

[54] **APPARATUS FOR SUPPORTING PIPE TONGS**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 104,865, Jan. 8, 1971, Pat. No. 3,703,111.

[52] U.S. Cl. **81/57.34**

[51] Int. Cl. **B25b 13/50**

[58] Field of Search 81/57.33, 57.34, 81/57.35, 57.2, 57.24, 57.40

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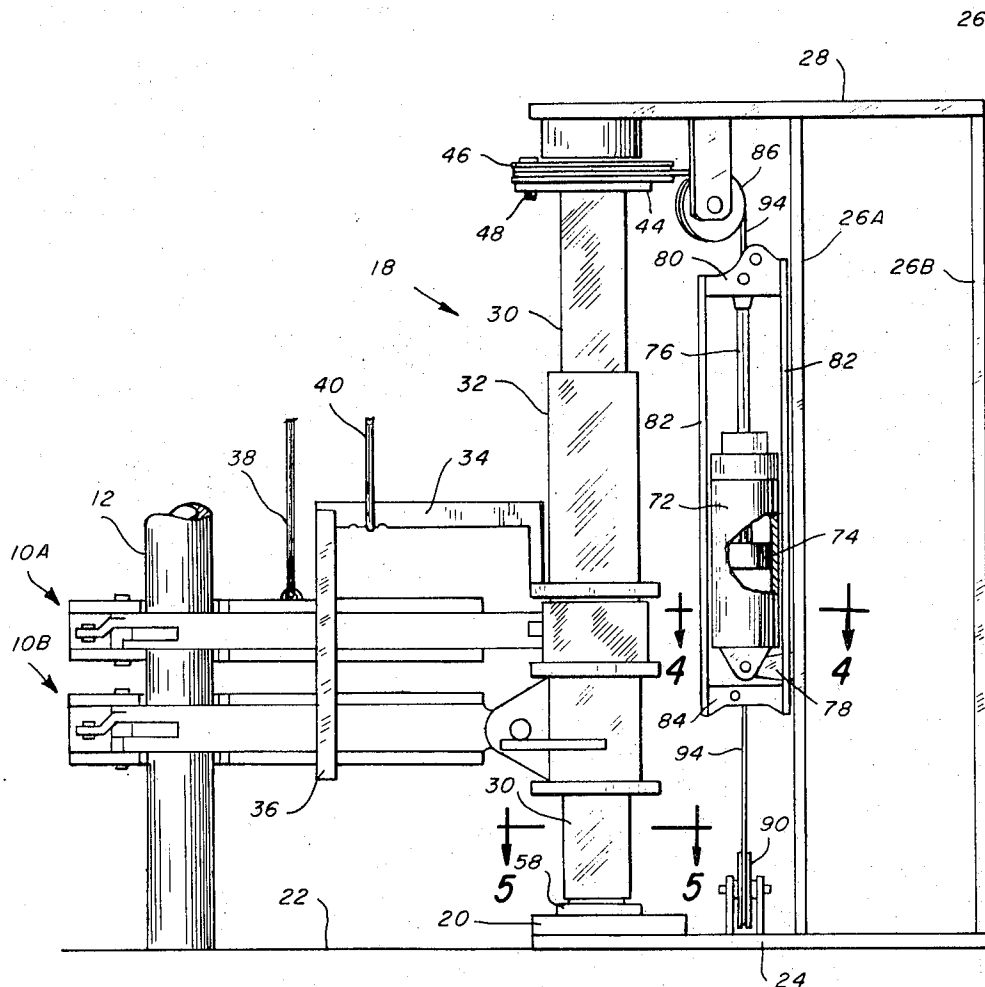
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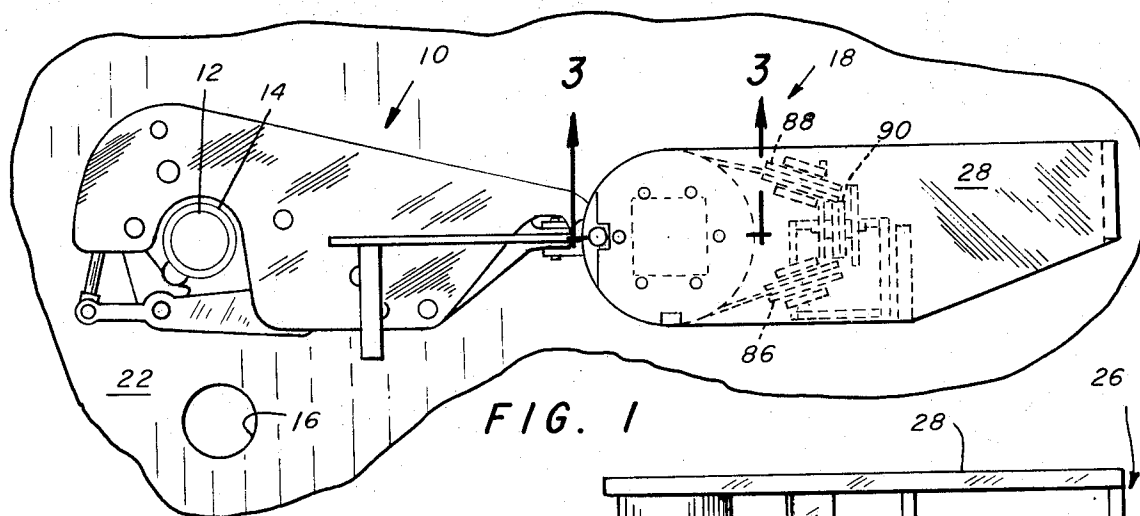
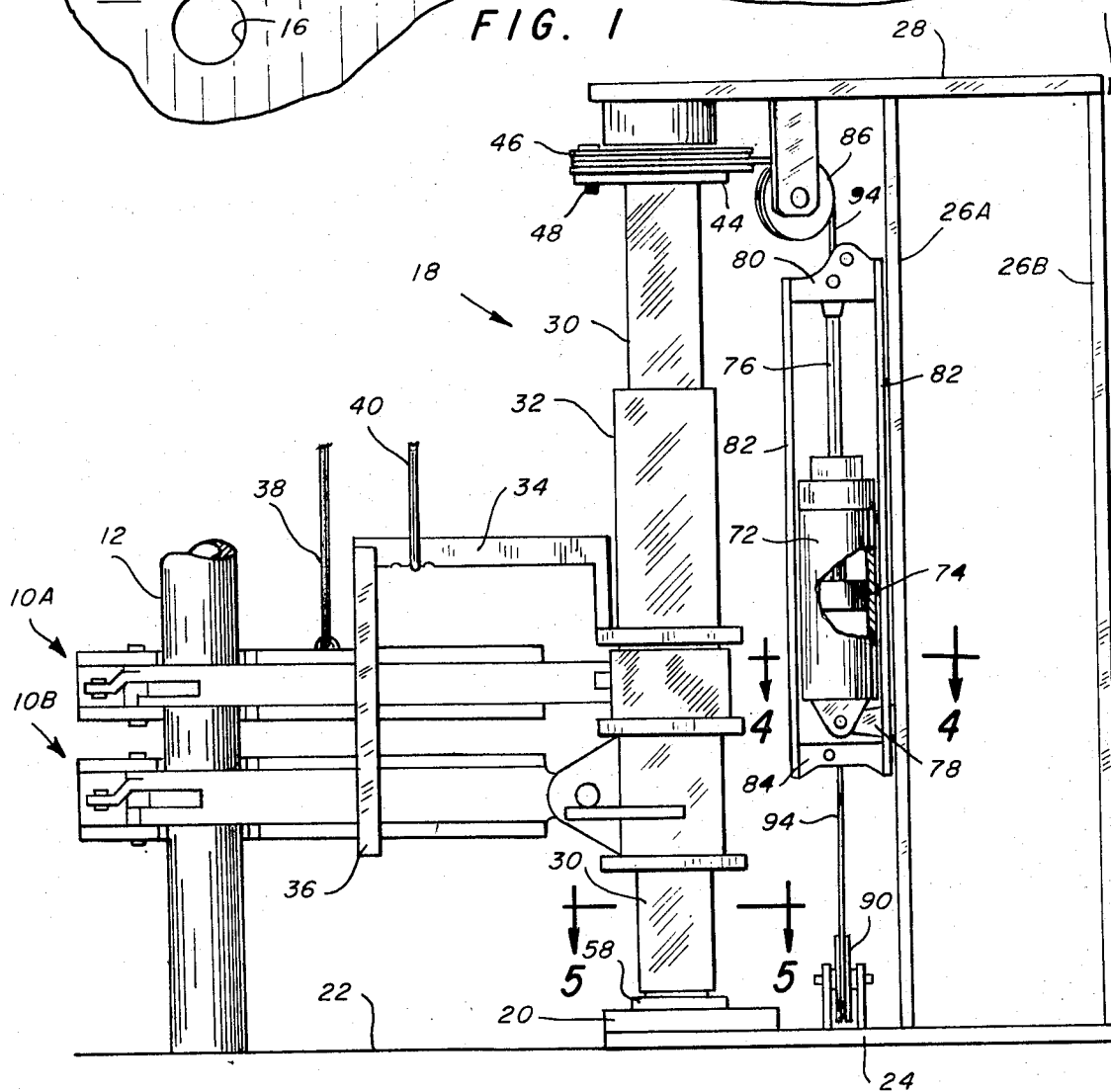
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ABSTRACT

An apparatus for supporting pipe tongs above a derrick floor including a pivot pad positioned on the derrick floor, a vertical support frame supported on the derrick floor having an upper horizontal arm portion extending above the pivot pad, a vertical pivot post rotatably supported between the pivot pad and the frame horizontal portion, the pipe tongs being affixed to and extending from the pivot post, and means of rotating the pivot post to thereby rotate the pipe tongs.

5 Claims, 6 Drawing Figures





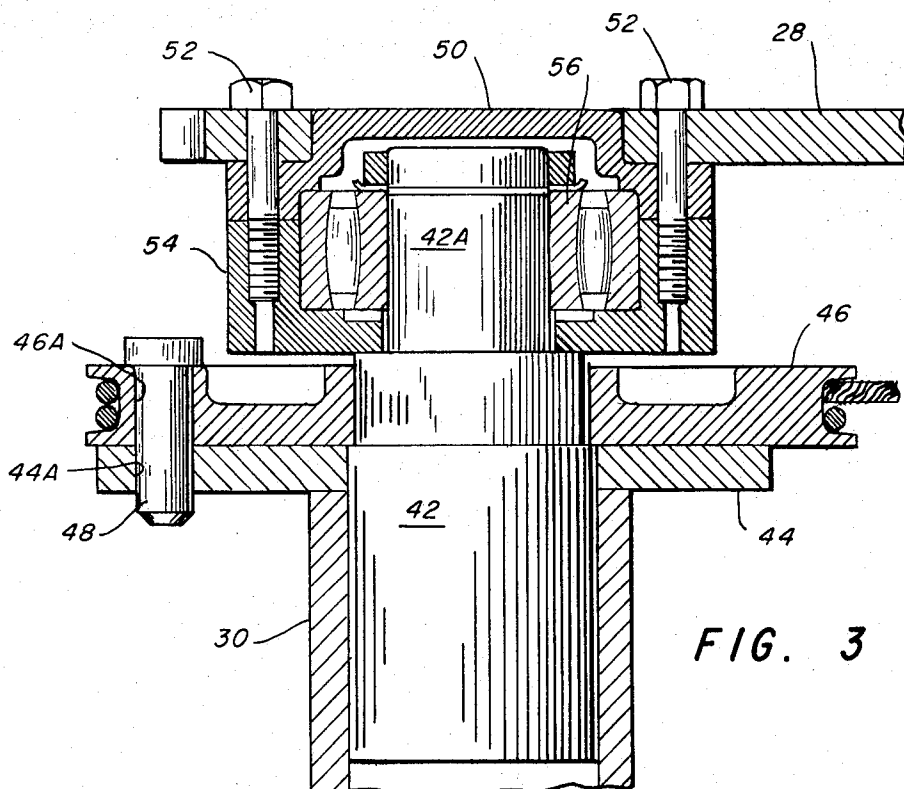


FIG. 3

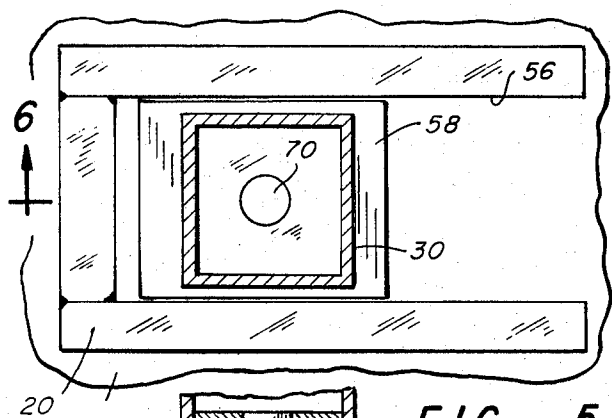


FIG. 5

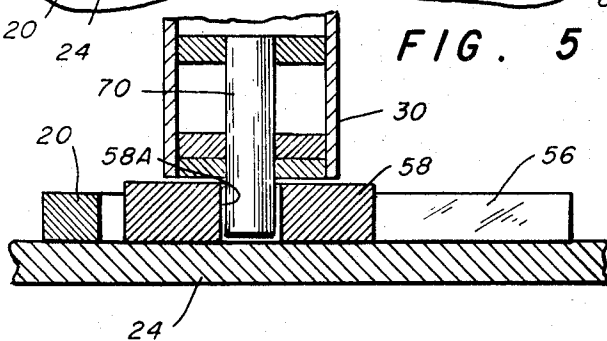


FIG. 6

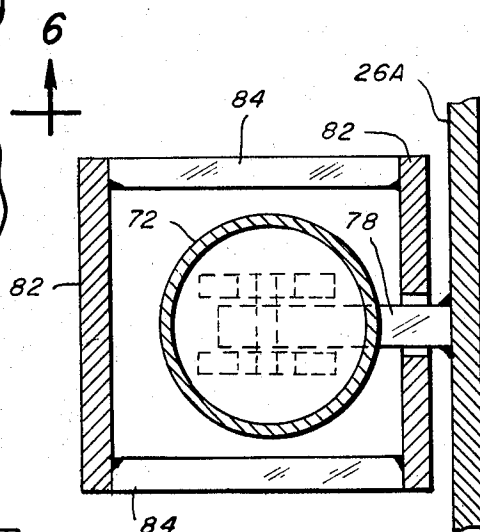


FIG. 4

APPARATUS FOR SUPPORTING PIPE TONGS

CROSS REFERENCE

This is a continuation-in-part of my copending application Ser. No. 104,865, entitled "Pipe Tongs," filed Jan. 8, 1971, now U.S. Pat. No. 3,703,111.

BACKGROUND, SUMMARY AND OBJECTS OF THE INVENTION

In my copending application I have described pipe tongs for use in drilling oil and gas wells. More particularly, the copending application describes power tongs for use in joining and disconnecting sections of pipe as utilized in the process of drilling oil and gas wells, and discloses means of rotatably supporting the tongs above a derrick floor. The present invention relates to an improved apparatus for supporting the pipe tongs above a derrick floor, and includes means of rotating the tongs as required.

It is therefore a general object of this invention to provide improved apparatus for supporting pipe tongs above a derrick floor.

More particularly, an object of this invention is to provide a support frame for supporting one or more pipe tongs above a derrick floor, including improved means for rotatably positioning the pipe tongs to facilitate moving the pipe tongs into and out of position for engaging drill pipe.

Another object of this invention is to provide improved apparatus for supporting pipe tongs above a derrick floor wherein the pipe tongs are rotatably positioned and including improved means of affording a change of inclination of the pipe tongs relative to the derrick floor to thereby permit the tongs to be moved from a drilling hole position to a mouse hole position, and vice versa.

Another object of this invention is to provide improved apparatus for supporting pipe tongs above a derrick floor including a hydraulic piston for rotatably positioning the pipe tongs.

These objects, as well as other more specific objects of the invention will be fulfilled in the following description and claims, taken in conjunction with the attached drawings.

DESCRIPTION OF THE VIEWS

FIG. 1 is a top view of pipe tongs positioned above a derrick floor and showing the apparatus of this invention for supporting the pipe tongs.

FIG. 2 is an elevational view of the apparatus of this invention.

FIG. 3 is an enlarged cross-sectional view of the upper portion of the apparatus taken along the line 3—3 of FIG. 1.

FIG. 4 is an enlarged view of the lower portion of the hydraulic jack and associated structural apparatus is utilized to rotate pipe tongs.

FIG. 5 is an enlarged cross-sectional view of the lower portion of the pivot post of the apparatus showing means for slidably supporting the pivot post on the derrick floor to permit slight pivotation of the pipe tongs as required in moving the tongs from one position to another.

FIG. 6 is a cross-sectional view taken along the lines 6—6 of FIG. 5 showing further details of the lower end of the pivot post.

DETAILED DESCRIPTION

In my above-mentioned copending patent application improved pipe tongs are described and an apparatus is shown for supporting the pipe tongs above a derrick floor. The tongs must be free to rotate completely away from the area of the drilled hole or well so as not to interfere with equipment utilized in various stages of completing a well. In addition, the pipe tongs of the type described in my copending application must be pivoted between positions immediately over the well and over a mouse hole in the derrick floor since in this way the tongs can be used to make up or break out over the well hole or make up or break out with the kelly over the mouse hole.

FIGS. 1 and 2 show pipe tongs, generally indicated by the numerals 10A and 10B, supported above a derrick floor. It is understood that tongs 10A and 10B form no part of the present invention and that the invention may be utilized with many different types of tongs which may have appearances altogether different than those seen in the drawings. Tongs 10A and 10B are shown positioned about a drill pipe 12 supported in a drilled hole or well 14. In making up and breaking out drill pipe the use of a mouse hole 16 is customarily employed. Thus the tongs 10A and 10B must be pivotal between positions over well 14 and mouse hole 16. In addition, tongs 10 must be pivotal completely away from the well 14 so as not to interfere with other activities concerning with drilling and completing an oil or gas well.

The tong support apparatus of this invention is generally indicated by the numeral 18 and may be utilized to support one or more tongs, although the customary practice is to utilize two tongs 10A and 10B which are supported parallel to each other and one above the other.

The tong support 18 includes a pivot pad 20 positioned on the derrick floor 22. In the illustrated arrangement pad 20 sits on a base 24. Extending upwardly from base 24 is a vertical support frame, generally indicated by the numeral 26, which may be formed of two components 26A and 26B as shown. The actual configuration of the support frame 26 is virtually unlimited and may be formed of a variety of combinations of beams, channels, T-sections, H-sections, etc.

Extending horizontally from the upper end of support frame 26 is an arm portion 28 which may also vary in structural detail.

Vertically extending between pivot pad 20 and arm portion 28 is a pivot post 30. A sleeve 32 is slidably received on post 30. Affixed to sleeve 32 are pipe tongs 10A and 10B. To support the pipe tongs a support arm 34 extends from sleeve 32 and includes a bracket 36 which extends downwardly to support the lower tong 10B. Cables 38 and 40 are used to counterbalance the weight of pipe tongs 10A and 10B, the cables typically extending over pulleys (not shown), each of the cables having a counterweight (also not shown) attached to the opposite ends to balance the weight of the tongs. The function of sleeve 32 is to provide vertical height adjustment for tongs 10A and 10B. The elevation or height of tongs 10A and 10B above the derrick floor 22 may be regulated such as by means of a hydraulically actuated cylinder and piston (not shown) attached between the derrick and counterweight secured to cables 38 and 40. The specific counterweight arrangement

and the means of controlling the elevation of tongs 10A and 10B are not part of this invention.

Pivot post 30 is preferably square or rectangular in cross section, as shown, and includes in the upper end thereof an axial cylindrical shaft extension 42 (see FIG. 3). Affixed to the upper end of pivot post 30 is a flange 44 and rotatably received about shaft extension 42 is a drum 46. Drum 46 is rotatably secured to flange 44 by means of a pin 48 extending through opening 44A and 46A.

The arm portion 28 receives the upper half of a bearing retainer 50. Bolts 52 engage the lower half 54 of a bearing retainer to thereby encompass a bearing 56. Pivot post 30 has a reduced diameter portion 42A which is received in bearing 56. Thus pivot post 30, having drum 46 affixed to it, is rotatably supported at its upper end by bearing 56 secured to arm 28. In addition, bearing 56 supports the weight of pivot post 30.

Referring to FIGS. 5 and 6, the lower end of the pivot post is shown and the relationship between it and the pivot pad 20 is illustrated. Pad 20 has a longitudinal slot 56. In essence the pad 20 can be formed such as by means of raised portions, as illustrated, positioned on the upper surface of base 24 or, if preferred, pad 20 may be formed of a member having the slot 56 machined into the upper surface. Positioned in slot 56 is a shoe 58 affixed to the lower end of pivot post 30. Shoe 58 has an opening 58A which receives a pin 70 extending axially downwardly from the lower end of post 30. In this way the post is rotatably positioned on the shoe 58 and a slight amount of pivotation is permitted between the post and the shoe. The weight of pivot post 30 is supported by the frame arm portion 28 through bearing 56 and does not bear on shoe 58.

It can be seen that the arrangement illustrated permits the shoe 58, and thereby the lower end of pivot post 30, to move laterally a short distance in slot 56. Such short lateral movement permits pivot post 30 to be inclined slightly relative to the vertical as pipe tongs 10A and 10B are moved between the drill hole and the mouse hole.

In order to position pipe tongs 10A and 10B to engage and disengage from pipe 12 it is necessary that the pivot post 30 be rotated. The means of providing for controlled rotation of the pivot post is an important part of this invention. Rotational force is applied to the pivot post 30 utilizing a hydraulic cylinder 72 (see FIG. 2). A piston 74 in the cylinder is secured to one end of a piston rod 76, the other end of which extends sealably through one end of the cylinder. The lower end of cylinder 72 is attached to a bracket 78 which extends from support frame portion 26A. Thus the cylinder 72 is held in fixed vertical position relative to the support frame 26.

The upper end of piston rod 76 is affixed to a cable connector 80. Extending downwardly from the ends of cable connector 80 are opposed paralleled portions of a yoke member 82 which connects to a lower cable connector 84. Thus as piston 76 is retracted and extended the upper and lower cable connectors 80 and 84 are concurrently raised and lowered.

Affixed to the lower surface of arm 28 are spaced apart pulleys 86 and 88. Supported to the upper surface of base 24 is a pulley 90. A cable 94 is attached to the upper cable connector 80, extends over pulley 86, around drum 46, over pulley 88, under pulley 90 and back up to connect to the lower cable connector 84.

As hydraulic fluid pressure is applied to cylinder 72 above piston 74 piston rod 76 moves downwardly. This moves cable 74 to cause drum 46 to rotate counter-clockwise, as seen from above in FIG. 1. This rotates the pipe tongs 10 towards well 14 or mouse hole 16. If hydraulic pressure is reversed, that is, applied to cylinder 72 below piston 74, the piston rod 76 moves upwardly, and pull is exerted on cable 74 causing drum 46 to rotate in the clockwise direction moving the pipe tongs away from well 14. Cable 94 and yoke member 82 form a complete loop having a length which remains the same as piston rod 76 is moved up and down to control the position of the pipe tongs. It can be seen that the location of pulley 46 at the upper end of post 30 permits the post to be pivoted slightly by shoe 58 sliding in slot 56 as the tongs are moved from over the well 14 to over mouse hole 16.

While the invention has been described with a certain degree of particularity it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of this disclosure. It is understood that the invention is not limited to the embodiment set forth herein for purposes of exemplification, but is to be limited only by the scope of the attached claim or claims, including the full range of equivalency to which each element thereof is entitled.

What is claimed:

1. An improved apparatus for supporting pipe tongs above a derrick floor comprising:
 - a pivot pad positioned on the derrick floor;
 - a vertical support frame supported to said derrick floor and having an upper horizontal arm portion extending vertically above said pivot pad;
 - a vertical pivot post rotatably supported between said pivot pad and said frame horizontal portion, the weight of the pivot post being supported by said frame horizontal portion, said pipe tongs being affixed to and extending from said pivot post; and
 - means of rotating said pivot post to thereby rotate said pipe tongs.
2. An improved apparatus for supporting pipe tongs above a derrick floor according to claim 1 wherein said pivot pad includes a parallel sided slot therein, and including:
 - a parallel sided shoe slidably positioned in said pad slot, said pivot post being rotatably supported on said shoe whereby said pivot post may be pivoted slightly to move said tongs between operable positions above a well hole and an adjacent mouse hole.
3. An improved apparatus for supporting pipe tongs above a derrick floor according to claim 1 wherein said means of rotating said pivot post includes:
 - a horizontal drum affixed coaxially to said pivot post;
 - a cable received on said drum; and
 - means of displacing said cable to cause said drum and thereby said pivot post to rotate.
4. An improved apparatus for supporting pipe tongs above a derrick floor according to claim 3 wherein said means of displacing said cable includes:
 - a cylinder having a piston therein and a vertical piston rod extending therefrom, said cylinder being supported to said support frame;
 - spaced apart first and second vertical pulleys supported to said support frame horizontal portion adjacent to said drum; and

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a lower pulley supported below said cylinder, said cable being looped around said drum, one end of said cable extending over one of said upper pulleys, and under said lower pulley, and attached to said piston rod, the other end of said cable extending over the other of said upper pulleys and attached to said piston rod whereby hydraulic pressure applied within said cylinder above said piston withdraws said piston rod within said cylinder, moving said cable and thereby said drum in one direction, and hydraulic pressure applied within said cylinder below said piston extends said piston rod and

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moves said cable and said drum in the opposite direction.

5. An apparatus for supporting pipe tongs above a derrick floor according to claim 4 including:

a vertical yoke member slidably encompassing said cylinder having an upper portion and a lower portion, one of said portions being affixed to said piston rod whereby said yoke is vertically displaced by said piston rod, one end of said cable being affixed to said yoke upper end and the other end of said cable being affixed to said yoke lower end.

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