position without danger to the operator; which will permit the racking of the pipe or tubing to be accomplished more rapidly and efficiently than by conventional methods, and which may be utilized to accomplish its intended purpose and to effect a reduction in cost of operation.

More particularly, it is an object of the present invention to provide a means for conveying and guiding the lower, free end of a drill pipe or tube to a position to be released onto or adjacent the stacking location of the pipes and which will automatically return to a position to engage another pipe and without requiring an operator for this purpose.

Still another and important object of the invention is to provide an apparatus which eliminates the need for extending the tie-back cable over the top of the derrick, as is conventional and required in pipe racking apparatus now in use, and which results frequently in injuries and fatalities to the workmen, due to the drill pipe elevators becoming fouled in the tie-back cable and prematurely releasing the drill pipe from an elevated position to fall onto the derrick floor therebeneath.

Still a further object of the invention is to provide a pipe racking and handling apparatus capable of being readily applied to conventional derricks for use in conjunction with the elevator thereof and without modification of the derrick or elevator structure.

Various and other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein—

Figure 1 is a side elevational view showing the apparatus applied to and associated with a conventional well derrick;

Figure 2 is an enlarged, rear elevational view of a portion of the apparatus, looking from left to right of Figure 1;

Figure 3 is an enlarged side elevational view of said portion of the apparatus;

Figure 4 is a top plan view thereof, and

Figure 5 is a perspective view of one element of the apparatus.

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The pipe handling and racking apparatus in its entirety is designated generally 6 and is intended for use in conjunction with various conventional well drilling rigs and is illustrated with a conventional derrick, designated generally 7 provided with a pulley block or sheave 8 at the upper end thereof over which is trained a flexible member or cable 9, one end of which, not shown, is adapted to be connected to suitable winding and unwinding apparatus and with the other, depending end thereof, attached to a conventional elevator 10, which is adapted to detachably engage a drill pipe 11, beneath the collar at the upper end thereof in a conventional manner, for hoisting the drill pipe away from a string being pulled from a well, not shown.

While the invention will be described in conjunction with the handling of drill pipe, it will be readily apparent as the description proceeds, that the apparatus 6 is equally well adapted for handling and stacking tubing, casings, rods and other elongated elements employed in connection with well drilling or similar operations.

The apparatus 6 includes an inclined slide or ramp 12 of arcuate cross section which is supported at one end thereof by a pair of extensible legs 13 formed of telescoping sections and which are capable of being secured in a plurality of adjusted positions by pins, bolts or other connecting means 14, extending through the telescoped portions thereof. The lower ends of the lower leg sections are preferably provided with plates or foot members 15 which may be disposed on and secured to any suitable supporting surface, such as the derrick floor 16a, as illustrated in Figure 1. The upper sections of the legs 13 are connected by cross and diagonal bracing means 16 and the upper ends of said upper sections of the legs 13 are provided with aligned openings for receiving bolts or trunnions 17 which project outwardly from opposite sides of a yoke 18 of arcuate cross section and in which the upper end portion of the ramp or slide 12 rests.

The upper end of the ramp or slide 12, above the yoke 18, is provided with a transverse well or recess 19 to receive a roller 20 which is journaled at its ends in suitable bearings of the ends of the well 19, and which has a portion of its periphery extending to above the inner or upper surface of the ramp or slide 12, for a purpose which will hereinafter become apparent. The ramp or slide 12 at its upper end and beyond the well 19, terminates in a downturned friction lip 21.

The forward or lower end of the slide or ramp 12 is supported by an extensible leg 22 which is

likewise formed of telescoping sections adjustably connected by fastening means 23, similar to the legs 13, and the upper section of which leg 22 is secured to the underside of the ramp 12 and the lower section of which is provided with a foot or base member 24 adapted to rest on and/or be secured to any suitable supporting surface. In Figure 1, the leg 22 is shown resting on a supporting surface, such as the ground, below the level of the derrick floor 16a, while in Figures 2 and 3, the legs 13 and 22 are shown resting upon the same supporting surface or supporting surfaces at the same level, to illustrate that due to the adjustability of said legs, the rear legs 13 may or may not be mounted upon the derrick floor 16a. A forwardly extending diagonal brace 25 is fixed to the brace means 16 of the legs 13 at one end thereof and has its opposite end disposed beneath and supporting the slide 12, intermediate of the ends thereof.

The slide 12 at its upper end, and at one side thereof supports a tubular elbow 26 which is suitably fastened thereto and has a flexible member such as a cable 27 extending therethrough and one end of which extends outwardly and downwardly over the slide 12 and to substantially therebeyond and which is suitably anchored to a post 28, as seen in Figure 1. The cable 27 is preferably formed of soft laid steel. The opposite end of the cable 27 extends downwardly from the elbow 26 and is suitably anchored, preferably by extending through the derrick floor 16 and being knotted therebeneath, as seen at 29 in Figure 1.

A safety rope 30 is anchored to the side of the derrick 7 remote to the slide 12 and is secured to an attaching bracket or eye 31 which is fixed to the slide 12 adjacent its upper end and preferably on the side thereof opposite to the elbow 26.

A retaining bracket 32 is preferably formed on or secured to the yoke 18, adjacent its upper end and at the side thereof on which the elbow 26 is mounted and said bracket 32 is fastened to a pulley 33, under which a rope or other suitable flexible member 34 is trained. The flexible member 34 extends from the pulley 33 in one direction upwardly and over a pulley 35, as seen in Figure 1, fastened in an elevated position to the derrick 7 and said end depends downwardly from the pulley 35 and has a weight or weights 36 attached thereto. The opposite end of the flexible member or rope 34 extends from the pulley 33 in a direction substantially parallel to the inclined end of the cable 27 and toward the anchoring stake or post 28 and is fastened at its terminal to a pin 37, which extends between the legs of the bifurcated upstanding shank 38 of a hook 39. Said bifurcated shank 38, above the pin 37 has a grooved roller 40 journaled between the legs thereof on a pin 41, extending therebetween and said grooved roller 40 is adapted to ride on the inclined portion of the cable 27, as best illustrated in Figure 3. The hook 39 is provided with a bill which includes a relatively elongated, substantially straight portion 42, which extends inwardly or toward the pulley 33 and which terminates in a restricted, upwardly inclined tip or terminal 43, for a purpose which will hereinafter become apparent.

As seen in Figure 1, the inclined portion of the cable 27 has a lock 44, adjustably secured thereto, at a point adjacent the anchor post 28 and which forms a stop for the hook shank 38, for a purpose which will hereinafter be described.

As seen in Figure 1, any suitable construction of rack 45 may be provided beneath the inclined portion of the cable 27 and between the lower end of the slide 12 and the anchor post 28 for supporting a plurality of lengths of drill pipe 11, racked in a horizontal position, and a slide 46 may be provided beneath the cable 27 and to one side of the rack 45 for deflecting the drill pipe 11, laterally onto the rack 45.

From the foregoing description, it will be readily apparent that the weight 36 will normally retain the hook 39, in its full line position of Figure 1, and adjacent to the pulley 33, as illustrated at A in Figure 1. Assuming that a drill pipe 11 has been attached in a conventional manner to the elevator 10 and has been raised by operation of the hoisting cable 9 so that the lower end thereof is out of engagement with the drill string and elevated to above said initial position of the hook 39. The hoisting cable 9 is then lowered slowly so that the lower end of the pipe 11 will engage the upturned tip 43 of the hook 39; said apparatus 6 being positioned with respect to the derrick 7 for accomplishing this engagement when the elevator 10 is lowered slowly with a drill pipe 11 suspended therefrom. The hoisting cable 9 is thereafter paid out to allow the elevator 10 to continue to move downwardly and as it does so, the weight of the pipe 11 will cause the hook 39 to travel downwardly along the inclined portion of the cable 27 toward the anchor post 28 as the elevator 10 moves downwardly to its dotted line position of Figure 1, and so that the pipe 11 will assume the dotted line position of Figure 1. Further lowering of the elevator 10 will cause the pipe 11 to assume substantially a horizontal position and with the upper portion thereof resting upon the roller 20. In this position, the hook 39 will have traveled still further in a direction toward the anchor post 28. When the pipe 11 is so disposed, the elevator 10 is disconnected therefrom and the weight of the pipe will cause it to travel over the roller 20 and to slide downwardly along the ramp 12, as illustrated in dotted lines in Figure 1, while forcing the hook 39 ahead of the lower or leading end of the pipe. At approximately the time that the upper or trailing end of the pipe 11 clears the lower end of the ramp 12, the bifurcated shank 38 of the hook 39 will strike the stop 44 and the momentum of the hook will thereby cause it to rock in a counterclockwise direction, as seen in Figure 1, to cause the tip 43 to disengage the leading end of the pipe 11 and so that said pipe can drop onto the rack 45, or onto the slide 46 to be conveyed laterally onto said rack 45.

During this movement of the hook 39 from left to right of Figure 1, it will be readily apparent that the rope or flexible member 34 will be moving in the same direction and so that the opposite end thereof, to which the weight 36 is connected will be elevated toward the pulley 35. Accordingly, after the pipe 11 disengages the hook 39, the weight 36 will cause the rope 34 to travel in the opposite direction for drawing the hook 39 to the left or back toward its initial position A of Figure 1 and into a position to be engaged by the lower end of the next drill pipe 11, which is raised to a position thereabove by the elevator 10.

From the foregoing it will be readily apparent that the operation of the handling and racking apparatus 6 is substantially automatic and so that no workmen are required adjacent the base of the derrick 7 and at a location where they would be

in danger should a breakage occur releasing the elevated drill pipe. Further, no part of the cable 27 extends above the slide 12, so that the danger of the drill pipe 11 becoming fouled and prematurely released by its contact or contact of the elevator 10 with said cable, as frequently occurs with other apparatus where a similar cable extends upwardly with respect to the derrick, is possible.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. In an apparatus for handling and stacking drill pipe or tubing, in combination with a well drilling derrick having a hoisting mechanism for elevating drill pipe, a handling and stacking apparatus comprising an inclined ramp, an inclined track disposed above and extending outwardly to substantially beyond said ramp, a drill pipe end engaging carrier movably supported on said track and movable to a position adjacent the upper end of the ramp for receiving and engaging the lower end of the drill pipe, when lowered by said hoisting means and for supporting and guiding said end outwardly and downwardly with respect to the ramp for positioning the opposite end of the drill pipe over the ramp and in a position to be engaged thereby when lowered to a predetermined extent and disconnected from the hoisting mechanism, said pipe being conveyed by gravity so that the last mentioned end thereof will slide downwardly and off of the lower end of the ramp and as the first mentioned, leading and lower end is supported and conveyed by said carrier, means for disengaging said carrier from the leading end of the pipe as the opposite end thereof clears the ramp, said track comprising a cable having an anchored end disposed remote to the lower, discharge end of the ramp and therebeyond, an elbow-shaped tube mounted on the upper end of the ramp and through which said cable extends, and means for anchoring the opposite end of the cable in a depending position to a floor portion of the derrick.

2. In an apparatus for handling and stacking drill pipe or tubing, in combination with a well drilling derrick having a hoisting mechanism for elevating drill pipe, a handling and stacking apparatus comprising an inclined ramp, an inclined track disposed above and extending outwardly to substantially beyond said ramp, a drill pipe end engaging carrier movably supported on said track and movable to a position adjacent the upper end of the ramp for receiving and engaging the lower end of the drill pipe, when lowered by said hoisting means and for supporting and guiding said end outwardly and downwardly with respect to the ramp for positioning the opposite end of the drill pipe over the ramp and in a position to be engaged thereby when lowered to a predetermined extent and disconnected from the hoisting mechanism, said pipe being conveyed by gravity so that the last mentioned end thereof will slide downwardly and off of the lower end of the ramp and as the first mentioned, leading and lower end is supported and conveyed by said carrier, means for disengaging said carrier from the leading end of the pipe as the opposite end thereof clears the ramp, said carrier comprising a hook having an upturned bill or tip portion to receive the lower end of the drill pipe and provided with an upstanding bifurcated shank portion having a

grooved roller journaled therein for engaging said track, a pulley supported in an elevated position on the derrick, a second pulley mounted adjacent the upper end of the ramp, a flexible member trained over said first pulley and under said second pulley and having one end fastened to the hook below the roller thereof, and a weight fastened to the opposite, depending end of said flexible member for returning the hook to its initial position, adjacent the upper end of the ramp after the hook has been tripped by engagement with said means and for urging the hook to rock in a direction toward the pipe for holding the bill of the hook in engagement with the lower end of the pipe.

3. In an apparatus for handling and stacking drill pipe or tubing, in combination with a well drilling derrick having a hoisting mechanism for elevating drill pipe, a handling and stacking apparatus comprising an inclined ramp, an inclined track disposed above and extending outwardly to substantially beyond said ramp, a drill pipe end engaging carrier movably supported on said track and movable to a position adjacent the upper end of the ramp for receiving and engaging the lower end of the drill pipe, when lowered by said hoisting mechanism and for supporting and guiding said end outwardly and downwardly with respect to the ramp for positioning the opposite end of the drill pipe over the ramp and in a position to be engaged thereby when lowered to a predetermined extent and disconnected from the hoisting mechanism, said pipe being conveyed by gravity so that the last mentioned end thereof will slide downwardly and off of the lower end of the ramp and as the first mentioned, leading and lower end is supported and conveyed by said carrier, means for disengaging said carrier from the leading end of the pipe as the opposite end thereof clears the ramp, said carrier comprising a hook having an upturned bill or tip portion to receive the lower end of the drill pipe and provided with an upstanding bifurcated shank portion having a grooved roller journaled therein for engaging said track, a pulley supported in an elevated position on the derrick, a second pulley mounted adjacent the upper end of the ramp, a flexible member trained over said first pulley and under said second pulley and having one end fastened to the hook below the roller thereof, and a weight fastened to the opposite, depending end of said flexible member for returning the hook to its initial position, adjacent the upper end of the ramp after the hook has been tripped by engagement with said means and for urging the hook to rock in a direction toward the pipe for holding the bill of the hook in engagement with the lower end of the pipe, and said means comprising a block fixed to the track for engaging the bifurcated upper portion of said shank, above the connection of the flexible member thereto, for causing the hook to rock on the track in the opposite direction or away from the pipe to disengage the bill of the hook therefrom.

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