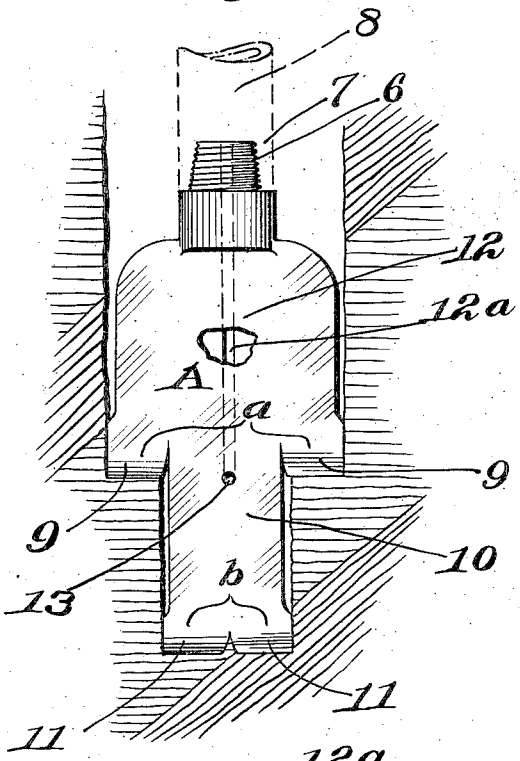
March 23, 1926. 1,577,875

J. RUTHERFORD ET AL

ROTARY DRILLING BIT

Filed Sept. 26, 1922

Fig. 1.



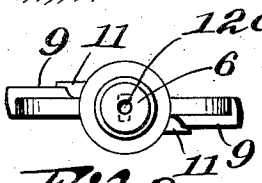


Fig. 2.

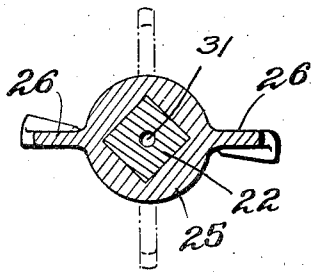


Fig. 5.

Fig. 3.

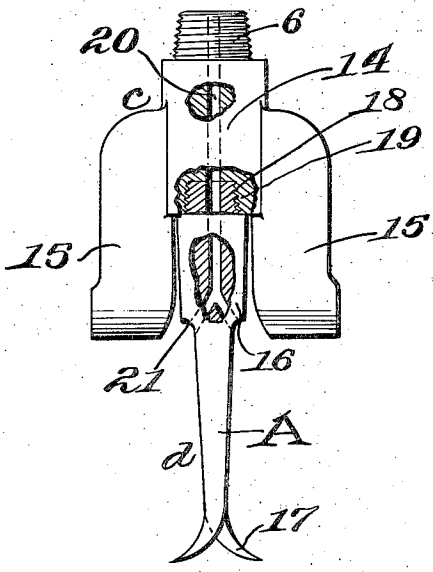
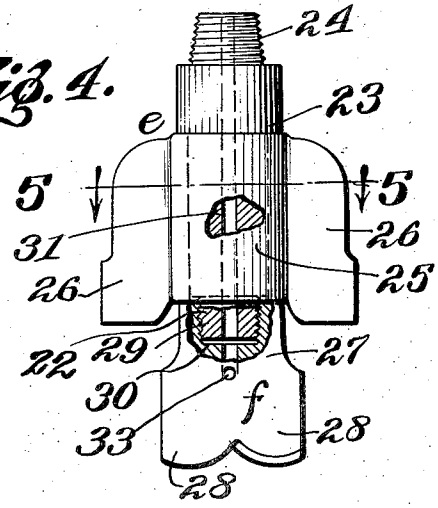


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN RUTHERFORD AND HENRY P. SCANLON, OF LONG BEACH, CALIFORNIA.

ROTARY DRILLING BIT.

Application filed September 26, 1922. Serial No. 590,597.

To all whom it may concern:

Be it known that we, JOHN RUTHERFORD and HENRY P. SCANLON, citizens of the United States, residing at Long Beach, in the county of Los Angeles and State of California, have jointly invented new and useful Improvements in Rotary Drilling Bits, of which the following is a specification.

This invention relates to drilling bits for well drilling, and more particularly rotary drilling bits for use in drilling and developing deep oil wells, and has for an object to provide improvements of the character stated which will enable more accurate and expeditious drilling and tend to prevent balling of the bit with mud and detritus, and which will be relatively superior in point of inexpensiveness and simplicity of construction, taken in connection with facility in use, positiveness and effectiveness in operation and general practicability.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, combination, association and inter-relation of parts, members and features, and mode of operation of same, all as hereinafter described, shown in the drawing, and finally pointed out in claim.

In the drawing:

Figure 1 is a fragmentary view of the lower end of a drilling string of pipe or tubing with a rotary drilling bit joined to the same, the parts being shown in position for service in the development of a bore or well hole through earth formation shown sectionally;

Figure 2 is a top plan view of the drilling bit shown in Figure 1;

Figure 3 is a view similar to the showing of the drilling bit in Figure 1 of a modified form of construction;

Figure 4 illustrates my preferred form of drilling bit; and,

Figure 5 is a detail transverse sectional view, taken upon the line 5—5 of Figure 4, and looking in the direction of the appended arrows.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawing, A designates in integral formation a main drilling bit *a* and a supplemental drilling bit *b*, preferably of the "fish-tail" type, having a coarse threaded tapered stem 6 coengaging with a similarly threaded tapered box 7 at the lower end of the drilling tubing or casing 8 by which the bit is rotated to bore the well hole. The bit *a* is provided with "tails" or cutting portions 9, oppositely faced, and at opposite sides of the shank 10 of the "tails" 11 of the bit *b*, and a circulation passage 12^a drilled through the shank 10 and the shank 12 of the bit *a* is provided with lateral outlets 13 in the shank 10 substantially in the transverse zone of the bit edge portions or "tails" 9. The shank 12 is shown as partly broken away to expose the passage 12^a. In Figure 3 we have shown a shank 14 on opposite sides of which depend the bit "tails" 15, the shank 14 having the usual tapered and threaded pin 6, and the "tails" 15 being spaced apart to accommodate the shank 16 of the "tails" 17 of a supplemental bit *d*, the shank 14 and its "tails" 15 comprising the main bit *c*, the shank 16 being joined to the shank 14 by a tapered threaded pin and socket 18 and 19, the shank 14 being broken away to disclose such junction. The shank 14 and shank 16 are shown as broken away to expose a circulation duct 20 drilled through such shanks and provided with branch ducts 21 which open out through the shank 16 substantially at the transverse zone of the cutting edges of the "tails" 15. In this form of construction the bit *d* is shown arranged in a plane substantially at right angles to that of the bit *c*.

In Figures 4 and 5 we have shown another form of drilling bit structure which comprises a shank 22 preferably rectangular in cross section and having an upper shoulder 23 and a threaded taper pin 24 above the shoulder and over which shank 22 is passed a corresponding bore collar 25 carrying lateral "tails" 26, the same being held in place by a shank 27 having terminal "tails" 28, which shank 27 is connected with the shank 22 by the usual threaded taper pin 29 and socket 30. The shank 22 and shank 27 are bored through to provide a circulation passage 31 which is forked at the lower end to provide outlet openings 33 at either side of the shank 27 substantially at or below the cutting edges of the "tails" 26. The shank 25 and its attendant parts constitutes the main bit *e* and the shank 27 and its attendant parts constitutes the supplemental bit *f*.

It will be understood that while the bits *b* and *f* are shown as lying in the same plane as the associated bits *a* and *e*, they may be

relatively positioned to produce the angularity shown between the bits in Figure 5 or any other suitable angularity.

In drilling, the supplemental bit *b*, *d* or *f* is the leading bit and performs an initial penetration, followed by the penetration of the main bit *a*, *c* or *e*, thus dividing up the drilling and cutting action and producing two attacks upon the earth formation. This is of assistance in penetrating particularly hard formations, and this relation of the bits likewise causes a centering of the entire bit structure so as to more accurately produce a true or straight hole or bore. It likewise divides up the cutting or drilling zone, into two main zones, which assists in preventing a "balling up" of the bit structure with mud or detritus which often occurs in the use of a rotary bit having all of the cuttings edge formations in substantially the same zone. The circulation of water through the circulation ducts 12ª, 20 and 31 assists the drilling operation in the usual manner, and provides for the proper consistency of "mud" to facilitate the attack of the bit surfaces upon the earth formations.

Many other advantages will be found to attach in the use of this invention, and it is obvious that many changes may be made in practicing the same, in departure from the specific structure and inter-relation of features shown in the drawing and hereinabove described, all without departing from the true spirit of the invention.

Having thus disclosed our invention, we claim and desire to secure by Letters Patent:

In a rotary drilling bit, a shank, a tail bit carried on said shank, a second tail bit secured to the shank and adapted to lock the first tail bit on said shank, the relative angularity between the tail-bits being adjustable.

In testimony whereof, we have signed our names to this specification.

JOHN RUTHERFORD.
HENRY P. SCANLON.