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L. LIBIN ET AL

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HOISTING PLUG FOR DRILLS

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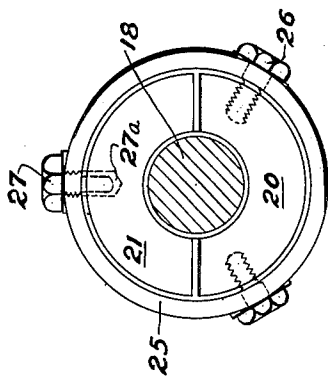
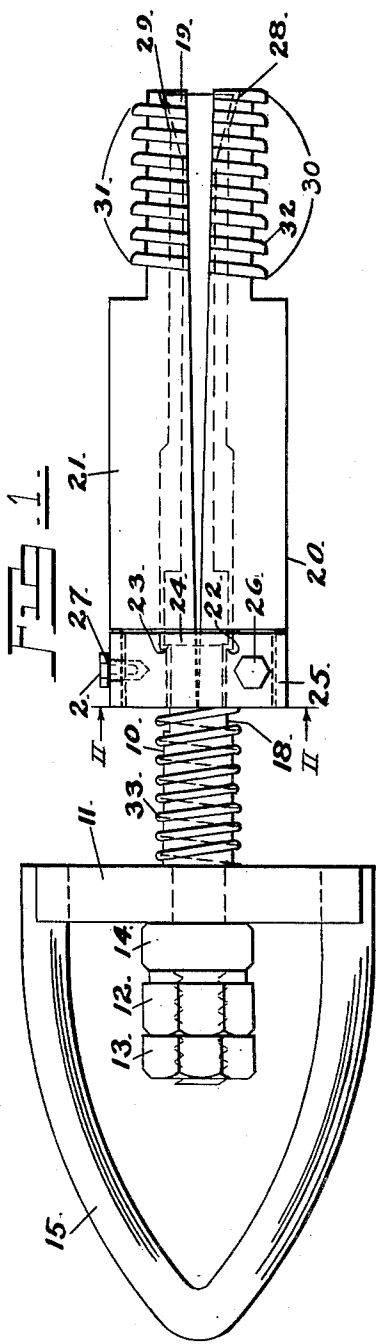


FIG. 2.

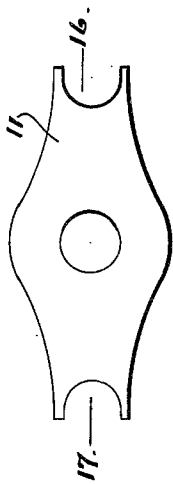


FIG. 3.

Inventor:
LESLIE LIBIN.
JOSEPH E. SPALDING.
By Smart & Biggar.
Attys.

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HOISTING PLUG FOR DRILLS

Leslie Libin and Joseph Edward Spalding,
Calgary, Alberta, Canada

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9 Claims. (Cl. 294—95)

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This invention relates to a device for use in raising and lowering flush-joint drill rods during drilling operations.

In earth drilling operations, particularly in drilling for oil or water, it is necessary as the drilling proceeds to add sections of drill rod. Similarly when raising the drill either for purposes of examining or repairing the drill head or when the drilling is completed it is necessary to disconnect sections of the drill rod as the same as raised.

Devices used in pulling operations generally consist of a solid piece of shaft, threaded at one end to fit the threads in the drill rod, and having a bail or loop on the other end for connection to the hoisting cable. Whenever it is desired for instance to remove a section of rod as the drill is being raised, this is done by unscrewing the device from the end of the uppermost section of rod, unscrewing the rod from the next section and screwing the device into the threads of the now uppermost section of rod. It is quite apparent that particularly where the drill hole is of considerable depth a large amount of time is consumed in screwing and unscrewing.

Our invention has as its principal object the provision of a device for raising and lowering drill rods of the flush-joint type which eliminates the necessity for screwing and unscrewing.

It is another object of our invention to provide a device of the type described which is simple in construction, rugged and positive in its action.

Various other objects and advantages of our invention will appear as the description thereof proceeds.

A device according to the invention comprising generally a pulling rod having bail means secured to the upper end thereof and having a conical plug portion at the lower end thereof, depressible jaw means designed to seat around said pulling rod and anchor band means for retaining the upper end of the jaw means in seated position around pulling rod. The jaw means comprises a plurality of jaw members, each of which has a threaded portion on the outer side of the lower end thereof designed to mesh with the inside threads of a flush-joint drill rod. Each of said jaw members is further provided with a conical face on the inner side at the lower end thereof which is adapted to cooperate with the conical plug portion on said pulling rod in such a manner that upward force applied to said pulling rod forces said jaw member outwardly into a secure engagement with the threads of the said drill rod, whereas radial pressure on said jaw member in

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the absence of upward force on the pulling rod causes downward displacement of said pulling rod allowing said jaw member to swing radially inwardly to disengage said threaded portion from the threads of said drill rod.

One embodiment of the present invention is illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal cross-section of a device according to the invention the lower end thereof being situated at the right hand side of the drawing.

Figure 2 is a cross-sectional view of the device taken along a plane II—II of Figure 1, showing the assembly of the floating jaw and anchor jaw within the anchor band.

Figure 3 is a plan view of the bail plate.

Referring now more particularly to the drawings, in the embodiment shown, the device consists of a pulling rod 10 passing through the bail plate 11 and secured thereto by the thrust nut 12 and lock nut 13. A thrust bearing 14 is provided between the thrust nut 12 and the bail plate 11 to relieve undue torsional stresses caused by turning of the drill rod. The bail 15 is secured to the bail plate 11 preferably by welding within the recesses 16 and 17 and is used for attachment of the hoisting cable. The pulling rod 10 is generally cylindrical in shape and is provided with the annular recess 18 for cooperation with the floating jaw and anchor jaw. The end of the rod is provided with a conical plug portion 19 and the major portion of the pulling rod between the recess 18 and the conical plug portion 19 may be of reduced diameter. The anchor jaw 20 and the floating jaw 21 which are generally complementary in shape and are designed to fit over the pulling rod 10 are provided with shoulders 22 and 23 respectively which are designed to abut against the shoulder 24 which forms the lower end of the annular recess 18 in the pulling rod 10. The anchor jaw and floating jaw are held in position about the pulling rod 10 by the anchor band 25 which is secured to the anchor jaw 20 by an anchor pin 26 on each side thereof. The anchor pins 26 are screw threaded both into the anchor band and into the anchor jaw. The floating jaw is secured in position by the lock pin 27 which is screw threaded into the anchor band 25 only, and the recess 27a is slightly enlarged to permit the floating jaw to rock slightly during engagement and disengagement. The lower ends of the floating jaw and the anchor jaw are provided with conical faces 28 and 29 respectively which are adapted to cooperate with the conical

portion 19 of the pulling rod 10 while the outer faces of the floating jaw and anchor jaw are provided with the thrust threads 30 and 31 respectively which are designed to cooperate with the internal threads at the end of a flush joint drill rod section. The threads 30 and 31 are preferably square on the thrust face but bevelled to a circular radius as for instance at 32 on the trailing face thereof to facilitate engagement with the drill rod threads.

The overall length of the floating jaw and anchor jaw is such that when the shoulders 22 and 23 abut against the shoulder 24 on the pulling rod 10 the conical faces 28 and 29 will engage the conical portion 19 of the pulling rod 10 and the lower ends of the floating jaw 20 and anchor jaw 21 will be maintained in an expanded position in which the threads 30 and 31 will engage the threads of a section of flush joint drill rod. As tension is applied to the bail for hoisting purposes the engagement between conical portion 19 and the lower faces 28 and 29 causes an outward pressure to be exerted by the threads 30 and 31, causing a very positive and secure engagement with the drill rod threads. When however the pulling rod slides downwardly with respect to the action jaw and floating jaw, the conical portion 19 no longer supports the conical faces 28 and 29 and the threads 30 and 31 may be disengaged from the threads in the drill rod by squeezing by hand the outside of the floating jaw 20 and anchor jaw 21. Actually in operation in squeezing the floating jaw and anchor jaw together a cam-like action is caused between conical portion 19 and conical faces 28 and 29 pushing the pulling rod in a downwardly direction and disengaging the threads in one motion. It will be appreciated that instead of the two jaw members 20 and 21, the device would be equally as effective if three or more jaw members were provided. In the case of three, for instance the jaw members would be designed to expand at an angle of 120° to each other. However, the device illustrated, comprising only two jaw members is to be preferred due to simplicity in construction and operation. The coil push spring 33 is provided to bias the threads 30 and 31 in the engaged position and to ensure a proper meshing of the threads with the threads in the drill rod before hoisting pressure is exerted. This prevents the threads becoming damaged due to pressure being exerted on the threads before they are properly meshed.

It will be apparent from the foregoing that the connecting and disconnecting of the drill rod puller described is a very simple matter, merely involving squeezing the device and inserting it or squeezing it and disconnecting it, and the saving in time involved will be appreciated when it is considered that some drill holes may employ a very large number of sections of drill rod.

While the invention has been described in relation to one particular embodiment thereof it is not to be limited thereto and various modifications of the device are contemplated within the scope of the appended claims.

We claim:

1. A device for use in raising and lowering flush-joint drill rods comprising a pulling rod having bail means secured to the upper end thereof, and having a portion of a conical plug at the lower end thereof, the surface of said plug being inclined at a substantial angle to the axis of said rod, jaw means depressible by slight inward pressure and having the upper end portions

thereof seated around said pulling rod, and anchor band means encircling the upper end of said jaw means so as to retain said jaw means in seated position, said jaw means comprising a plurality of jaw members, each of said jaw members having a threaded portion on the outer side of the lower end thereof for meshing with the inside threads of a flush-joint drill rod, the inner side of the lower end portion of said jaw members having surfaces mating with said inclined surface of said plug whereby upward force on said pulling rod forces said jaw members outwardly into interlocking engagement with the threads of said drill rod, and an inward radial pressure on said jaw members in the absence of upward force on said pulling rod causes downward displacement of said pulling rod allowing said jaw members to swing radially inwardly to disengage said threaded portion from the threads of said drill rod.

2. A device as defined in claim 1 in which said jaw means comprises an anchor jaw rigidly secured to the anchor band and a pivotal jaw which is maintained in pivotable relation to said anchor band.

3. A device as defined in claim 1 and spring means mounted between said bail and jaw means continually urging said jaw means downwardly whereby, due to the engagement of said conical plug portion with said mating surfaces, said threaded portions are normally extended outwardly to the engaged position.

4. A device as defined in claim 1 in which said jaw means comprises an anchor jaw rigidly secured to the anchor band and a pivotal jaw which is maintained in pivotable relation to said anchor band, the said jaw means being continually urged in a downward direction by spring means connected between said bail and jaw means, whereby, due to the engagement of said conical plug portion with said mating surfaces, said threaded portions are normally extended outwardly to the engaged position.

5. A device as defined in claim 1 in which said jaw means comprises an anchor jaw rigidly secured to the anchor band and a pivotal jaw which is maintained in pivotable relation to said anchor band, the upper end of the said jaw means having radially inwardly projecting shoulders being seated within an annular recess provided on said pulling rod, said jaw means being capable of limited longitudinal movement within said recess.

6. A device as defined in claim 1 in which said bail means comprises a bail and a bail plate having a central opening therein receiving the upper end of said pulling rod, the upper end of said pulling rod having a radially outwardly projecting shoulder butting against said bail plate, and means for securing said pulling rod in butting position on said bail plate.

7. A device as defined in claim 1, a shoulder on the upper end of said pulling rod, said bail means comprises a bail and bail plate bored centrally to receive the upper end of said pulling rod and abut against said shoulder thereof, and means for securing said pulling rod in position on said bail plate by securing means, thrust bearing means being provided between said bail plate and said securing means whereby to cushion torsional stresses in said pulling rod.

8. A device as defined in claim 1 in which said jaw means comprises an anchor jaw rigidly secured to the anchor band and a pivotal jaw which is maintained in pivotable relation to said anchor band, a shoulder on the upper end of said pulling

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rod, said bail means comprising a bail and bail plate having a central opening therein to receive the upper end of said pulling rod and abut against said shoulder, and lock nut means for securing said pulling rod on said bail plate, thrust bearing means located between said bail plate and said lock nut means whereby to cushion torsional stresses in said pulling rod.

9. A device for use in raising and lowering flush-joint drill rods comprising a pulling rod having bail means secured to the upper end thereof, and having a portion of a conical plug at the lower end thereof, the surface of said plug being inclined at a substantial angle to the axis of said rod, jaw means depressible by slight inward pressure and having the upper end portions thereof seated around said pulling rod, said jaw means being always slidable on said pulling rod, and anchor band means encircling the upper end of said jaw means so as to retain said jaw means in seated position, said jaw means comprising a plurality of jaw members, each of said jaw members having a threaded portion on the outer side of the lower end thereof for meshing with the inside threads of a flush-joint drill rod, said jaw members having an exposed portion above said threaded portion for application of depressing pressure, the inner side of the lower end portion of said jaw members having surfaces mating

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with said inclined surface of said plug whereby upward force on said pulling rod forces said jaw members outwardly into interlocking engagement with the threads of said drill rod, and an inward radial pressure on said jaw members in the absence of upward force on said pulling rod causes downward displacement of said pulling rod allowing said jaw members to swing radially inwardly to disengage said threaded portion from the threads of said drill rod.

LESLIE LIBIN.

JOSEPH EDWARD SPALDING.

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