June 26, 1962 R. O. BIGGS 3,040,824

DRILLING TOOL

Filed Aug. 18, 1960

FIG. 1

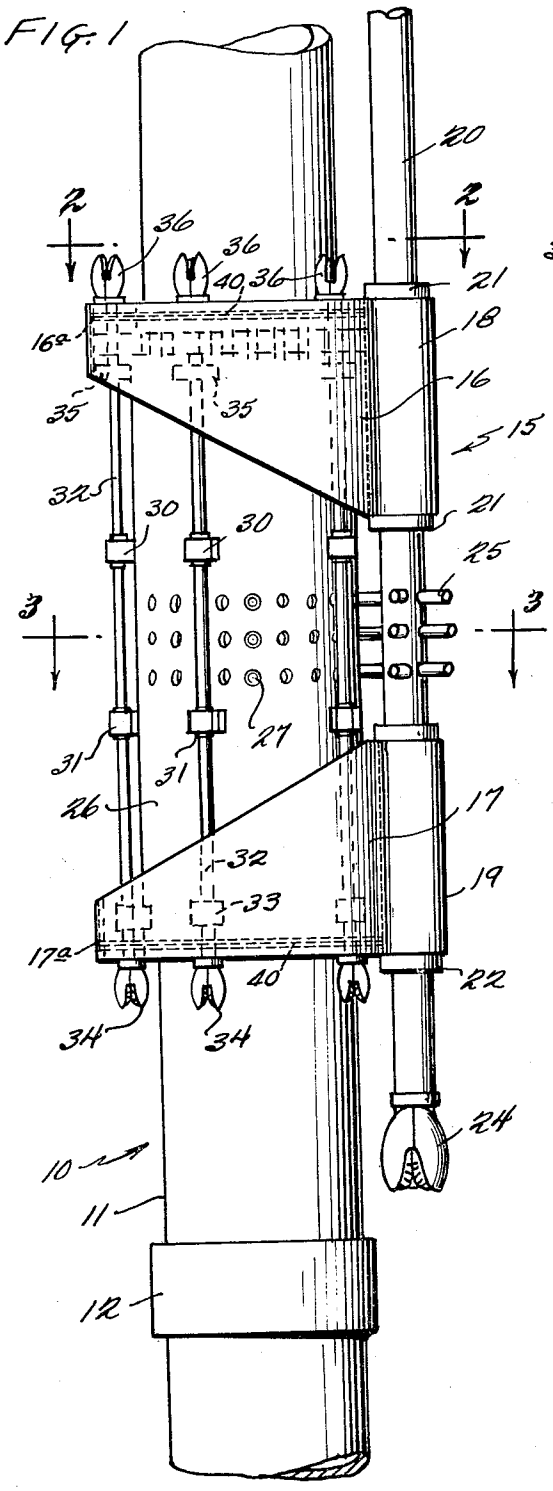


FIG. 2

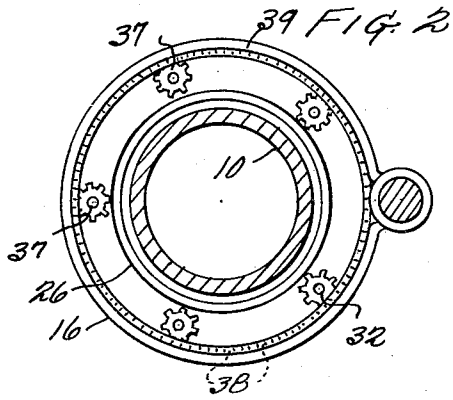


FIG. 4

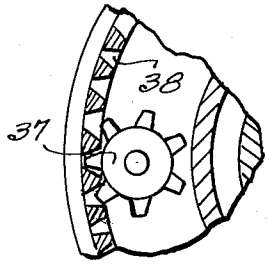


FIG. 3

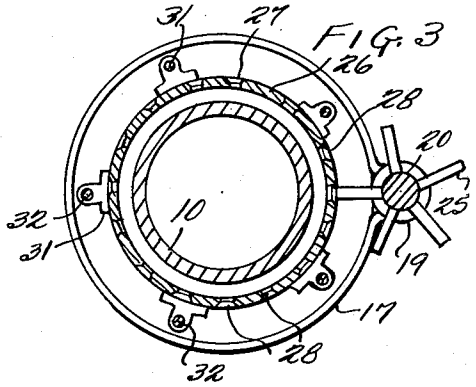
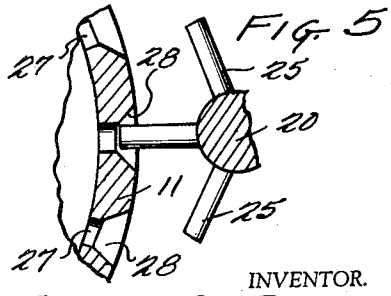


FIG. 5



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DRILLING TOOL

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This invention relates to a drilling tool, and has as its primary object the provision of a tool which is adapted to encircle a well casing in an oil well, or the like for the purpose of drilling over or through cemented or stuck well casings so as to free the well casing in a well and allow it to be pulled up and removed from the well.

An additional object of the invention is the provision of such a device including a collar which is mounted on the well casing, and a plurality of radially disposed rotatable bits for the purpose of drilling either upwardly or downwardly through material adhering to the surface of the well casing to free the same.

An additional object of the invention is the provision of a device including means for rotating the individual drill bits from a common drill stem, which is actuated from the mouth of the well.

Still other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawing wherein there is shown a preferred embodiment of this inventive concept.

In the drawing:

FIGURE 1 is a side elevational view of one form of drilling tool embodying the instant invention shown as applied to a drill pipe.

FIGURE 2 is a sectional view taken substantially along the line 2—2 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 3 is a sectional view taken substantially along the line 3—3 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 4 is an enlarged fragmentary detail sectional view of a portion of the structure of FIG. 2; and

FIGURE 5 is an enlarged fragmentary detail sectional view of a portion of the structure of FIG. 3.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawings in detail, there is generally indicated at **10** a well casing, comprised of a plurality of sections **11**, which are connected by couplings **12** at conventionally spaced intervals.

The drilling tool of the instant invention is generally indicated at **15**, and comprises an upper collar member **16**, and a similar lower collar member **17**. The collar members **16** and **17** are adapted completely to encircle the pipe **10**, and are so dimensioned as to pass over the couplings **12**. The collars **16** and **17** are provided respectively with vertical bosses **18** and **19**, the bosses being in alignment along one edge thereof, and adapted for the reception of a drill stem **20** which extends therethrough, being held in position by collars **21** and **22** at the upper and lower extremities of the bosses **18** and **19**, respectively.

The lower end of drill stem **20** carries a drill bit **24** of conventional design in general, with the exception of the fact that the same is made of oval cross-sectional configuration so that it clears the side wall of the well casing **10** between the couplings **12**, and due to its configuration, passes over the couplings **12** when turned to the proper position.

Intermediately of the upper and lower bosses **18** and **19** the drill stem **20** is provided with a plurality of vertically aligned and radially aligned rows of pins **25**, which project outwardly from the surface of the stem, and serve as drive means for a rotatable sleeve **26**, which is provided with a plurality of vertically and radially aligned rows of openings **27**, which are counter sunk as at **28** (see FIG. 3)

and which, when engaged by the rotating pins **25**, serve to rotate the sleeve **26**. The upper collar **16** is formed with an internal shoulder **16***a*, which is spaced downwardly from its top; similarly, the lower collar **17** is formed with an internal shoulder **17***a*, which is spaced upwardly from its bottom. The rotatable sleeve **26** has secured thereto upper and lower ball bearing races **40**—**40**, which respectively abut these internal shoulders **16***a* and **17***a* to secure the sleeve against longitudinal movement within the sleeves **16** and **17**.

Upper and lower rows of bearings **30** and **31** are fixedly secured at spaced intervals radially about the sleeve **26**, and serve rotatably to support a plurality of drill shafts **32**. The lower portion of each drill shaft **32** carries a rotatable sleeve or collar **33** which engages against the inner side of the collar **17** to avoid friction, and has at its lower end a drill bit **34**. The upper portion of each shaft **32** is provided with a collar **35**, similar to the collars **33** and for the same purpose, and carries at its extremity a drill bit **36**, in order that when the device is moved upwardly the drill bits **36** may effectively engage in any binding substance such as cement or the like above the collar.

It will thus be seen that as the sleeve **26** is rotated the shafts **32** rotate therewith, and at the same time the drill bits **34** and **36** are rotated individually. This individual rotation is effected by the provision of a spur gear **37** on each of shafts **32**, which spur gears engage in openings **38**, in a ring gear **39**, which is carried interiorly of the collar **16** and fixed thereto. Obviously, as the sleeve **26** is rotated by the pins **25** the spur gears **37** will rotate the individual spindles **32** to rotate the drill bits **34** and **36**, which in turn will effectively cut through any cement or other impediment holding the drill pipe in the well. The assembly **15** may be moved upwardly or downwardly as much as is necessary by means of the drill stem **20**, which, it is to be noted, is rotated by any conventional means from the top of a well, until each individual impediment is removed and the drill pipe **10** is substantially clean, at which time, being free to float in the well, it may be readily removed by conventional means.

It is to be noted that the drill bits **34** and **36** are also of oval cross sectional configuration to enable the same to pass over the couplings **12**.

From the foregoing it will now be seen that there is herein provided an improved drilling implement which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

I claim:

1. In a well drilling tool, a pair of spaced collars adapted to surround a well casing, aligned bearings carried by said collars exteriorly thereof, a rotatable drill stem extending through said bearings, a drill bit on the end of said stem below the lowermost of said collars, a sleeve rotatably mounted interiorly of said collars, means comprising a plurality of countersunk openings extending in aligned relation about the periphery of said sleeve and a plurality of pins carried by said drill stem engageable in said openings for rotating said sleeve by said drill stem, a plurality of vertical drill spindles rotatably mounted on said sleeve, drill bits on each end of each said drill spindles, and means comprising a spur gear carried by each drill spindle and a ring gear carried by the interior of one of said collars in engagement with said spur gears for rotating each drill spindle about its own axis.

2. In a well drilling tool, a pair of collars adapted to

surround a well casing in aligned and spaced relationship and having aligned bearing bosses thereon, a shaft extending from the top of the well journalled in said bearing bosses, a sleeve rotatably mounted within said collars and adapted to surround the well casing, gearing between the shaft and the sleeve for imparting rotation to the latter from the former, a plurality of drill shafts rotatively mounted in said collars, drill bits carried by said drill shafts at their opposite ends, and gearing between

one of said pair of collars and said drill shafts for imparting rotation to the latter from the former.

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