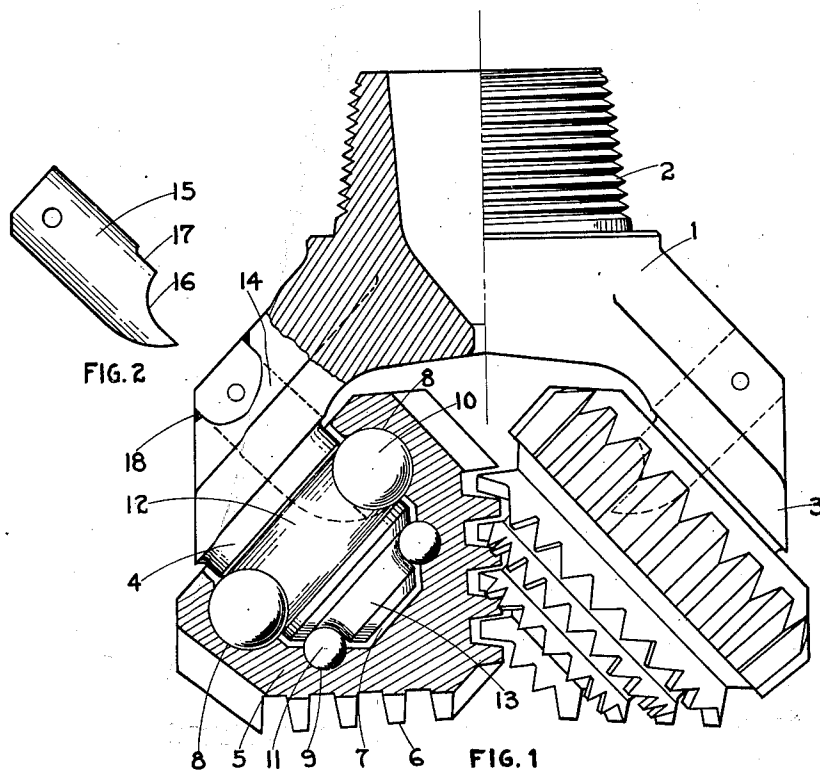


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L. H. WELLENSIEK ET AL
ROLLER CUTTER RETAINING DEVICE

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ROLLER CUTTER RETAINING DEVICE

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Our invention relates to well drills with roller cutters thereon and pertains particularly to the construction of the retaining means by which the cutters are held in position upon their shafts.

Where balls interfitting between the cutter and the shaft upon which the cutter is mounted, are used to retain the cutter in place the means by which the balls are entered into position becomes a problem. If an opening through the heel of the cutter to the ball race is provided, the cutter is weakened, and a material part of the cutting surface of the cutter is removed. This is a marked objection as it interferes with the cutting action of the cutter and lowers the cutting capacity of each set of cutters. If the balls are inserted through the axis of the shaft it necessitates a lateral or transverse bore from the axial opening to the raceway and increases the cost of construction and weakens the shaft somewhat.

It is an object of our invention to provide a construction whereby the balls may be inserted to the raceway by way of one straight bore in the cutter shaft leading directly to the raceway.

This invention includes a plug to fill the opening after it has served its purpose to allow the passage of the balls, which plug acts to strengthen the shaft and form part of the raceway.

We also desire to employ a separate anti-friction bearing for the cutter, acting to hold the cutter spaced uniformly from the shaft and allow free circulation of fluid about the cutter bearings.

In the drawing herewith, Fig. 1 is a side view partly in central vertical section of a well drill employing our invention.

Fig. 2 is a side elevation of the retaining pin, removed.

The tool upon which our invention is employed is a drill having a head 1 with a threaded shank 2 and diverging legs 3 thereon. Upon each leg is an inwardly and downwardly extending cutter shaft 4 formed integral therewith. Surrounding the end of each shaft and rotatable thereon is an ap-

proximately conical shaped cutter 5 formed with teeth 6 thereon.

These cutters are generally old in the art but their method of mounting has been changed from that formerly employed. The interior of each cutter is formed with a recess 7 shaped to fit over the end of its shaft 4 so as to allow free clearance about the shaft to allow circulation of slush or to receive lubricant. The interior wall of the cutter has two annular half round grooves 8 and 9 to provide races for the balls 10 and 11 respectively. The balls 10 are retaining balls and act to retain the cutter on the shaft. The balls 11 are anti-friction bearings also acting to space the cutter from the shaft.

The shaft 4 has grooves 12 and 13 to receive the balls 10 and 11 respectively. The balls 11 are placed in the race 9 in the cutter and held in place by a heavy grease when the cutter is placed on the shaft. The balls 10 have to be inserted when the cutter is in place on the shaft.

To introduce the balls 10 a hole 14 is bored through the leg 3 of the bit head and down one side of the shaft 4, the inner end of this hole being curved slightly toward the outside and terminates at a point registering with the outer rim of the race 12 in the shaft. When the balls are dropped into this hole they pass directly to the raceway and when they are all in place the hole is plugged with a pin 15.

The pin has its inner end shaped to conform to the shape of the shaft 4 and raceway 12 therein. It has a curved recess 16 to conform to the shape of the raceway and a recessed shoulder 17 to register with the outer surface of the shaft adjacent the raceway. The outer end of the pin has a transverse opening to receive a cotter-pin or rivet extending therethrough. In addition, we contemplate placing a bond of welding metal 18 about the pin to hold it rigidly in place.

The cutter, thus mounted, will rotate freely on its shaft. The two ball races are arranged to space the cutter uniformly from the shaft and to allow circulation of slush or lubricant. The forward balls 11 take up the end thrust upon the shaft. The balls 10

retain the cutter upon the shaft and also act as anti-friction bearings.

The forming of the opening 14 in the particular position shown so that the balls may pass through a bore hole in the bit head directly to the bearing race without the necessity of a branching passage makes the construction cheaper; it assures the insertion of the balls without choking of the passage, and enables the operator to fill the opening with a straight pin which prevents weakening of the cutter shaft and presents a smooth race in the shaft for the balls 10. The opening 14 need not be parallel with the axis of the shaft but must be a straight bore which may be completely filled with a plug pin as shown.

What we claim as new is:

1. In a well drill, a head, cutter shafts thereon tapered adjacent their ends, said shafts having grooves thereon for ball bearings, one of which is upon said tapered area, balls in said grooves, cutters on said shafts and a bore in said head and shaft leading in a straight line to one of said grooves, and means to fill said bore holding the balls in said groove.

2. In a well drill, a head, a pair of opposed inwardly inclined shafts integral with said head, cylindrical bores in said head and shafts parallel with the axes of said shafts, cutters surrounding the ends of said shafts, a row of balls interfitting in a groove between each shaft and its cutter to retain said cutter rotatably on said shaft, said bores terminating in said grooves, and a cylindrical plug in said bore acting to prevent weakening of said shafts.

In testimony whereof, we hereunto affix our signatures this the 18th day of November A. D. 1931.

LOUIS H. WELLENSIEK.
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