July 5, 1932. P. YUNGLING 1,866,335

PNEUMATIC WELL DRILL

Filed Feb. 24, 1931

FIG. 1.

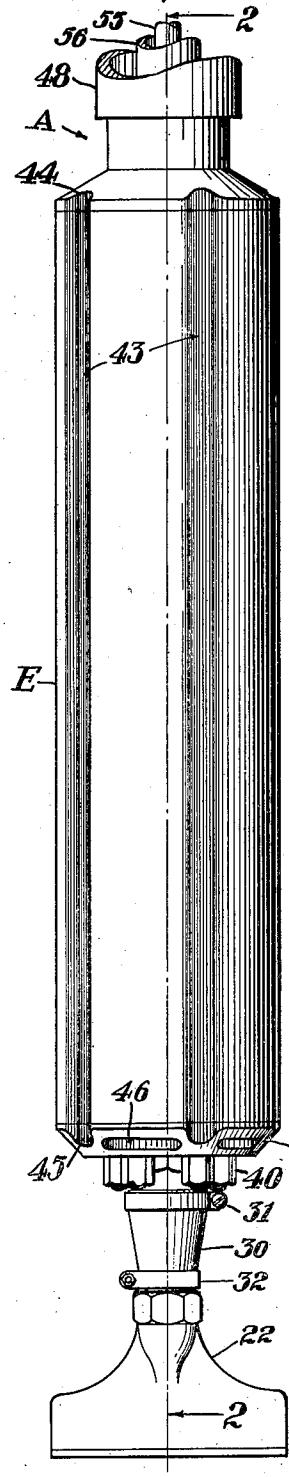


FIG. 2.

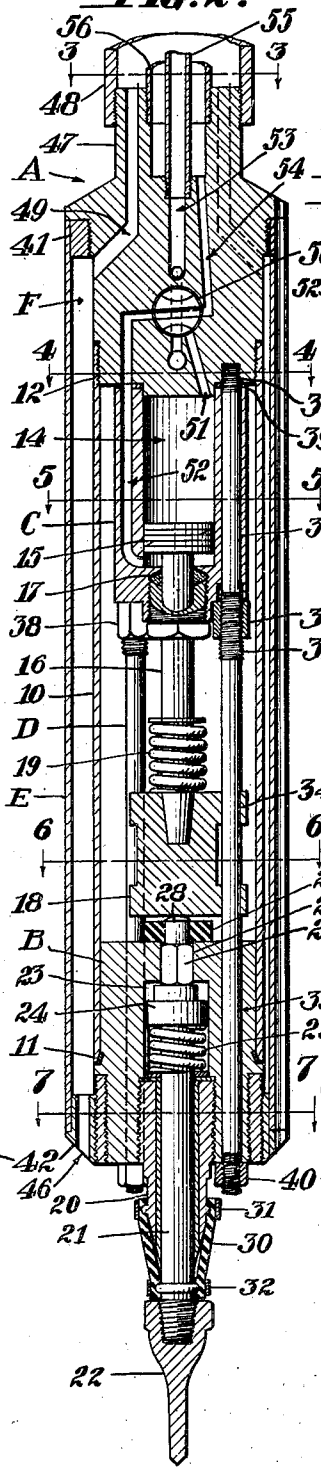


FIG. 3.

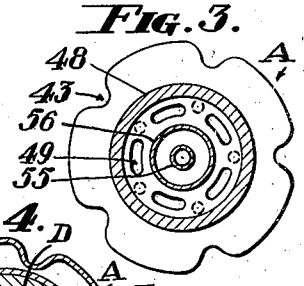


FIG. 4.

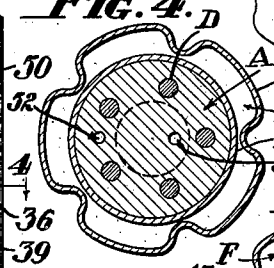


FIG. 5.

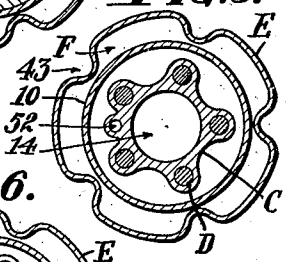


FIG. 6.

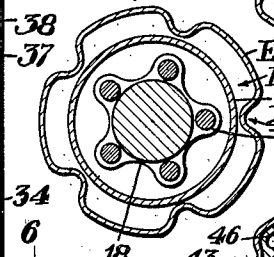


FIG. 7.

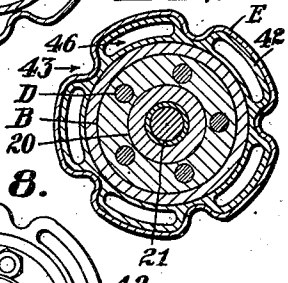
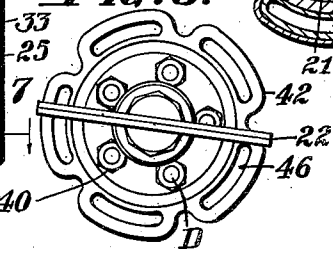


FIG. 8.



Inventor

Paul Yungling.

By R. L. Brown

Attorney

Patented July 5, 1932 1,866,335

UNITED STATES PATENT OFFICE

PAUL YUNGLING, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO MONARCH OIL WELL AIR DRILL CO. LTD., OF RENO, NEVADA, A CORPORATION OF NEVADA

PNEUMATIC WELL DRILL

Application filed February 24, 1931. Serial No. 517,879.

This invention relates to pneumatic tools and particularly pertains to a drill of the pneumatically operated type set forth in my co-pending application for United States patent, Serial Number 402,835, filed October 28, 1929 in which fluid pressure actuated mechanism is operated while submerged in liquid and which is particularly applicable for use in drilling wells in the manner employing a liquid or mud circulation through the well bore during drilling operations.

An object of the invention is to provide a construction in a well drill of the above character whereby assemblage of the drill will be greatly facilitated and whereby the operative parts of the drill are rendered readily accessible for replacement and repair.

With the foregoing object in view together with such other objects and advantages as may subsequently appear, the invention resides in the features and in the construction and arrangement of the parts and in the parts and combinations of parts hereinafter described and claimed and illustrated by way of example in the accompanying drawing in which:

Figure 1 is a view of the drill as seen in side elevation;

Figure 2 is a view of the drill as seen in longitudinal section on the line 2—2 of Figure 1 with parts shown in elevation;

Figure 3 is a view in cross section as seen on the line 3—3 of Figure 2;

Figure 4 is a view in cross section taken on the line 4—4 of Figure 2;

Figure 5 is a detail in cross section as seen on the line 5—5 of Figure 2;

Figure 6 is a view in cross section taken on the line 6—6 of Figure 2;

Figure 7 is a view in cross section taken on the line 7—7 of Figure 2; and

Figure 8 is a view in elevation of the lower end of the drill.

Referring to the drawing more specifically, A and B indicate respectively upper and lower drill shank sections here shown as of general cylindrical form and connected together by a tubular shell 10 which is secured as by a weld joint 11 to the lower section B which extends into the lower portion of the shell 10 and the upper end of which shell is detachably connected to the lower end of the upper shank section A as by a threaded joint 12.

Projecting downwardly from the lower end of the upper shank section A is a cylinder block C which is formed with a vertically extending cylinder 14 in which is reciprocally mounted a piston 15 mounted on the upper end of a stem 16 which projects downwardly through a stuffing or packing gland 17 on the lower end of the block C.

Affixed to the lower end of the stem 16 is a ram or hammer 18 adapted to be reciprocated between the cylinder block C and the lower end section B of the drill shank on reciprocation of the piston 15. A coil spring 19 is wound around the stem 16 above the ram 18 to serve as a buffer on up-stroke of the latter.

Projecting from the lower end of the section B is a tubular sleeve 20 in which is mounted for reciprocal movement a bit shank 21 fitted at its lower end with a bit 22 of suitable construction and the upper end of which bit shank extends into a recess 23 formed in the section B and is fitted with a head 24 between which and the bottom of the recess 23 is interposed an expansive coil spring 25 which serves to normally maintain the bit shank 21 in a retracted position.

Seating on the upper end of the head 24 is a pin 26 which projects upwardly through and is slidable in an opening 27 in the upper end wall of the chamber 23 and which pin is formed with an upper end portion 28 extending above the upper face of the section B and which is encircled by a resilient cushion 29. The upper end of the pin 26 is positioned to be impacted by the ram 18. A resilient sleeve 30 is disposed to encircle the portion of the drill shank 21 protruding beyond the lower end of the sleeve 20 and which resilient sleeve is here shown as affixed at its upper end to encompass the sleeve 20 by a clamp 31 and is affixed at its lower end to the shank 21 by a clamp 32.

As a means for affording a substantial connection between the shank sections A and B and to also afford a means for connecting

the cylinder block C to the section A and at the same time afford a guide-way for the ram 18, a series of tie-rods D are provided, which rods extend upwardly through openings 33 in the section B and through openings 34 in the ram 18 and through bores 35 in the cylinder block C and are screwed at their upper ends into engagement with the shank section A as indicated at 36. The tie-rods D are formed intermediate their ends with screw threads 37 on which are screwed nuts 38 arranged to bear against the lower end of the cylinder block C to clamp the latter against the under side of the shank section A. A gasket 39 is interposed in the joint between the upper end of the cylinder block C and the lower end of the section A. Nuts 40 are screwed on the lower ends of the tie-rods D to bear against the lower end of the shank section B to cooperate with the shell 10 in tying the shank sections A and B together.

The sections A and B are further united by a second tubular shell E arranged to encircle the shell 10 in spaced relation thereto and concentric therewith, the upper and lower ends of which shell E are affixed respectively to rings 41 and 42 which are screwed into engagement with the sections A and B or otherwise affixed thereto. A space F is thus afforded between the shells E and 10. The external shell E is formed with longitudinally extending flutes 43 which are positioned in register with recesses 44 and 45 formed in the section A and ring 42 respectively. The ring 42 is formed with a series of openings 46 which afford a communication between the lower end of the space F and the lower end of the drill.

The upper stem section A is formed with a reduced upper end portion 47 adapted to be engaged with a coupling 48 on the lower end of a tubular drill stem and leading from the upper end portion of the passage or chamber F is a series of ducts 49 which open to the interior of the coupling 48 and afford a communication between the tubular drill stem and the chamber F whereby mud or other liquid may be directed downwardly from the drill stem through the chamber F to discharge through the opening 46.

The section A is equipped with a conventional form of fluid pressure control mechanism which may be of any suitable construction for effecting intake and exhaust of fluid under pressure to and from the cylinder 14 to effect operation of the piston 15 in a well known manner; this mechanism being here shown as including a valve 50 for controlling and effecting alternate opening and closing of passages 51 and 52 leading to the upper and lower ends of the cylinder 14 respectively and to place said passages in and out of communication with intake and exhaust passages 53 and 54 leading upwardly in the section A and with which passages 53 and 54 are connected respectively to a fluid pressure supply pipe 55 and an exhaust pipe 56 which are disposed in spaced telescopic relation and extend upwardly through the tubular drill stem so as to afford a means for directing fluid pressure downwardly through the drill stem and to exhaust same upwardly therethrough apart from the circulating liquid delivered downwardly through the drill stem.

The operation of the ram and its pneumatic control mechanism and of the bit and its shank are effected in a conventional manner and constitute no part of the present invention other than in association with the structural features of the drill and the manner of assembling same in which the essence of the present invention resides as is apparent from the foregoing and as is set forth in the accompanying claims.

I claim:

1. In a drill, spaced upper and lower drill shank sections, a shell interconnecting said sections, a ram reciprocally mounted within said shell, fluid pressure operated means carried by the upper of said drill shank sections for actuating said ram, a bit, means for operating said bit actuated by said ram, and a longitudinally fluted shell surrounding said first named shell and spaced therefrom to form a passage for liquid; said last named shell being connected at its ends to said upper and lower drill shank sections and said sections being formed with recesses registering with the flutes in said shell; said upper drill shank section having an inlet leading to the passage between said shells, and said lower drill shank section having an outlet leading from the space between said shells.

2. In a drill, spaced upper and lower drill shank sections, a cylindrical shell interconnecting said sections, a second shell carried by said sections surrounding said first named shell and forming a passage extending longitudinally between said shells, a passage leading through the upper drill shank section from the upper end thereof communicating with said passage between said shells for directing liquid thereto, means for directing liquid from the lower end of the passage between said shells, a bit carried by the lower drill shank section, and fluid pressure operated means carried by the upper drill shank section for actuating said bit.

3. In a fluid pressure operated well drill, spaced upper and lower drill shank sections, a plurality of tie rods extending between and connecting said sections, a cylinder block, means for securing said cylinder block to the upper drill shank section including said tie rods, a piston mounted in said cylinder block, a ram guided on said tie rods arranged between said cylinder block and the lower drill shank section, a connection between said piston and said ram, a shell ex-

tending between said drill shank sections and enclosing said tie rods and their associated parts between said drill shank sections, a drill bit carried by the lower drill shank section operable by said ram, fluid pressure control mechanism carried by the upper drill shank section for controlling operation of said piston, and a second shell extending between said sections and encompassing said first named shell and spaced therefrom to form a passage between said shells, the upper drill shank section having an inlet leading to said passage, and said lower drill shank sections having an outlet leading from said passage.

4. In a fluid pressure operated well drill, spaced upper and lower drill shank sections, a plurality of tie rods extending through the lowermost of said sections and screwed into engagement with the upper section, a cylinder block, means for securing said cylinder block to the upper drill shank section including said tie rods, a piston mounted in said cylinder block, a ram guided on said tie rods arranged between said cylinder block and the lower drill shank section, a connection between said piston and said ram, a shell extending between said drill shank sections and enclosing said tie rods and their associated parts between said drill shank sections, a drill bit carried by the lower drill shank section operable by said ram, fluid pressure control mechanism carried by the upper drill shank section for controlling operation of said piston, a shell encompassing said first named shell forming a longitudinally extending passage between said shell and which passage has an outlet at its lower end, and a passage leading from the upper end of said last named passage opening to the upper end of said upper drill shank section.

PAUL YUNGLING.