

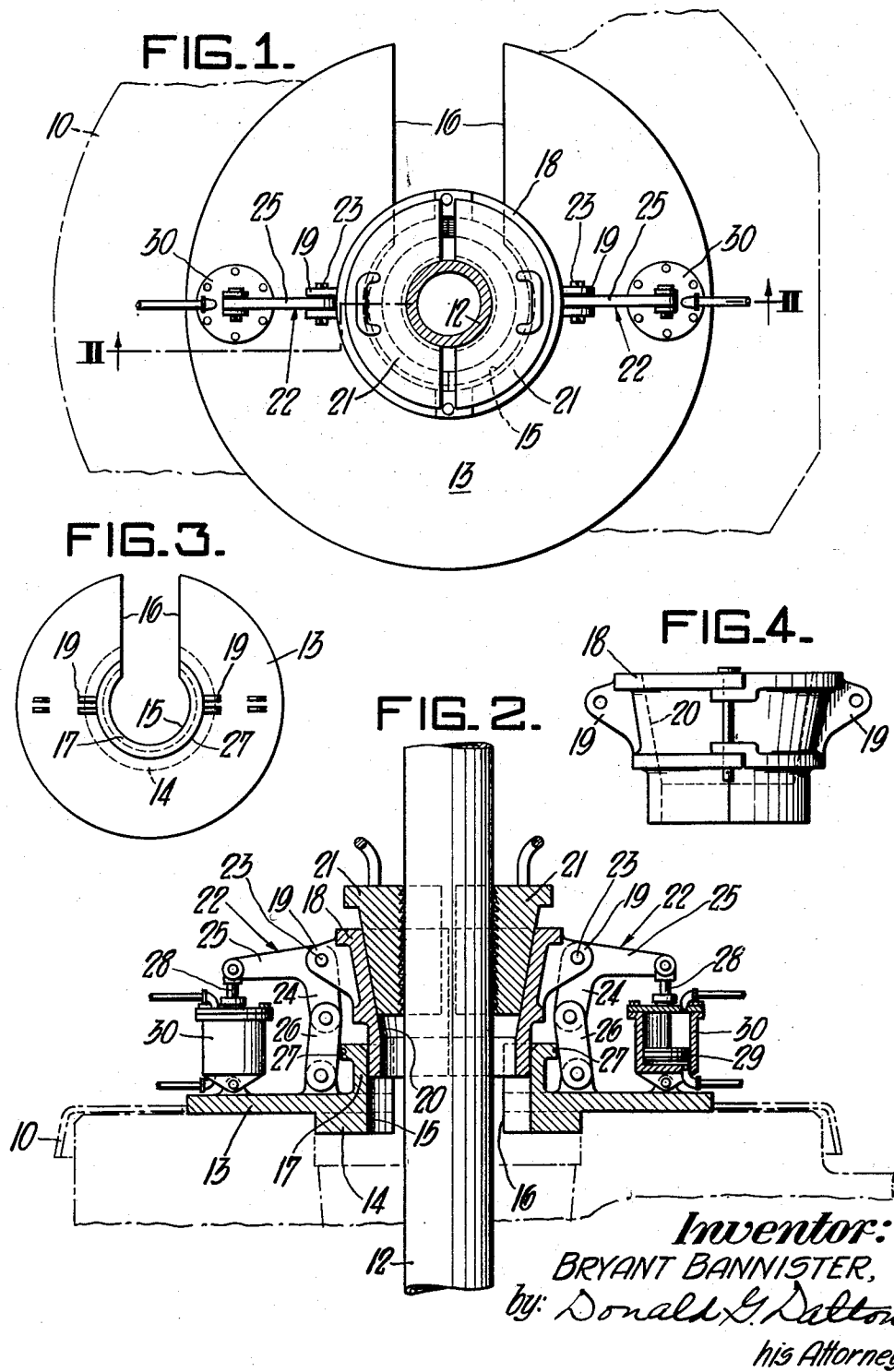
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OPERATING MECHANISM FOR ROTARY SLIPS

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OPERATING MECHANISM FOR ROTARY SLIPS

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2 Claims. (Cl. 24—263)

This invention relates to improved operating mechanisms for rotary slips used in well drilling.

In the well drilling art, a rotary is a gear mechanism which is situated at the top of a well for rotating the drill string. Rotary slips are wedge devices for supporting the weight of the drill string from the rotary, as becomes necessary while sections of drill pipe are being connected to or detached from the drill string. Normally the hoist and the drilling line support this weight. The usual rotary slips with which I am familiar in practice can be released only by operating the hoist and thus raising the drill string slightly, although I am aware of previous hydraulic and mechanical linkages for accomplishing such release. Release of slips by such previous mechanisms is somewhat time consuming and therefore adds to drilling costs.

An object of the present invention is to provide improved operating mechanisms which release rotary slips without hoisting the drill string and thereby conserve time.

A further object of the invention is to provide improved operating mechanisms which have a combination fluid pressure and mechanical linkage for releasing rotary slips from a drill string by lowering the supporting bowl instead of hoisting the drill string.

A further object of the invention is to provide improved operating mechanisms which have a mechanical linkage for furnishing a positive support for a drill string and a fluid pressure means for operating said linkage and lowering the supporting bowl and thus releasing the slips without operating the hoist.

In accomplishing these and other objects of the invention, I have provided improved details of structure, a preferred form of which is shown in the accompanying drawing, in which:

Figure 1 is a top plan view of a pair of rotary slips and an operating mechanism which embodies features of the present invention;

Figure 2 is a vertical sectional view taken substantially on line II—II of Figure 1;

Figure 3 is a top plan view of the base plate used for mounting this mechanism; and

Figure 4 is a side elevational view of the supporting bowl.

The drawing shows part of a rotary 10 and of a drill string 12, both of which can be of any standard construction. The mechanism of the present invention includes a base plate 13 which rests on the rotary and preferably has a depending flange 14 which fits within an opening of the rotary to position the mechanism. The base plate has a central passage 15 for the drill string and a radial slot 16 for installing or removing the mechanism over the drill string (Figure 3).

The upper face of the base plate carries an upstanding bowl guide 17. A bowl 18 is mounted in said bowl guide for vertical sliding movement, and has two sets of diametrically opposed, outwardly directed lugs 19. The bowl is formed of two halves hinged together at one edge and latched together at the other, as known in the art, so that it can be installed or removed around the drill string. The bowl has a central passage 20 which tapers downwardly. A pair of wedge-shaped slips 21 fit within said passage and are adapted to support the drill pipe in the usual fashion.

In accordance with the present invention, the lugs 19 on each side of the bowl have bell cranks 22 fulcrumed thereto on pins 23. Said pins are removable to enable the bell cranks to be detached from the bowl so that the bowl can open for removal from the base plate. Each

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bell crank has a downwardly directed arm 24 and an outwardly directed arm 25. A link 26 is pivotally connected to the lower extremity of each downwardly directed arm 24 and to the base plate. The upper edge of bowl guide 17 has an outwardly directed lip 27, which links 26 abut when the bowl is in its raised position. The bell cranks and links thus constitute a linkage for positively supporting the bowl in its raised position and, as hereinafter explained, for moving the bowl between its raised and lowered positions.

A piston rod 28 is pivoted to the outer extremity of each outwardly directed arm 25 and each piston rod is connected to a piston 29, which is reciprocally mounted in a fluid pressure cylinder 30. Said pistons and cylinders are double acting and can be either hydraulic or pneumatic. The lower ends of cylinders 30 are pivotally connected to the base plate. Preferably both pistons and cylinders are actuated from a common source so that the two pistons are raised and lowered together. The pistons and cylinders thus constitute a fluid pressure means for operating the linkage.

In operation, when the pistons are fully lowered and the bowl is in its raised position, the downwardly directed bell crank arms 24 and links 26 are slightly inward of the position in which they are aligned and links 26 abut lip 27. The slips 21 then can be inserted in the bowl for supporting the drill string 12. Arms 24, links 26 and lip 27 furnish a positive support for the bowl, slips and drill string. If the pistons are raised from this position, the bell cranks pivot upwardly and, after they pass the position in which their arms 24 and links 26 are aligned, they lower the bowl away from the slips to its lowered position. Thereupon the slips release their grip on the drill string and the slips can be removed. Thus it is unnecessary to operate the hoist even slightly to release the slips.

From the foregoing description, it is seen that the present invention provides a simple and effective operating mechanism for rotary slips and one which conserves time by eliminating the need for operating the hoist to release the slips.

While I have shown and described only a single embodiment of the invention, it is apparent that modifications may arise. Therefore, I do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

I claim:

1. An operating mechanism for rotary slips comprising a base plate adapted to be supported on a rotary, a bowl guide on said base plate, a bowl mounted in said guide for vertical movement between raised and lowered positions and having a downwardly tapering passage adapted to receive rotary slips, said bowl in its raised position being adapted to support the slips and a drill string and in its lowered position releasing the slips and drill string, a pair of bell cranks removably pivoted to said bowl and each having a downwardly extending arm and an outwardly extending arm, links pivoted to the downwardly extending arms of said bell cranks and to said base plate, said links and downwardly extending arms being inwardly of the position in which they are aligned when said bowl is in its raised position, means against which said links abut when said bowl is in its raised position, said bell cranks and links thus constituting a linkage for positively supporting said bowl in its raised position and for moving said bowl between its raised and lowered positions, and fluid pressure means connected to the outwardly extending arms of said bell cranks for operating said linkage.

2. An operating mechanism for rotary slips comprising a base plate adapted to be supported on a rotary, a bowl guide on said base plate, a bowl mounted in said guide for vertical movement between raised and lowered positions and having a downwardly tapering passage adapted to receive rotary slips, said bowl in its raised position being adapted to support the slips and a drill string and in its lowered position releasing the slips and drill string, a pair of bell cranks removably pivoted to said bowl and each having a downwardly extending arm and an outwardly extending arm, links pivoted to the downwardly extending arms of said bell cranks and to said base plate, said links and downwardly extending arms being inwardly of the

position in which they are aligned when said bowl is in its raised position, means on said bowl guide against which said links abut when said bowl is in its raised position, said bell cranks and links thus constituting a linkage for positively supporting said bowl in its raised position and for moving said bowl between its raised and lowered position, and fluid pressure means pivotally connected to the outwardly extending arms of said bell cranks and to said base plate for operating said linkage.

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