

Nov. 6, 1928.

1,690,469

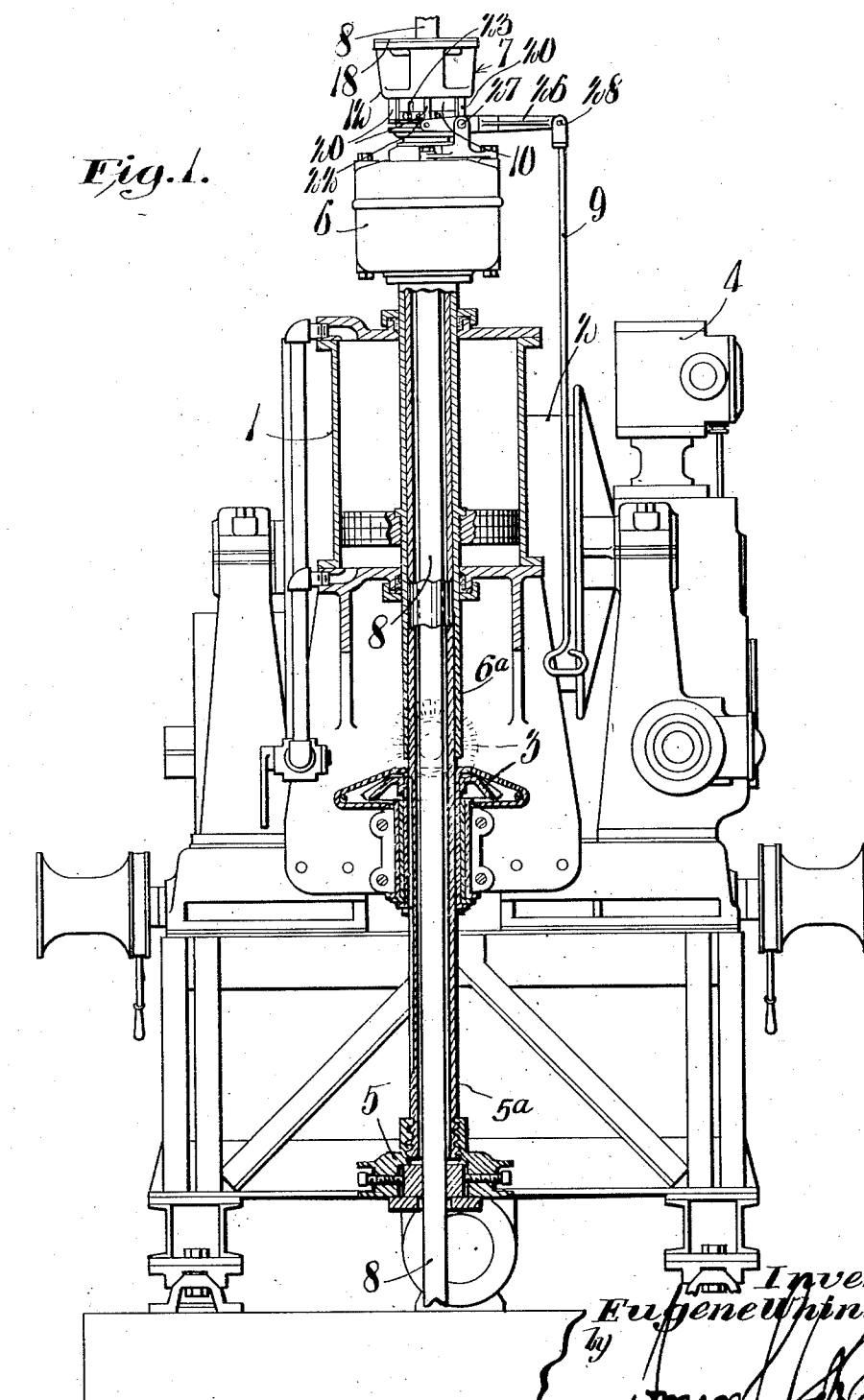
E. WHINNEN

DRILLING APPARATUS

Filed April 3, 1924

2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

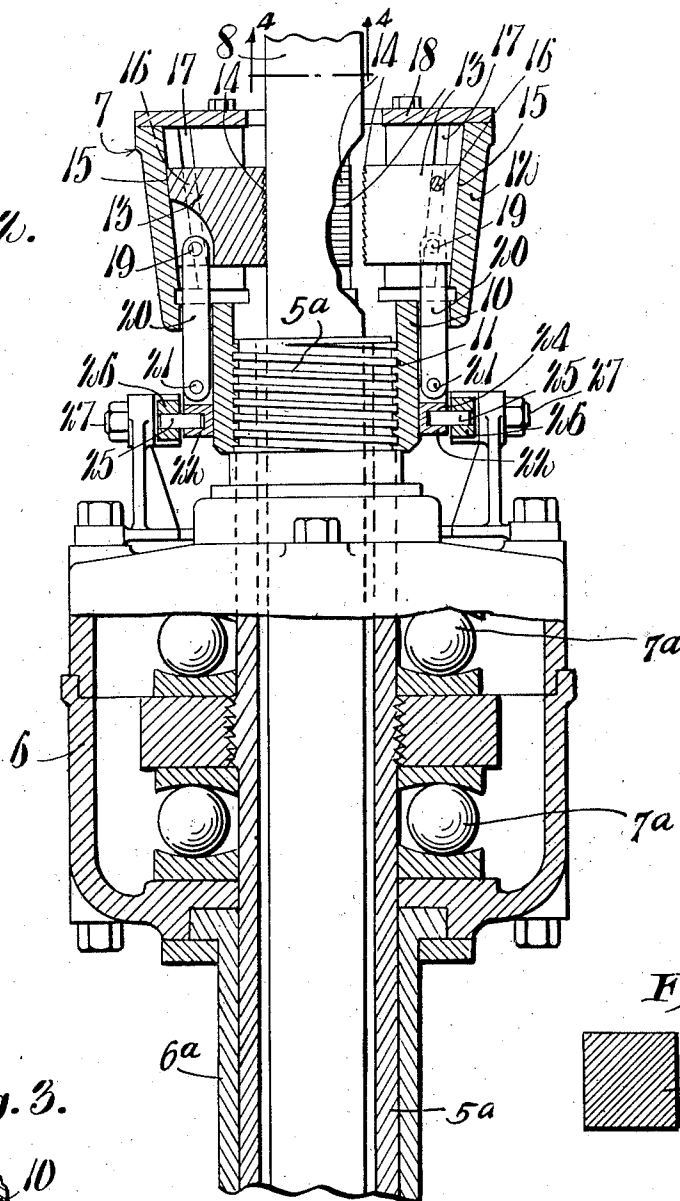


Fig. 3.

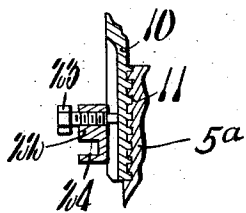
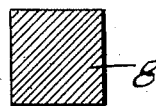


Fig. 4.



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UNITED STATES PATENT OFFICE.

EUGENE WHINNEN, OF LONG BEACH, CALIFORNIA, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

DRILLING APPARATUS.

Application filed April 3, 1924. Serial No. 703,957.

My invention relates to drilling apparatus.

It has for its object to provide an improved drilling apparatus and more particularly an improved drilling apparatus of the type adapted for oil or gas well work. A further object of my invention is to provide such an apparatus with improved means for controlling the rod line which is sure in operation and conveniently operable by an operator at his station near the drilling mechanism. A still further object of my invention is to provide an improved feed controlling mechanism especially adapted to use in connection with a grief stem whereby the rod line may be rotated while being lowered. These and other objects and advantages of my invention will hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a front elevation partially in section showing a drilling apparatus of the hydraulic core drill type equipped with my improvement.

Fig. 2 is an enlarged detail view of the controlling mechanism, certain parts being shown in section to facilitate illustration.

Fig. 3 is a detail view of part of this mechanism.

Fig. 4 is a transverse sectional view of the grief stem.

In this illustrative construction I have shown my improvement as applied to a core drill of a well known commercial type comprising a hydraulic feeding cylinder and piston 1, a hoisting drum 2, and rod line rotating mechanism 3, both of the latter being driven by a suitable steam engine 4, while a lower chuck mechanism 5 is provided beneath the cylinder and a usual swivel head 6 is disposed above the latter, the construction being such that the rod line may be fed longitudinally relative to the hydraulic cylinder and rotated while it is fed, improved controlling or upper releasable chuck mechanism, generally designated 7 and hereafter more particularly described, being herein disposed above the swivel head 6. More specifically it will be observed that the larger

bevel gear 3 is splined in operative sliding relation with the inner driving tube 5^a by which the lower chuck mechanism 5 is carried, in a well known manner. An outer tube 6^a is secured to the feed piston and extends upwardly within the usual swivel head 6. The collared upper end of the tube 5^a is journaled in usual ball thrust bearings 7^a supported within the swivel head 6. It will thus be evident that the gear 3 drives the inner tube and consequently the grief stem 8 while the outer tube permits the feeding of the grief stem upwardly or downwardly as desired, the thrust of the rod line being absorbed by the thrust bearings 7^a within the swivel head 6, all as well known in the art.

Referring more particularly to this construction, it will be noted that herein a grief stem 8 of square cross section is extended through the machine, this stem passing through the chuck mechanism 7, the head 6, the cylinder 1 and the lower chuck 5, the chuck mechanism 7 being adapted to control the freedom of movement of the stem 8 from a point adjacent the front of the drill as through a suitable operating member 9. Considering the upper chuck mechanism 7 more specifically, it will be noted that it comprises a casing member 10 threaded as at 11 on the tubular member 5^a rotated by the rotation mechanism and through which the stem 8 is passed. Moreover, it will be noted that this member 10 has an enlarged generally cup-shaped upper portion 12 carrying a plurality of wedge-like stem gripping members or slips 13 herein four, adapted to grip the four surfaces of the square stem and for this purpose provided with gripping surfaces 14 on their inner surfaces and opposite wedge surfaces 15 adapted to cooperate with corresponding surfaces on the member 12. Herein, it will be noted that these members 13 are each provided with pins 16 adapted to move in suitable guides 17 and the member 12, the guides 17 herein being disposed parallel to the wedge surfaces 15. Attention is also directed to the fact that a cover plate 18 having an axial opening therein for the stem, is disposed over the member 12 in such manner as securely to retain the members 13 in operative relation. It will also be noted that each of

these members 13 is pivotally connected as at 19 with a depending link 20 which extends downward through a suitable aperture in the bottom of the member 12 and is in turn pivoted at 21 to a member 22 rotatable with the member 10 and connected thereto by a set screw and slot connection 23 as shown in Fig. 3. As shown, this member 22 also has an annular groove 24 therein into which extend oppositely disposed pins 25 carried by an actuating lever 26 pivoted at a point near one of its ends at 27 and having a longer arm extending outward from the latter pivot and pivoted at 28 to the upper end of the member 9.

In operation the gripping members 13 operate by the wedge principle to hold the stem 8 and its connected rod line against downward movement from any given position and are releasable and connectible at will in such manner as to facilitate feeding. Thus, for example, when the feeding mechanism has been operated until the piston of the hydraulic feed 1 is at the bottom of the cylinder, the stem 8 is connected to the hoist 2 through a usual connection and operated in such manner that the weight of the stem 8 and rod line connected thereto is carried by the hoist. Then the lower chuck 5 is released and the member 9 is pulled down to throw up the short end of the lever 26 which in turn causes the members 13 to be raised and thereby release the stem 8 so that the piston of the hydraulic feeding mechanism 1 may be run up for a fresh feed. When the hydraulic has thus been run up, the member 9 is again pushed up in such manner as to cause the jaws 13 to grip the stem and the lower chuck 5 is then reset, whereupon the weight of the rod 8 and rod line is released from the hoist by slackening the usual connections and the feeding apparatus is prepared to feed down a further section of rod line. Another mode of operation is to set the clamp on the rods when the hydraulic piston is an inch or two from its lowest position and then run the piston down to release the jaws of the top clutch, this mode of operation minimizing clutch handling and the need for starting the hoist.

Further, it will be noted that I have herein shown my improvement as applied to use in connection with a core drill, it being especially desirable to operate a grief stem with such a drill where there is a large amount of mud or sand in the bottom of the hole and rotation of the rod line during lowering is accordingly desirable, or when the drill is doing fishtailing as during drilling in soft strata of no value, my improved construction wherein the coaxially disposed hydraulic mechanism imposes no limitation on the length of feed while the stem is rotating, enabling a core drill to operate with the facility of a rotary in meeting either of these conditions.

More particularly it will be noted that with my improved construction when lowering the rods by the hoist and simultaneously rotating the same, the mechanism 7 may be released, the grief stem 8 then being turned by the rotating mechanism through the usual lower chuck 5 which for the purpose is preferably provided with smooth jaws of suitable conformation or a suitable apertured plate as seems most desirable, although obviously if desired rotation may be effected through the top chuck mechanism in a similar manner. While not so satisfactory, the same result may also be obtained by simply loosening the jaws of the chuck 7, the lower chuck 5 then being disconnected. It will also be understood that this mechanism may be used if desired with oil or gas well drilling mechanism of the core drill type, the same then cooperating with the other controlling mechanism (not shown), such, for example, as the pressure controlling mechanism usually provided with core drilling mechanisms of well known commercial types now in general use. Attention is here also directed to the fact that when stems or rods of different section are used members 13 having different shaped gripping surfaces may be substituted readily.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms and applied to other drills than core drills without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A drilling apparatus comprising hydraulic rod line feeding mechanism, rod line rotating mechanism, and a plurality of chuck mechanisms for connecting the rod line in driving relation with said feeding and rotating mechanisms, one of said chuck mechanisms being connectible to and rotatable with the rod line, and operating means for substantially instantaneously connecting or disconnecting said last mentioned chuck mechanism at will, said operating means being operative to disconnect said chuck mechanism from the rod line during rotation thereof.

2. A drilling apparatus comprising a hydraulic rod line feeding mechanism, rod line rotating mechanism including a swivel head, a top chuck mechanism disposed above said swivel head, a cooperating bottom chuck mechanism disposed below said swivel head, said chuck mechanisms being adapted to connect the rod line in driving relation in said feeding mechanism, and operating means for said top chuck mechanism for substantially instantaneously connecting or releasing said top chuck mechanism including controlling

mechanism operable from a point substantially below said feeding mechanism.

3. Drilling apparatus comprising a hydraulic feeding mechanism, rotation mechanism including a chuck connectible to the rod line below said hydraulic mechanism, a swivel head connected thereto above said hydraulic mechanism, a releasable chuck mechanism operating at a point above said head, and means extending below said chuck mechanism for manually releasing or connecting the same.

4. Drilling apparatus comprising a hydraulic feeding mechanism, rotation mechanism including a chuck connectible to the rod line below said hydraulic mechanism, a swivel head connected thereto above said hydraulic mechanism, and a releasable and connectible wedge mechanism operating at a point above said head.

5. The combination with a core drilling mechanism, of rod line feeding mechanism, a grief stem and rotating and connecting mechanism including a plurality of chuck mechanisms operating on said grief stem, one of said chuck mechanisms being connectible to and rotatable with said grief stem, and operating means for substantially instantaneously connecting or releasing said last mentioned chuck mechanism at will, said operating means being operative to disconnect said chuck mechanism from the grief stem during rotation thereof.

6. The combination with a core drilling mechanism, of rod line feeding mechanism, a grief stem, and rotating and connecting mechanism including a plurality of chuck mechanisms operating on said stem, one of said chuck mechanisms being connectible to and rotatable with said grief stem, and operating means for substantially instantaneously connecting or releasing said last mentioned chuck mechanism at will, said operating means being operative to disconnect said last mentioned chuck mechanism from said grief stem during rotation thereof.

7. The combination with drilling mechanism including a hydraulic feeding mechanism and rotation mechanism including a final driving element, of means including mechanism coaxial with said feeding mechanism whereby a rod extending axially there-through and through said rotation element may be rotated during lowering beyond the feeding range of said hydraulic, said rod being freely movable through said feeding and rotation mechanisms while rotation thereof by said rotation element is continued.

8. The combination with drilling mechanism including a hydraulic feeding mechanism and rotation mechanism including a final driving element, of means including chuck and rotating devices coaxial with said feeding mechanism whereby a rod extending axially through said feeding mechanism and

said rotation element may be rotated during lowering beyond the feeding range of said hydraulic, said rod being freely movable through said feeding and rotation mechanisms while rotation thereof by said rotation element is continued.

9. The combination with drilling mechanism comprising a hydraulic feeding mechanism and rotation mechanism including a final rotation element, a rod extending axially through said feeding mechanism and said rotation element, and means including mechanism through which said rod is likewise passed whereby said rod may be rotated during lowering beyond the feeding range of said hydraulic, said rod being freely movable through said feeding and rotation mechanism while rotation thereof by said rotation element is continued.

10. In combination with drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein, a rod extending axially through said cylinder, and means including a releasable chuck engaging said rod whereby said rod may be rotated during lowering beyond the feeding range of said hydraulic.

11. In combination with drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein, a rod extending axially through said cylinder, and means including cooperating chuck and rotating members through which said rod is likewise passed whereby said rod may be rotated during lowering beyond the feeding range of said hydraulic.

12. In combination with drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein, a rod extending axially through said cylinder, and means including a releasable chuck engaging said rod at a point above said hydraulic whereby said rod may be rotated during lowering beyond the feeding range of said hydraulic.

13. In combination with drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein, a rod extending axially through said cylinder, and means including a releasable chuck engaging said rod at a point above said hydraulic and a cooperating rotating means likewise engaging said rod whereby said rod may be rotated during lowering beyond the feeding range of said hydraulic.

14. In combination with drilling mechanism comprising a hydraulic feeding mechanism including feed cylinder and piston elements, a swivel head above the latter, and means including a releasable chuck above said swivel head whereby a rod extending axially through said first mentioned elements may be rotated and lowered while rotating beyond the feeding range of said hydraulic.

15. In combination with drilling mechanism

nism comprising a hydraulic feeding mechanism including feed cylinder and piston elements, a swivel head above the latter, and means including a releasable chuck above said swivel head and cooperating rotating mechanism whereby a rod extending axially through said first mentioned elements may be rotated and lowered while rotating beyond the feeding range of said hydraulic.

16. In combination with a drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a feed piston therein, a grief stem extending axially through said feed cylinder, and means whereby said stem may be rotated and fed during lowering independently of said hydraulic feeding mechanism including a power driven rotation element by means of which said stem is rotated both during said hydraulic feeding and during said independent feeding.

17. In combination with a core drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein and a rod line rotating mechanism, a grief stem extending axially through said feed cylinder, and means whereby said stem may be rotated and fed during lowering, said means including a top chuck releasable at will.

18. In combination with a core drilling mechanism comprising a hydraulic feeding mechanism including a feed cylinder and a piston therein and a rod line rotating mechanism, a grief stem extending axially through said feed cylinder, and means whereby said stem may be rotated and fed during lowering, said means including a top chuck releasable at will and comprising a plurality of wedge members operating to grip said grief stem.

19. In combination with a core drilling mechanism comprising a hydraulic feeding mechanism and a rod line rotating mechanism, a grief stem, and means whereby said stem may be rotated and fed during lowering, said means including a top chuck releasable at will and comprising a plurality of wedge members operating to grip said grief stem and control mechanism operable from a point substantially below said mechanism.

20. In combination with a core drilling apparatus, hydraulic feeding mechanism, power rotation mechanism, a chuck mechanism operatively connected to both of said mechanisms, a rotatable grief stem extending through said mechanisms, hoisting mechanism connectible to said grief stem, and supplemental chuck mechanism connectible to and rotatable with said grief stem and releasable or connectible at will during rotation thereof.

21. Drilling apparatus comprising hydraulic feeding mechanism, rotating mechanism including a tubular member, a plurality of chuck mechanisms carried by and rotatable with said tubular member, and

operating means for one of said chuck mechanisms whereby the same may be quickly applied or released during rotation thereof.

22. Drilling apparatus comprising hydraulic feeding mechanism, rotating mechanism including a tubular member, a plurality of chuck mechanisms carried by and rotatable with said tubular member, and a grief stem extending through said tubular member and engageable by said chuck mechanisms, said grief stem being adapted to move freely through said tubular member while said stem is rotated thereby.

23. Drilling apparatus comprising hydraulic feeding mechanism, rotating mechanism including a tubular member, a plurality of chuck mechanisms carried by the upper and lower ends of and rotatable with said tubular member, and a grief stem extending through said tubular member and engageable by said chuck mechanisms, said grief stem being adapted to move freely through said tubular member while said stem is rotated thereby.

24. Drilling apparatus comprising hydraulic feeding mechanism, a grief stem, rotating mechanism coaxial with said feeding mechanism for rotating said grief stem and including a tubular member extending through said feeding mechanism, a plurality of chuck mechanisms carried by and rotatable with said tubular member, said chuck mechanisms being connectible to said grief stem, and means whereby said grief stem may move freely through said feeding mechanism while rotation of said stem is continued.

25. Drilling apparatus comprising hydraulic feeding mechanism, rotating mechanism coaxial with the latter and including a tubular member extending therethrough, a plurality of chuck mechanisms carried by and rotatable with said tubular member, a grief stem extending through said tubular member with which said chuck mechanisms are engageable, and means whereby said grief stem may move freely through said chuck mechanisms while rotation of said stem is continued.

26. Drilling apparatus comprising hydraulic feeding mechanism including a feed cylinder, a grief stem, rotating mechanism disposed coaxially with said feed cylinder for rotating said grief stem, and a plurality of chuck mechanisms, one of said chuck mechanisms having wedge shaped slips for engaging said grief stem.

27. Drilling apparatus comprising hydraulic feeding mechanism, rotation mechanism including a chuck connectible to the rod line below said hydraulic mechanism, a releasable top chuck mechanism disposed above said hydraulic mechanism, and operating means extending below said hydraulic mechanism for quickly releasing said top chuck mechanism.

28. Drilling apparatus comprising hy-

draumatic feeding mechanism, rotation mechanism including a chuck connectible to the rod line below said hydraulic mechanism, a releasable top chuck mechanism disposed above said hydraulic mechanism and connectible to and rotatable with the rod line, and means for releasing said top chuck mechanism at will during rotation thereof.

29. Drilling apparatus comprising hydraulic feeding mechanism including a feed cylinder and a piston therein, rotating mechanism disposed coaxially with said cylinder including a grief stem, and a plurality of chuck mechanisms one of which includes a plurality of wedge members engageable with said grief stem.

30. Drilling apparatus comprising hydraulic feeding mechanism including a tubular member, a swivel head carried by said tubular member, rotating mechanism comprising a tubular member disposed coaxially with said first mentioned tubular member, a chuck mechanism carried by the lower end of said rotation member, a top chuck mechanism carried by one of said tubular members above said swivel head, and operating means whereby the operator may quickly release or connect said top chuck mechanism.

31. Drilling apparatus comprising hydraulic feeding mechanism including a feed cylinder and a piston therein and a hollow drive member movable with said piston, rotation mechanism comprising a grief stem extending coaxially through said drive member and said feed cylinder, and a member engageable with said grief stem for rotating the latter while the same may freely slide through said drive member.

32. Drilling apparatus comprising hydraulic feeding means including a feed cylinder and a piston therein, rotation means comprising a tubular member arranged coaxially with said feed cylinder and movable with said piston, a grief stem extending coaxially through said tubular member, and a member engageable with said grief stem for rotating the latter while the same may freely slide through said tubular member.

33. Drilling apparatus comprising hydraulic feeding means including a feed cylinder and a piston therein, rotation means comprising a tubular member arranged coaxially with said feed cylinder and movable with said piston, a grief stem extending coaxially through said tubular member, a member engageable with said grief stem for rotating the latter while the same may freely slide through said tubular member, and a chuck mechanism carried by said tubular member and rotatable therewith.

34. The combination with a rotary well drilling apparatus comprising a drill stem, of a hydraulic cylinder around said stem, means for admitting fluid to said cylinder,

means for permitting fluid to leave said cylinder, an apertured piston in said cylinder encircling said stem, a pipe secured to, or integral with, said piston and extending above said cylinder and encircling said stem, a bearing plate secured to said pipe, a second pipe within the first mentioned pipe and rotatable relative thereto and supported thereby, a second plate rotatable relative to said bearing plate and secured to said second pipe, and slips between said stem and said second pipe.

35. The combination with rotary well drilling apparatus comprising a drill stem, of a hydraulic cylinder around said stem, means for admitting fluid to said cylinder, means for permitting fluid to leave said cylinder, an apertured piston in said cylinder encircling said stem, a pipe secured to, or integral with, said piston and extending above said cylinder and encircling said stem, a bearing plate secured to said pipe, a second pipe within the first mentioned pipe and rotatable relative thereto and supported thereby, a second plate rotatable relative to said bearing plate and secured to said second pipe, slips between said stem and said second pipe, and a horizontally movable platform for moving hydraulic apparatus away from or to a well.

36. Drilling apparatus comprising hydraulic feeding mechanism including a tubular member, a swivel head carried by said tubular member, a grief stem, rotation mechanism for said grief stem comprising a tubular member disposed coaxially with said first mentioned tubular member, a chuck mechanism carried by the lower end of said rotation member, a top chuck mechanism carried by one of said tubular members above said swivel head, said chuck mechanisms being connectible to said grief stem, and means whereby said grief stem may slide freely through said chuck mechanisms while rotation of said stem is continued.

37. Drilling apparatus comprising hydraulic feeding means including a feed cylinder and a piston thereon, rotation means including a rotatable member arranged coaxially with said feed cylinder, a grief stem extending through said rotatable member and adapted to be rotated thereby, and means engageable with said grief stem and driven by said rotating member for rotating said grief stem while the same moves freely there-through.

38. Drilling apparatus comprising hydraulic feeding mechanism, a grief stem, rotation mechanism for said grief stem including a tubular member through which said grief stem extends, a plurality of chuck mechanisms carried by and rotatable with said tubular member for connecting said grief stem with said feeding mechanism, and means

permitting said grief stem to move freely through said chuck mechanisms while rotation of said stem is continued.

39. Drilling apparatus comprising hydraulic feeding mechanism including a feed cylinder and a feed piston therein, rotation means including a rotatable member arranged coaxially with said feed cylinder, a grief stem extending through said rotatable mem-

ber and adapted to be rotated thereby, a device above said hydraulic feeding mechanism for connecting said grief stem thereto, and means whereby said grief stem may slide freely through said rotatable member while rotation of said stem is continued.

In testimony whereof I affix my signature.

EUGENE WHINNEN.