DEVICE FOR POSITIONING A SECTION OF DRILL PIPE IN A DRILLING DERRICK

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Application July 15, 1953, Serial No. 368,193

2 Claims. (Cl. 214—2.5)

This application is directed to a device for positioning a section of drill pipe in a drilling derrick.

In the drilling of boreholes by the conventional method using a rotary drilling rig, it is customary when returning the drill bit into the borehole to move sections of the drill pipe from racking position at the side of the derrick to the center of the derrick by supporting them from the elevator attached to the traveling block. Since the suspended section of drill pipe is in effect a pendulum, it tends to oscillate. In order to couple the lower end of the suspended pipe with the upper end of the drill stem in the borehole, it is essential to stop such oscillation and to position the suspended section of pipe so that its center line coincides with that of the drill stem in the borehole so that the screw threads on the end of the suspended pipe may engage with or stab the threads on the upper end of the drill stem.

The present invention is directed to an assembly for absorbing the shock as a suspended section of drill pipe swings from racking position to the center of the derrick and for positioning the suspended pipe so that its center line coincides with that of the drill pipe in the borehole.

Other objects and advantages of the present invention may be seen from the following description taken in conjunction with the drawings in which:

Fig. 1 is a top view showing an embodiment of the present invention and,

Fig. 2 is a side view of the embodiment of Fig. 1.

In the drawing a conventional rotary table is shown consisting of a base member A and a part B which may be rotated with respect to member A by a suitable power means, not shown in the drawing, with the power transmitted through drive shaft C. As indicated in the drawing, the operation being conducted are such that member B is motionless and is provided with a set of slips D for restraining at least a portion of the drill stem in the borehole, the upper end of the drill stem being indicated by dashed lines E.

The assembly of the present application has as its main parts an auxiliary supporting member F, carriage G, cylinder H, piston power assembly I, pipe engaging member J, cylinder and piston power assembly K, latch assembly L, and valves M and N.

The lower end of supporting member F is attached to base A of the rotary table by any convenient means. In the drawing the attaching means are pins 11, 11. It will be understood that for convenience the pins 11, 11 may be readily removed so that the entire structure may be taken from the rotary table when it is desired to have the derrick floor clear.

Power cylinder and piston assemblies of the type designated I are well known to the art and in order to simplify the drawing the details of construction of this assembly are not shown. In the drawing it may be seen that cylinder 12 has piston rod 13 projecting from the end thereof. It will be obvious to a workman skilled in the art that a piston, not shown in the drawing, fits slidably within cylinder 12 and is attached to piston rod 13 so that the piston, not shown, and piston rod 13 slide together as a unit.

Cylinder 12 of assembly H is mounted on carriage G so that it may move arcuately. This mounting means is provided by the use of a pivotal mounting, 14 and a pair of springs 15, 15. Attached to the end of carriage G are a pair of brackets 16, 16 with a spring 15 mounted in each bracket so that one end of a spring is held by a bracket while the other end rests against cylinder 12 of assembly H. Thus cylinder 12 of assembly H can move through a limited arc about pivot 14, the limitations of arcuate movement being imposed by the length of the brackets 16 and the strength and design of the springs 15, 15.

Valve M may be conventional 4-way bleeder type compressed air valve having a neutral center position. Since such valves are known to the art, the details and construction are not shown in the drawing. Compressed air is supplied to the inlet of valve M from a suitable source of supply, such as an air compressor not shown in the drawing, connected to compressed air main O. The valve M is connected by delivery line 20 to the head end of cylinder 12 of assembly H. Through delivery line 21 to the piston rod end of cylinder 12. The movable part of the valve, not shown in the drawing, may be actuated by member 22 connected to operating handle 23. By way of convenience in explaining the operation of the device, it may be assumed that when handle 23 is in the position shown by solid lines in the drawing, the valve element is in its neutral position and holds the air pressure in the two delivery lines 20, 21 and when the handle is moved to the left to the position shown by dashed lines 24, the valve delivers compressed air to line 20 and bleeds air from line 21 and when the handle is moved to its right position as indicated by dashed lines 25 in Fig. 1 that it delivers compressed air to line 21 and bleeds air from line 20.

Thus when valve M is in its neutral position the cylinder and piston assembly N damp shock imposed on piston rod 13 from two directions. Longitudinal shock imposed from the left is damped by compressed spring assembly K. Cylinder 12 and lateral thrust is damped by springs 15.

The pipe receiving assembly J is provided with extending arms 30 and 31 having pipe engaging surfaces 30a, 31a, respectively, which form a V-shaped opening for receiving the section of pipe to be positioned. In the drawing a section of pipe is indicated by dashed lines 37 as being held in the center of the V-shaped opening. The arms 30, 31 of the pipe receiving assembly A, as shown, afford a large pipe receiving area whereby the pipe being received does not have to be precisely stabbed into the device, therefore eliminating any manhandling. This also affords a safety feature.

The means for latching or clamping a section of pipe in member J consists of latch assembly L and power cylinder and piston assembly K. The latching member L consists of member 32 secured to member J by a pivot 33. The power cylinder and piston assembly is conventional to the art and for this reason details of construction are not shown. In the drawing a cylinder 34 is shown with a piston rod 35 projecting therefrom. It will be understood that a piston, not shown in the drawing, is slidable arranged within cylinder 34 and is attached to piston rod 35. Piston rod 35 is secured to the end of pipe clamping member 33 by means of pivot pin 38, so that latching assembly L is actuated by the cylinder and piston power assembly K.

A suitable valve N is operatively connected to the cylinder piston and power assembly K. For illustrative
purposes, a handle actuated valve is shown in the drawing. This valve may be a conventional 4-way bleeder type valve. Since such valves are known to the art, the details of construction are not shown, in order to simplify the showing of the drawing. In the valve shown compressed air is delivered from a suitable source, such as an air compressor not shown in the drawing, through compressed air main O and the body of the valve is connected through delivery line 40 to the head end of cylinder 34 of assembly K and through delivery line 41 to the piston rod end of cylinder 34. For convenience in description of the operation of valve N, it will be assumed that when operating handle 43 is in the position shown by solid lines, compressed air passes from delivery main O through delivery line 40 to the head end and is bled by line 41 from the piston rod end of assembly K, thus biasing the piston, not shown, of assembly K to its left position and latching or clamping the section of pipe 37 in position as indicated in the drawing. Then when the operating handle is moved to the position indicated by dashed lines 44, compressed air is delivered through line 41 and bled from line 40, thus biasing the piston, not shown, in assembly K to the right position and causing the latch assembly L to release the stand of pipe from member J.

The assembly H with valve M serves several purposes. With the valve M in its neutral position, the compressed air in cylinder 13 acts as a spring member to absorb longitudinal shock. When compressed air is supplied through line 20 and bled to the atmosphere through line 21, the assembly serves as a positioning assembly to force member J to assume the position shown in solid lines in Fig. 1. When valve M is actuated to deliver compressed air through line 21 and bleed to the atmosphere from line 20, the assembly serves as a retracting means for member J, forcing member J to assume the position shown by dashed lines 45 in Fig. 1.

From the foregoing description, it will be seen that the assembly of the present application serves as a pipe positioning assembly for a section of pipe being moved from racking position to the center of the derrick and is provided with latching means for latching the pipe in a predetermined position. The assembly is provided with means for resisting and damping the shock imposed by the swinging section of pipe both along the longitudinal axis of the cylinder and piston assembly H and also laterally.

I claim:

1. A centering device for centering vertical sections of pipe in a drilling derrick having a rotary table comprising, in combination, a base member, a supporting member attached to said base member, a power piston and cylinder assembly consisting of a first and a second member one of which is a cylinder and the other of which is a piston with a piston rod attached thereto slidably arranged within the cylinder, means pivotally mounting said first member on said supporting member to move arcuately in a predetermined horizontal plane, a plurality of shock absorbing members secured to said supporting member and operably connected to said first member for restricting the horizontal arcuate movement of said piston and cylinder assembly and biasing same to a yieldable, relatively fixed position in said predetermined horizontal plane, a pipe receiving member secured to the second member, said pipe receiving member having an opening for receiving a section of pipe and means for releasably clamping said section of pipe in said pipe receiving opening.

2. A device in accordance with claim 1 in which the shock absorbing members comprise a pair of opposed helical coil springs.

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