Oct. 21, 1924. 1,512,658

S. G. WOODRUFF

HOLE ENLARGER

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Fig. 1.

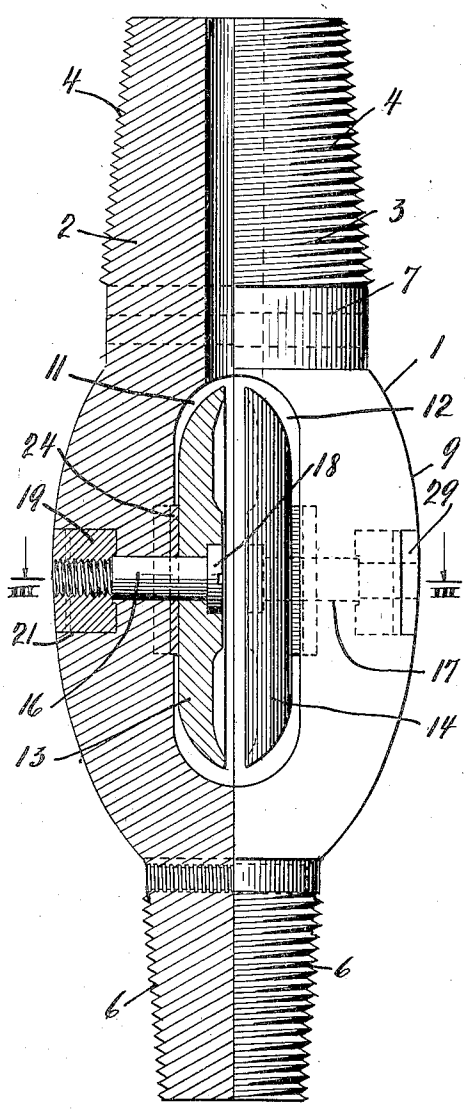
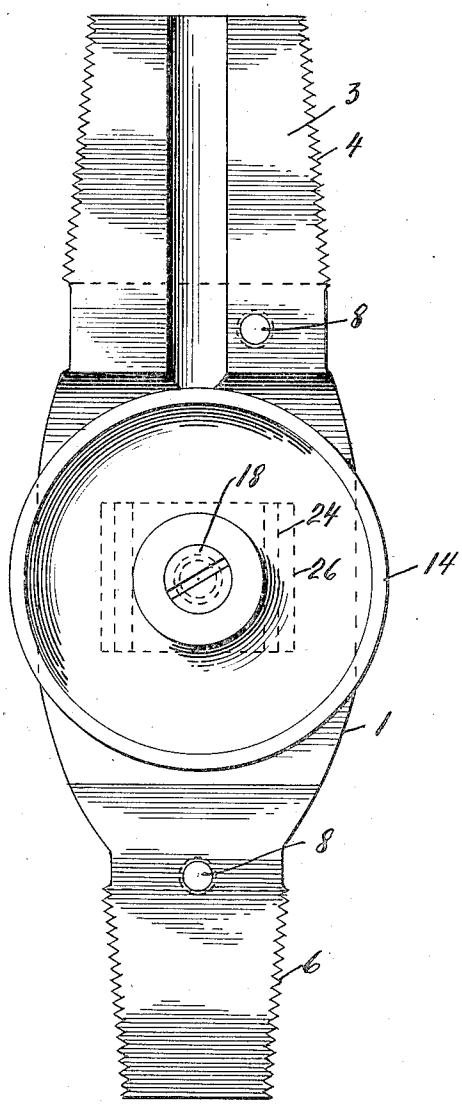


Fig. 2.



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Fig. 3.

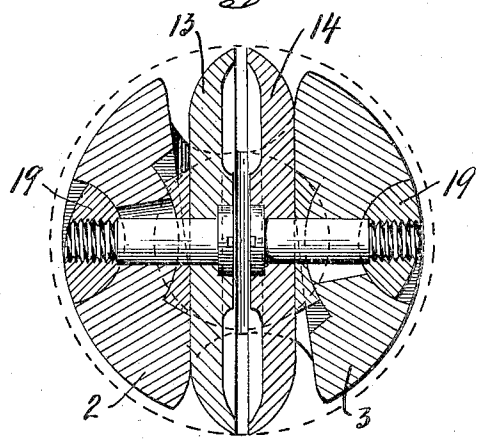


Fig. 4.

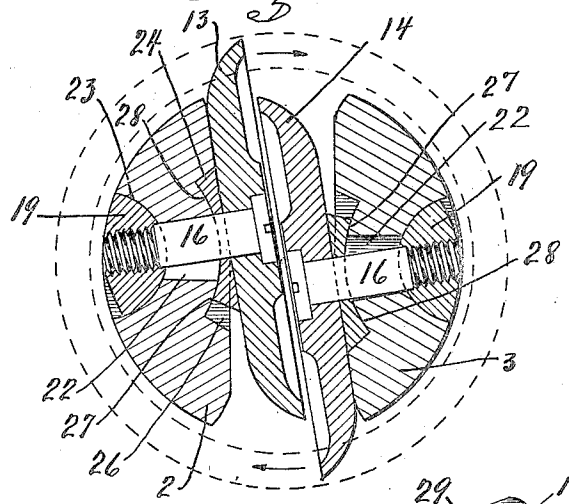


Fig. 5.

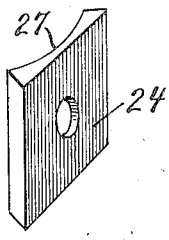
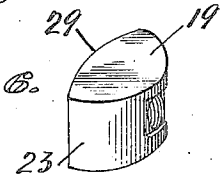


Fig. 6.



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UNITED STATES PATENT OFFICE.

SHELLEY GANES WOODRUFF, OF LONG BEACH, CALIFORNIA.

HOLE ENLARGER.

Application filed February 6, 1923. Serial No. 617,294.

To all whom it may concern:

Be it known that I, SHELLEY GANES WOODRUFF, a citizen of the United States, and a resident of Long Beach, county of Los Angeles, State of California, have invented a new and useful Hole Enlarger, of which the following is a specification.

The present invention relates to improvements in means for enlarging holes such as are drilled for the purpose of establishing oil wells or the like. The principal object of the present invention is to provide a means allowing a hole to be enlarged below a casing introduced into the hole. An important feature of the invention is the fact that my hole enlarger will automatically adjust itself to the size of the casing if moved longitudinally so that it will freely pass through the casing, and that the bits will automatically spread so as to engage the wall of the hole as soon as the device is rotated. This feature allows my hole enlarger to be lowered through the casing and to be rendered operative by rotating the same as soon as a place below the casing has been reached. Further objects and advantages of my invention will appear as the specification proceeds.

The preferred form of the invention is illustrated in the accompanying drawing in which Figure 1 shows a side view of my device, one-half of the same being shown in section; Figure 2 an inner view of one of two sections composing my device; Figure 3 a horizontal section taken along line III—III of Figure 1; Figure 4 a horizontal section taken along the same line showing the cutting tools in an operative position; Figure 5 a detail view of a stop washer used in my device; and Figure 6 a perspective detail view of a swivel nut used as a part of my hole enlarger. While I have shown only the preferred form of the invention it should be understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

My hole enlarger comprises a casting (1), preferably made of two symmetrical sections (2) and (3), each terminating at its upper and lower ends in threaded portions (4) and (6) registering with the corresponding threaded portions of the other section so as to form complete threads adapted to receive internally threaded connecting members not shown in the drawing. The two sections are secured to one another by means of suitable screws (7) penetrating corresponding perforations (8) and also by means of the connecting members threadedly engaging the top and bottom of the hole enlarger. It should be understood that the top of the hole enlarger will ordinarily be connected to a rotary drill pipe, while the lower end would be connected to a threaded sleeve or a similar element holding a drill tool. It should be observed that the device described in this specification is not intended as a means for drilling a hole but only for enlarging a hole that has been previously drilled.

The central portion (9) of my hole enlarger is made circular in outline and the two sections forming the central portion are provided with large internal recesses (11) and (12) adapted to accommodate two disc cutters (13) and (14) which latter are supported on bolts (16) and (17). The head (18) of each bolt is received in a recess of the disc cutter and the shank of the bolt extends through the body of its section into a nut (19) held in a recess (21) in the outer face of the section. The hole (22) receiving the shank of the bolt (16) is made oblong horizontally so as to allow of a swinging motion of the bolt in a horizontal plane. The nut (19) is rounded as shown at (23) and received in a round recess in the body of the section so that the nut does not interfere with the swinging motion of the bolt. A stop washer (24) is provided on the bolt and is allowed to swing in a recess (26) in the body of the casting, the dimensions of the recess being such that the swinging motion of the washer is limited. It will be seen from the detail view of Figure 5 as well as from other views that the face (27) of the washer and the seat (28) provided for the same are made arc-shaped, the arc being part of a circle drawn around the center of the general swinging motion. It should be understood, of course, that the oblong hole (22) and the recess (26) are made to correspond in such a manner that the walls of the hole and the recess simultaneously engage the shank of the bolt and the washer so that both are stopped at the same time, and no undue stress is applied to a small portion of the bolt. The nut (19) which receives the threaded end of the bolt is shown in detail in Figure 6 and it will be seen that its outer face (29) is curved to

correspond to the general outlines of the whole casting.

The manner of using my device should be readily understood from the foregoing description. To assemble each section of the casting the bolt (16) is passed through the disc cutter and the washer (24) and thereafter through the body of the casting until its extreme end engages the nut (19) which is simultaneously held in its seat by the other hand. The bolt is then turned by means of a screw driver until it engages with the nut and binds the various parts firmly together. After both sections have been assembled in this manner they are connected face to face by means of the screws (7) whereupon the rotary drill pipe at the top and the sleeve for holding the drill tool at the bottom may be secured to the casting. The device may then be lowered through the casing, and while going through this part of the operation the two discs will automatically assume the position shown in Figure 3, that is a central position relative to the casting. After the lower end of the casing has been passed the casting is rotated by any suitable means, and this rotary motion will cause the disc cutters to come in contact with the wall of the casing, each cutter securing a bite, and being forced outwardly to the extreme limit as the rotation is continued. After the hole has been enlarged the rotary motion is stopped and the casting pulled upward. As soon as the disc cutters strike the lower end of the casing they are automatically forced back into their original position and offer no resistance to the withdrawal of the device through the casing.

I claim:

1. In a device of the character described, a casting, a tool, and means for supporting the latter in the former with freedom of tilting motion comprising a bolt engaging the tool passing through the casting and a swivel nut holding the bolt against endwise motion but allowing of swinging motion of the same, with a washer provided on the bolt swinging in a recess in the casting adapted to limit the tilting motion of the tool.

2. A hole enlarger of the character described, comprising a casting consisting of two symmetric sections provided at the top and the bottom with registering screw threads for receiving connecting members and presenting spaced intermediate portions, each having cutting means mounted therein with freedom of swinging motion adapted to project outwardly into operative engagement with the wall of a hole when the casting is turned.

3. A hole enlarger of the character described comprising a casting consisting of two symmetrical sections provided at the top and bottom with registering screw threads for receiving connecting members and presenting spaced intermediate portions, and cutting means mounted between the intermediate portions for freedom of swinging movement to project outwardly into operative engagement with the wall of the hole when the casting is rotated.

4. A hole enlarger of the character described comprising a casting including two opposing sections, cutting members between the sections having reversely disposed continuous cutting edges, and means for supporting the members so as to project outwardly into operative engagement with the wall of a hole when the casting is rotated.

5. A hole enlarger as specified in claim 4, wherein said means comprises bolts extending through the casting, nuts on the bolts for holding the latter against endwise motion but to allow swinging movement thereof, and cutting elements carried by the bolts and arranged between the sections.

6. A hole enlarger of the character described comprising a casting including two opposing sections, cutting members between the sections having reversely disposed continuous cutting edges, bolts extending through the casting having the cutting members secured thereto, nuts on the bolts for holding the latter against endwise motion but allowing swinging motion thereof and stop washers mounted on the bolts and movable in seats formed in the sections.

7. A hole enlarger of the character described comprising a casting including two opposing sections, cutting members between the sections, and means for supporting the members so that they are adapted to project outwardly into operative engagement with the wall of a hole when the casting is rotated.

8. A hole enlarger of the character described comprising a casting including two opposing sections, recesses in the outer faces of the sections, seats on the inner faces of the sections and slots connecting the recesses and seats, bolts extending through the slots and into the recesses, nuts on the bolts and movably mounted in the recesses to allow pivotal movement of the bolts, stop washers mounted on the bolts and slidable in said seats, and cutting members carried by the confronting ends of the bolts.

SHELLEY GANES WOODRUFF.