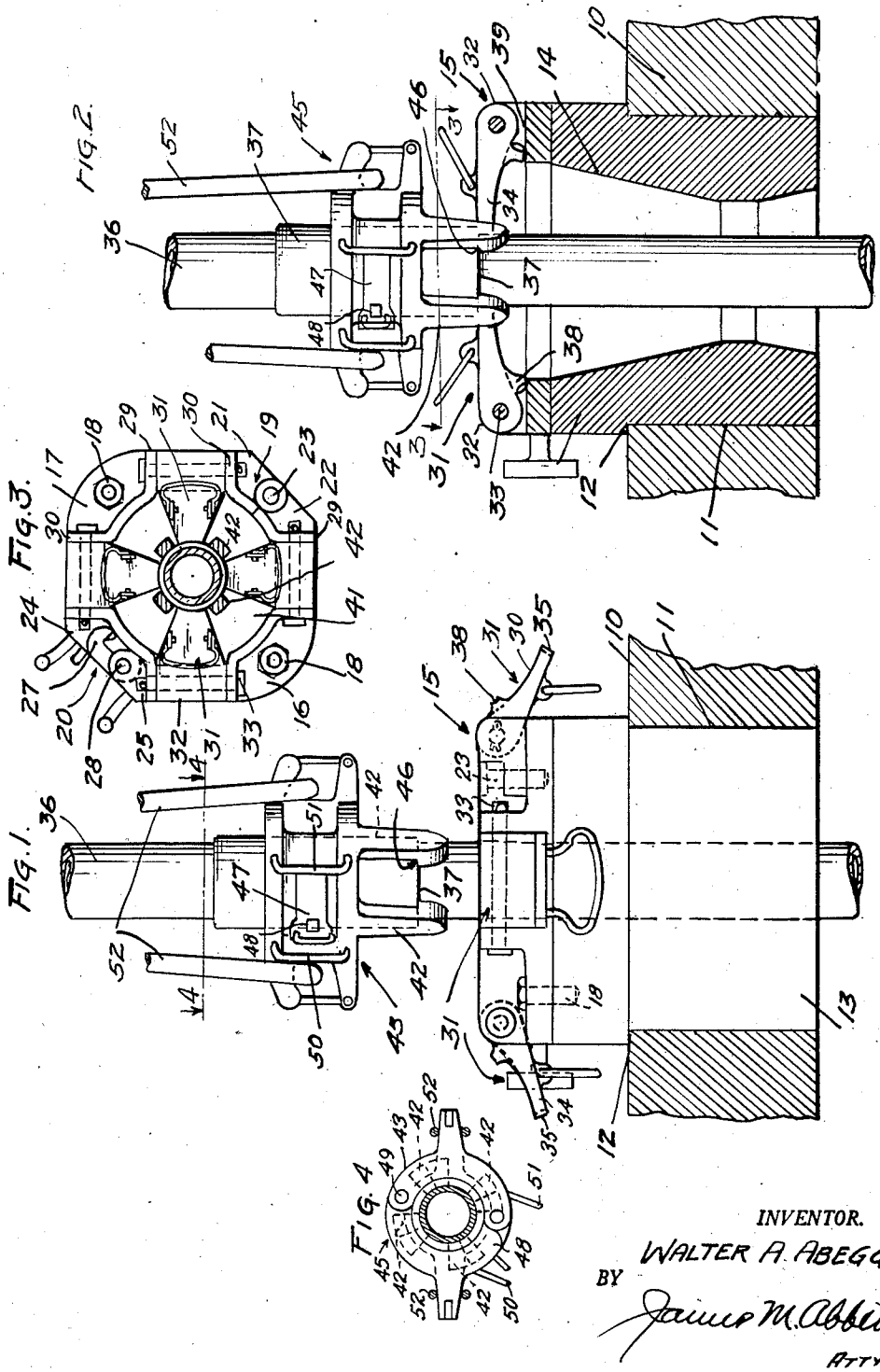
Nov. 7, 1944. W. A. ABEGG 2,362,042

ELEVATOR AND TABLE SUPPORT FOR DRILL PIPES

Filed Sept. 19, 1942 2 Sheets-Sheet 1



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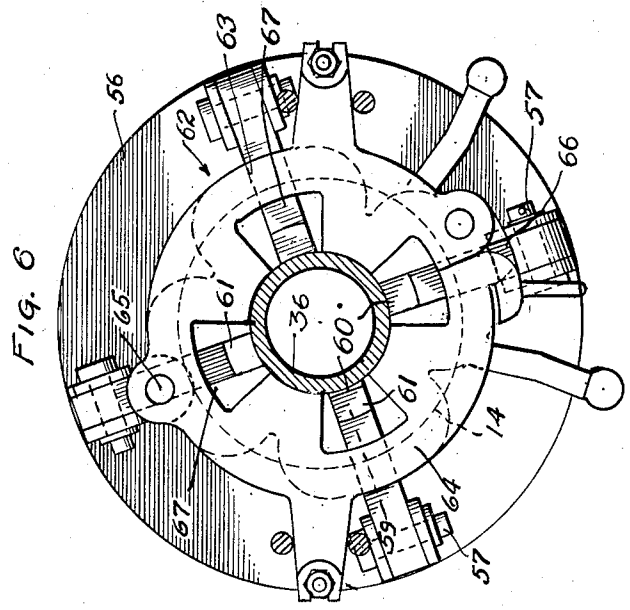


FIG. 6

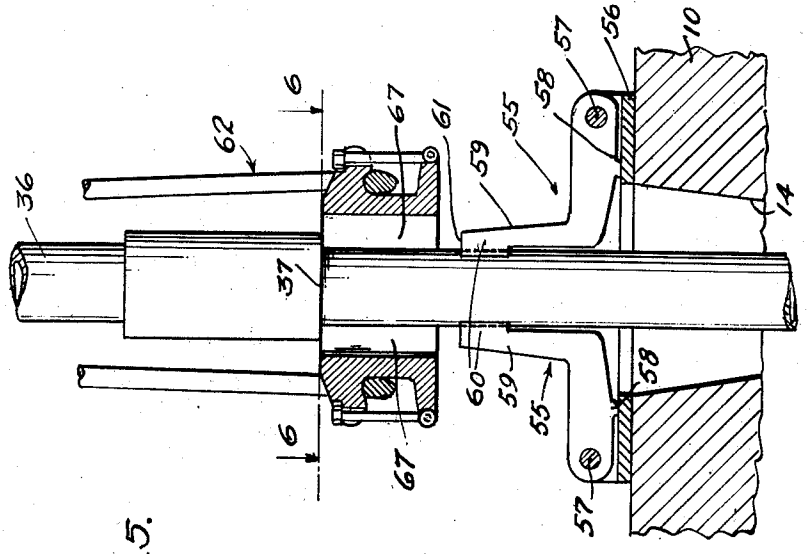


FIG. 5.

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Patented Nov. 7, 1944 2,362,042

UNITED STATES PATENT OFFICE

2,362,042

ELEVATOR AND TABLE SUPPORT FOR DRILL PIPES

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Application September 19, 1942, Serial No. 458,980

2 Claims. (Cl. 294—90)

This invention relates to oil well drilling equipment and particularly pertains to an elevator and table support for drill pipes.

It is common practice to support drill pipes which extend through a drill table by the use of drill slips. These slips have tapered back faces and wickered front faces. These faces provide a plurality of teeth which impinge against and into the outer surface of the drill pipe and create a substantially positive engagement therewith to hold the drill pipe against downward vertical movement. The gripping action is increased due to the fact that the weight of a suspended string of drill pipe will act to pull the drill slips downwardly into their tapered seats, and thus to force the drill slips outwardly to grip the pipe more firmly. This action is not detrimental when a drill string of ordinary drilling length is suspended from the table, but present practice contemplates the drilling of very deep holes, such for example as 15,000 feet, with the result that an enormous weight of drill string is suspended from the drill table and gripped by the tapered slips. In many cases this action causes the drill pipe to "bottle-neck"; that is, to be crushed inwardly to a smaller diameter, which weakens the pipe so that the tensile strain upon the pipe will damage it. It has been found desirable, therefore, to support the weight of the drill string, wherever practicable, from the enlarged collar portions of the tool joint. It will be understood that in early drilling practice the lengths of drill pipe were connected by threaded collars which were larger in diameter than the drill pipe, and that in later years separate tool joints have been threaded to the contiguous ends of the pipe and thereafter threaded together with a pin and box connection, or have been made integral with the pipe by an upsetting action. It is desirable to support long and heavy strings of pipe upon the lower shoulder of any one of this type of drill pipe connection, and to engage the pipe in the elevator by this shoulder as well as upon the rotary table. Certain attempts have been made to provide a drill string support which involved the use of two shoulders, one to support the drill string on the rotary table and the other to be engaged by the elevator before or after the drill string has been supported on the first mentioned shoulder. This method of handling drill pipe has not met with commercial success due to the fact that it is necessary to construct special tool joints or special pipe lengths having a plurality of shoulders, and this would render obsolete all of the drill pipe equipment now in use. It is desirable, therefore, to provide a structure which will operate with any of the standard types of drill string, and it is the principal object of the present invention to provide a bowl for the rotary table of a drill rig and an elevator, the two being so constructed as to insure that the elevator may grip and properly handle a string of pipe resting upon a tool joint shoulder, and that the string of pipe may be directly rested upon a support on the rotary table without inconvenience and without the necessity of using slips.

The present invention contemplates the provision of a rotary table bowl through which a string of drill pipe may be passed in either direction, and which is provided with means optionally controlled to engage a shoulder on the string of drill pipe and support the same in a manner to permit an elevator to lower a shoulder of said string of drill pipe onto the support or engage it and lift it therefrom.

The invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a fragmentary view in section and elevation showing the bowl portion of a rotary table and with a string of drill pipe supported upon an elevator prior to being seated on the bowl.

Fig. 2 is a view in section and elevation showing the position of the elevator and the bowl when the elevator has lowered the shoulder of the drill string to a weight supporting position on the bowl.

Fig. 3 is a view in horizontal section and elevation as seen on the line 3—3 of Fig. 2 and discloses the interrelation of the elevator and the bowl.

Fig. 4 is a view in plan showing the elevator construction as seen on the line 4—4 of Fig. 1.

Fig. 5 is a view in vertical section and elevation showing another form of the invention in which the supporting detents extend upwardly.

Fig. 6 is a view in transverse section as seen on the line 6—6 of Fig. 5 and shows the construction of the elevator structure used with the form of device shown in Fig. 5.

Referring more particularly to the drawings, 10 indicates the conventional rotary table of a well drilling rig formed with a central opening 11 therethrough and a shoulder 12 to receive a slip bowl 13. This bowl has a tapered opening 14 through it to receive the usual wickered slips, which are not here shown. It is understood, however, that slips might be utilized in the event it is found necessary to grip a pipe at a point be-

tween the tool joints for some emergency purpose. Mounted upon the top of the bowl is a fitting 15, which comprises corner sections 16 and 17, and which may be secured to the upper face of the bowl by bolts 18. By reference to Fig. 3 it will be seen that the corner sections 16 and 17 are secured over diametrically opposite corners of the bowl, and that at the two remaining corners a hinge section 19 and a locking section 20 are provided. The hinge section is formed of two parts 21 and 22 hinged together by a hinge pin 23. The locking section 20 is formed of parts 24 and 25. The section 24 carries a lug 26 and the section 25 carries a latch member 27 pivoted thereto upon a pin 28.

The corner sections 16, 17, 19 and 20 are formed with upstanding flanges, which provide portions 29 and 30 spaced from each other to receive drill string support detents 31. Due to the arrangement described there are four of these members radially disposed with relation to the vertical axis through the center of the bowl 11. These detents each have a boss 32 fitting between the members 29 and 30 and through which a hinge pin 33 extends, so that the detent may swing vertically from a position as shown in Fig. 1 of the drawings to the position shown in Figs. 2 and 3 of the drawings. Extending from the boss portion of each detent is a drill string supporting element 34. This element, when viewed in plan, as shown in Fig. 3, has oppositely inclined sides and terminates in a radial end face 35 adapted to substantially conform to the outer circumference of a drill pipe 36. It will be understood that the length of the members 34 of the detents is such as to permit the detents to swing toward and away from a horizontally aligned position without binding, and at the same time to project beneath the shoulder 37 of a tool joint carried by the drill string. The upper surface of the members 34 may be abraded or otherwise prepared so that they will have increased frictional engagement with the shoulder 37. Each of the extensions 34 of the detents is formed with a load bearing shoulder 38 which comes to rest upon the upper face 39 of the base portion 40. This base portion extends between the sets of members 29 and 30 and connects them so that the corner members 16 and 17 will be formed integral with complementary elements of the hinge corner 19 and the latch corner 20.

By reference to Fig. 3 of the drawings it will be seen that when the detents have been swung to positions in a common horizontal plane they will be arranged radially around the longitudinal axis of the drill pipe, and that triangular spaces 41 will occur between them. It is to be understood of course that while the drawings show four detents and four intervening spaces, that other numbers of detents and spaces may be used in the design of the device without departing from the spirit of the invention. The spaces 41 are provided to accommodate elevator fingers 42 which extend downwardly from collar sections 43 and 44 of the elevator structure 45. It will be seen that these fingers have tapered points, and that shoulders 46 are formed on their inner sides. These shoulders are intended to fit beneath and engage the shoulder 37 of a tool joint on a section of drill pipe when the member 45 is locked in position. The locking mechanism comprises the usual latch 47 pivoted to the member 43 and engaging a lug 48 on the member 44. It is understood that the arcuate sections 43 and 44 are pivoted together upon a pin 49, and that these sections may be swung toward and away from their embracing position by handles 50 and 51. The member 45 is carried by reins 52 so that the elevator may raise and lower a drill pipe 36, the shoulder 37 of which has been engaged by the shoulders 46 of the elevator fingers 42. It is also to be understood that the width of the fingers 42 bear such a relation to the width of the triangular openings 41 between the detents 31 as to permit the elevator to be latched or unlatched while the fingers are positioned within the openings.

In operation of the present invention a rotary table 10 is provided with a bowl 13 upon which a fitting 15 is secured. The detents 31 are swung normally to their outermost positions, as indicated in Fig. 1 of the drawings. The elevator is placed with its fingers 42 disposed around a drill pipe with the shoulders 46 of the fingers beneath the shoulder 37 of a tool joint on the drill pipe. Thus, the drill pipe may be run into the hole, and as the elevator reaches the horizontal plane of the top of the fitting 15 the detents 31 are swung inwardly so that the arcuate faces 35 will be arranged around the circumference of the body of the drill pipe 36. The elevator is then manipulated to cause the fingers 42 to pass downwardly through the openings 41 between the portions 34 of the detents, and when the shoulder 37 of the tool joint rests upon the upper faces of the extensions 34 of the detents further downward movement of the elevator will transfer the support of the drill pipe from the fingers 42. The latch structure 47 of the elevator may then be manipulated to release the elevator so that it can be withdrawn.

In the event it is desired to withdraw the drill string from the well bore a reverse operation may be performed. That is the elevator may be lowered so that the fingers 42 will pass downwardly and into the spaces 41 between the detents, after which the elevator may be latched in an embracing position around the tool joint, and then lifted. When it is lifted the shoulders 46 on the fingers will engage the shoulder 37 on the tool joint and act to lift the drill string, after which the detents 31 may be swung outwardly to a disengaging position if desired.

Referring particularly to Figs. 5 and 6, a slightly different form of the invention is disclosed, although the same desirable results are obtained. In this structure detents 55 are mounted upon a fitting 56 by pivot pins 57. The detents are formed with load shoulders 58 which limit the downward movement of the detents. The free ends of the detents carry upwardly extending arms 59 terminating in arcuate saddles 60 which conform to the outer circumference of the drill string 36. These members have an upper flat shoulder 61 against which the shoulder 37 of a tool joint may rest. The elevator structure, as shown in Fig. 6 and generally indicated at 62, is made in two halves 63 and 64. These halves are pivoted together by a pin 65. A latch 66 at the free ends of the members 63 and 64 hold the structure in an embracing position around the drill pipe 37. Extending longitudinally through the members 63 and 64 are passageways 67 which are here shown as being four in number to agree with the number of detents 55 mounted on the rotary table. These passageways accommodate the upwardly extending portions 59 of the detents as indicated by dotted lines in Fig. 6, thus allowing the drill string to be lowered until the elevator structure passes over the upwardly projecting portions 59 of the detents 55 and brings

the shoulders 37 of the tool joint to rest upon the shoulders 61 on the ends of the members 59. It will be evident that in using this type of device the same desirable results may be obtained as previously described, while permitting the drill string to be supported directly upon the shoulder of its tool joint when it has been lowered to this position by the elevator structure or permitting it to be engaged by the elevator structure while supported upon the detents 55.

It will thus be seen that the elevator and rotary table bowl construction here disclosed provides simple and effective means for handling tool joints and drill strings of conventional character and design without requiring any alteration in these parts, and makes it possible for the string of pipe to be moved or supported while the weight rests upon a shoulder of the drill string and is carried either by a shoulder on the elevator or a shoulder on the detent. This makes it possible to readily adapt this structure for use with the ordinary rotary table by a mere addition to the bowl of the rotary table, and also makes it possible to easily remove the structure and permit the bowl of the rotary table to be used in the customary manner with slips, particularly in the event that the drill string must be gripped at some point intermediate the tool joint collars.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of my invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A tubing elevator adapted to dispose a tubing in a position of rest upon a plurality of circumferentially arranged and spaced supports on a rotary table, said elevator including a split collar, and means for securing said collar in an embracing position around the coupling portion of a tubing, said collar portions carrying downwardly extending fingers, each formed with an inner horizontal shoulder upon which the lower shoulder of the tubing coupling may rest, said fingers being designed to pass downwardly and between the circumferentially arranged supports on the rotary table, whereby the tubing may be lowered to a position to dispose the lower shoulder of the tubing coupling upon said circumferential supports.

2. An elevator for tubing or the like, adapted to lower the shoulder of the tubing coupling into or lift said shoulder from supporting engagement with a plurality of circumferentially spaced members carried upon a rotary table, said elevator including a pair of arcuate collar sections articulately connected at their one ends and temporarily fastened together at their opposite ends to embrace the tubing collar, supporting reins engaging said collar sections, and downwardly projecting fingers carried by said sections, the fingers being circumferentially spaced with relation to each other to pass between the supporting elements on the rotary table, each finger having an inwardly extending horizontal shoulder to engage the lower shoulder of a tubing coupling and being formed with side faces converging toward the lower ends of the fingers, whereby the fingers may enter the spaces between the supporting members on the table.

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