A. OTTO.

REAMER FOR OIL AND GAS BEARING SAND.

APPLICATION FILED DEC. 21, 1918.

1,323,905.

Patented Dec. 2, 1919.

Fig. 1.

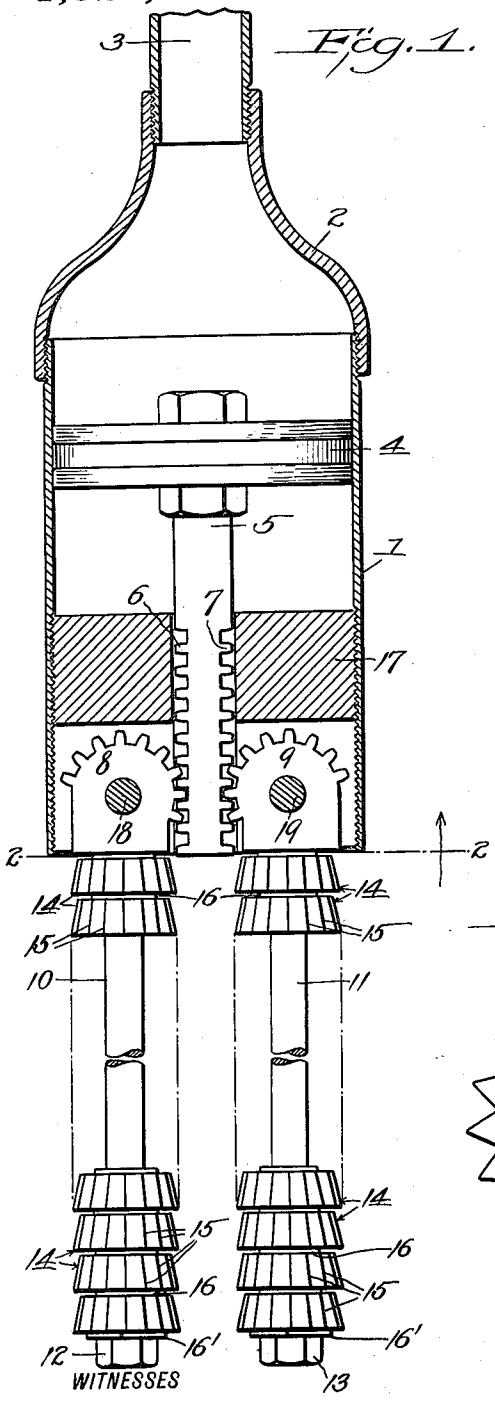


Fig. 2.

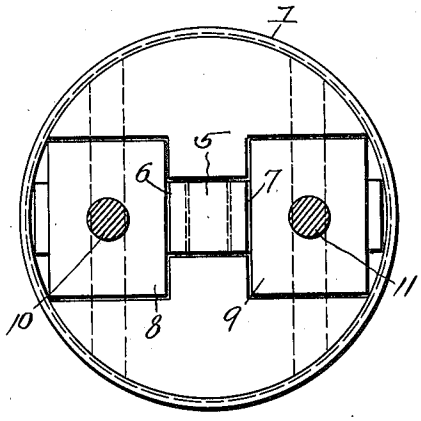


Fig. 3.

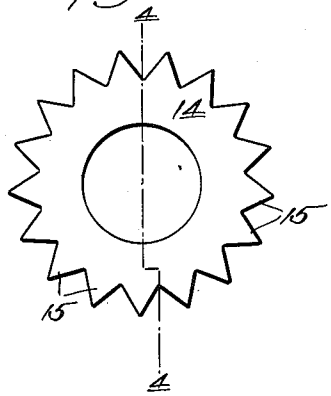
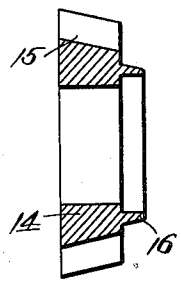


Fig. 4.



WITNESSES

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REAMER FOR OIL AND GAS BEARING SAND.

1,323,905. Specification of Letters Patent. Patented Dec. 2, 1919.

Application filed December 21, 1918. Serial No. 267,818.

To all whom it may concern:

Be it known that I, ALBERT OTTO, a citizen of the United States, and a resident of Kansas City, in the county of Jackson and State of Missouri, have invented a new and Improved Reamer for Oil and Gas Bearing Sand, of which the following is a full, clear, and exact description.

This invention relates to reaming devices for oil wells and has for an object the provision of an improved construction which will quickly and substantially evenly remove sand and the deposit thereon adjacent the bore of the oil well with a minimum effort.

Another object in view is the provision of a reamer in which the reaming members are spread and maintained in a spread condition by the action of steam or gas, compressed air and the like, whereby the reaming members may accommodate themselves to the particular shape of the sand being reamed.

Another object of the invention is the provision of a reamer with a plurality of pivotally mounted reaming members in a reciprocating rack for moving the reaming members to any desired angle and holding the reaming members to that angle.

In the accompanying drawing:

Figure 1 is a longitudinal vertical section through a reamer embodying the invention.

Fig. 2 is a transverse sectional view through Fig. 1 on line 2—2.

Fig. 3 is a face view of one of the cutter or reaming wheels.

Fig. 4 is a section through Fig. 3 on line 4—4.

Referring to the accompanying drawing by numerals, 1 indicates a cylinder which is open at both ends and has a head 2 secured thereto at one end by any suitable means, as for instance by being threaded thereon, said head having a pipe 3 threaded thereon. Pipe 3 acts as means for conveying rotary motion to head 2, cylinder 1 and associate parts and in addition acts as means for conveying compressed air, steam or other fluid to the head 2 and the upper part of cylinder 1 for moving the piston 4 downwardly. Piston 4 has a piston rod 5 rigidly connected thereto, said rod having racks 6 and 7 positioned thereon and engaging the mutilated gear wheels 8 and 9 for rotating, or rather rocking the same back and forth. These gears are formed integral with or rigidly secured to rods 10 and 11 carrying nuts 12 and 13 at the ends. On rods 10 and 11 are arranged cutters or cutting wheels 14 having teeth 15. These cutters or cutting wheels may be made from chilled steel or any other desired material, as preferred. These cutting wheels are loosely placed on the bars or rods 10 and 11 and completely cover said bars. An annular friction shoulder 16 is formed on each of the cutting wheels 14, the same coacting with resilient locking washers 16′ placed between the respective nuts 12 and 13 and the next adjacent cutting wheel 14 so that when the nuts are tightened the cutting wheels and friction shoulders are held together by reason of the spring pressure of the resilient washers 16′. This will result in friction between the shoulders 16 and the next adjacent wheel 14 whereby considerable resistance to the rotation of the wheels will be produced. During the operation of the entire reamer, however, as these cutting wheels are pressed against the sand, stone, or other material in the well they will slowly rotate and thereby all of the cutting teeth 15 will be brought into action.

In operation when it is desired to clean a well so that the oil will flow more freely the pumping apparatus of the well is removed and the reamer shown in Fig. 1 is lowered into the well until the cutting wheels 14 come opposite the oil bearing sand. Steam or compressed air is then forced through pipe 3 and cylinger 1 so as to push the piston 4 downwardly whereupon the racks will act on the gears 8 and 9 for spreading or swinging the cutters in opposite directions until they strike the sand. The entire reaming outfit is then rotated, preferably at comparatively high speed and the cutting wheels 14 are held against the sand by the action of piston 14 and associate parts under the pressure of the steam or air. If desired the reamer may be raised or lowered gradually during the reaming operation so as to positively engage all of the oil bearing sand and thereby remove or grind off the layer next to the wall. This layer which is being removed is objectionable only because it has a deposit of solidified paraffin and other substances thereon which fill up the sand and prevent the free flow of the oil. When the sand has been ground off as just described the paraffin and other obstructions are also ground off whereupon the

obstructions of the oil have been removed and consequently the flowing oil will continue indefinitely or until the deposit has again shut off the openings. It is, of course, evident that the removed sand and paraffin may be pumped out if desired or may be allowed to drop down into the bottom part of the well. After the grinding operation has been completed the reamer is removed from the well and the pumping apparatus substituted. This grinding operation is performed as often as necessary, which in some cases, may be desirable once or twice a year, while in other cases it may be desirable only every three or four years. Heretofore various methods have been provided for removing the layer of paraffin or other objectionable matter, as for instance by exploding a shell of high explosive in the well, which is commonly known as "blowing the well". This often times will injure the well by forcing the paraffin into the sand rather than breaking the sand down and opening the pores thereof. In the present instance there is no danger of injuring the well as the deposit is removed without affecting the remaining part of the sand or the oil and gas still remaining in the sand.

In positioning the heads 8 and 9 on the rods or bars 10 and 11 they are pivotally mounted on the block 17 by means of pivotal pins 18 and 19. Block 17 is slotted for accommodating the heads 8 and 9 as shown in Fig. 2 whereby the rack bars 6 and 7 may freely act thereon. Preferably the block 17 is threaded into the cylinder or shaft 1 in order to be easily removable whenever desired while holding the parts normally in a proper position.

What I claim is:

1. A reamer for oil and gas wells comprising a plurality of rods, a plurality of cutting wheels rotatably mounted on said rods, annular friction shoulders on said cutting wheels so that rotation is retarded when said wheels are clamped together, nuts screwed to the ends of said rods, resilient locking washers between the nuts and the cutting members so that they are clamped together under spring pressure when the nuts are tightened, means for swinging the cutting members apart, means for moving said rods, and cutting members in a circle, and means for raising and lowering said cutting members.

2. A reamer for oil and gas wells comprising a cylinder, means for directing compressed air into said cylinder, a core fixed in the end of said cylinder and provided with a square, axially located aperture, a piston arranged to slide in the cylinder, a square piston rod slidably mounted in the square aperture of the cylinder core and provided with a plurality of racks on its faces, a plurality of recesses in the outside end of said core, a plurality of mutilated gears pivoted in said recesses and meshing with the racks of the piston rod, a plurality of rods fixed to the mutilated gears, a plurality of cutting wheels rotatably mounted on said rods, friction means arranged between the cutting members, means for clamping the cutting members and friction members together, spring means for pressing the cutting members and the friction members together so that the rotation of the cutting members will be retarded, means for swinging the rods apart, means for moving said rods and cutting members in a circle, and means for raising and lowering said rods and cutting members.

3. A reamer for oil and gas wells comprising a pair of rods, a plurality of cutting wheels loosely arranged on said rods, friction means arranged between the cutting members, means for clamping the cutting members and friction members together so that the rotation of the cutting members will be retarded, means for swinging the rods apart, and means for moving in a circle said rods and cutting members.

ALBERT OTTO.