No. 662,895. Patented Nov. 27, 1900.

W. DUNCAN.

UNDERREAMER.

(Application filed Apr. 4, 1900.)

(No Model.)

Fig 1

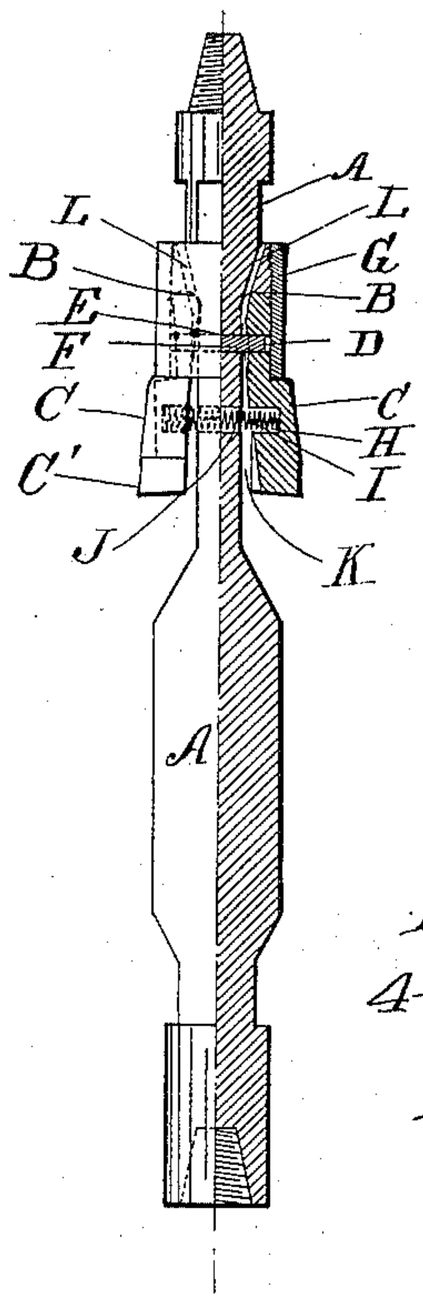


Fig. 2.

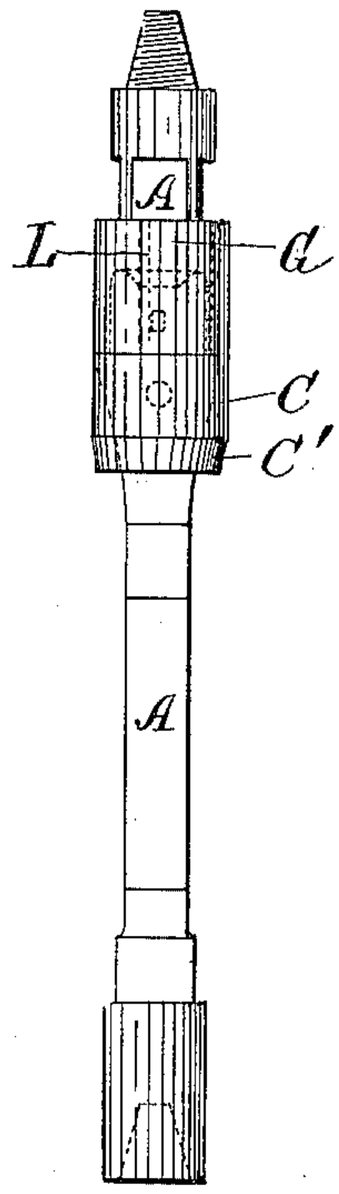


Fig. 3.

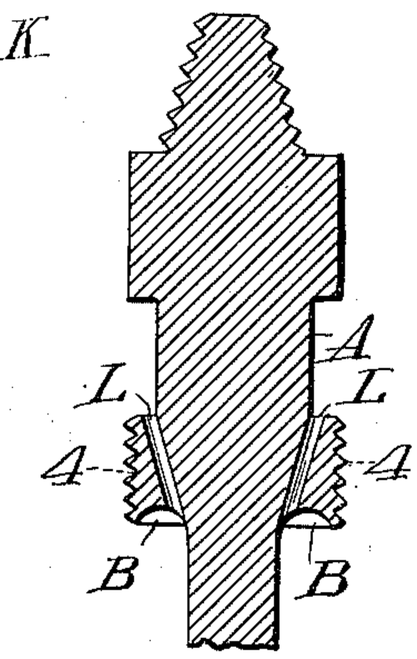
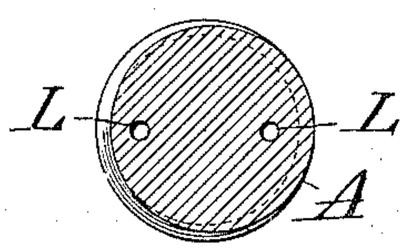


Fig. 4.



Witnesses
M. C. Wilkinson,
H. N. Robbins

Inventor
Walter Duncan
by
Hazard & Hopkins
Attorneys

UNITED STATES PATENT OFFICE.

WALTER DUNCAN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO ANTHONY H. HEDLEY, OF SAME PLACE.

UNDERREAMER.

SPECIFICATION forming part of Letters Patent No. 662,895, dated November 27, 1900.

Application filed April 4, 1900. Serial No. 11,547. (No model.)

To all whom it may concern:

Be it known that I, WALTER DUNCAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Underreamers, of which the following is a specification.

My invention relates to improvements in reamers for enlarging a well-hole; and the objects of my improvements are, first, to provide a reamer that will enlarge the well-hole below the casing when necessary, and, second, to provide a reamer which will straighten the hole in case the drill gets the hole out of perpendicular. I attain these objects by the mechanism described herein and illustrated in the accompanying drawings, forming a part hereof, in which—

Figure 1 is a side view, partly in section and partly in elevation, of my reamer. Fig. 2 is a side view of the same on a plane at right angles to the plane of the view in Fig. 1. Fig. 3 is an enlarged longitudinal section of the upper part of the reamer-shaft. Fig. 4 is a cross-section on line 4 4 of Fig. 3.

A is the shaft or body of my reamer, the top of which is screw-threaded, so that it may be easily attached to the drill-stem, and in the bottom thereof is a screw-threaded socket whereby any suitable well-boring tool may be attached to the reamer when desired. The upper and lower portions of the body are preferably circular and of a size to snugly fit within the casing of the well being drilled, and thereby provide a suitable guide to keep the reamer perpendicular.

In each side of the lower part of the upper circular portion of the body are two semicircular grooves B, one on each side thereof, to provide a bearing for the upper ends of cutters C, below which, as shown in Fig. 1, the body A is reduced in size for a short distance to provide clearance for the cutters C when the reamer is passing through the casing. The upper ends of the cutters fit into the grooves B. Near the upper ends of cutters C are holes D, through which and through hole E in body A and registering therewith when cutters C are in position passes pin F, which, with collar G, which screws onto body A and passes down over the upper portion of the cutters, holds the cutters C in position attached to body A. Pin F has a loose fit in the cutters C and a tight fit in the body A and is kept in position by collar G. In the lower portion of cutters C and on the inner side thereof are sockets H for the reception of spiral spring I, which is seated therein and which passes through hole J in body A and keeps the cutters expanded when underreaming. It will be seen that when underreaming there is some little space K between the lower edge of the cutters C and body A and that this space decreases until it practically runs out at the grooves B. This space under collar G might pack with debris if there were no upper outlet to the same. As drilling is always done with water in the hole, I provide channels L, which pass out of body A above collar G and furnish an outlet for the upper portion of space K, so that the debris may freely pass therethrough, and thereby avoid packing space K.

Around the lower edge of cutters C is a concave chamfer C′ of such depth that when the cutters are pressed in against body A and the tool is passed down into the casing and the cutters are expanded to contact with the casing the upper edge of chamfer C′ will contact with the casing, while the lower or cutting edge thereof will not be in contact with the casing, thereby permitting the tool to slide down to the bottom of the casing, and when the bottom of the casing is passed the cutters are further expanded by spring H, so that the lower or cutting edge of the chamfer C′ will contact with the rock or dirt of the well-hole below the casing and as the tool is raised and lowered will cut the same until the hole is underreamed to the full size of the expansion of cutters C, which is only required to be a little in excess of the size of the casing that is being used in the hole in order that it may be pushed down more easily than if the dirt or rock touched the casing.

Having described my invention, what I claim is—

1. The herein-described underreamer, comprising the body A, provided with grooves B, one on each side thereof, and holes E and J therethrough, and channels L therein; cut-

ters C, one on each side of body A near the top thereof, said cutters having sockets H; and holes D therethrough, and chamfers C′ in the lower outer periphery thereof; spring I adapted to fit in said sockets and pass through hole J; pin F adapted to pass through holes D in the cutters, and hole E in body A, and collar G adapted to screw on body A and keep pin F in position, and to keep cutters C from having too great expansion.

2. The herein-described underreamer, comprising a shaft, circular at the top and bottom and reduced in size intermediate the circular portions, and having holes therethrough and channels therein, as shown; a groove in each side of the bottom of the upper circular portions; cutters having upper circular ends adapted to fit in said grooves; said cutters having holes extending through the upper ends, and sockets in the lower ends on the inner sides, and a chamfer around the outer lower edges thereof; a pin extending through a hole in the shaft and into the holes in the upper ends of said cutters; a spiral spring extending through a hole in the shaft, and having its ends housed in the sockets in the lower ends of said cutters; and a collar adapted to be screwed onto the upper circular part of the shaft and to project over the upper portion of the cutters.

In witness that I claim the foregoing I have hereunto subscribed my name, this 28th day of March, 1900, at Los Angeles, California.

WALTER DUNCAN.

Witnesses:
M. C. WILKINSON,
G. E. HARPHAM.