June 27, 1933. R. G. HAMAKER ET AL 1,915,527

ROLLER BIT

Filed May 15, 1931

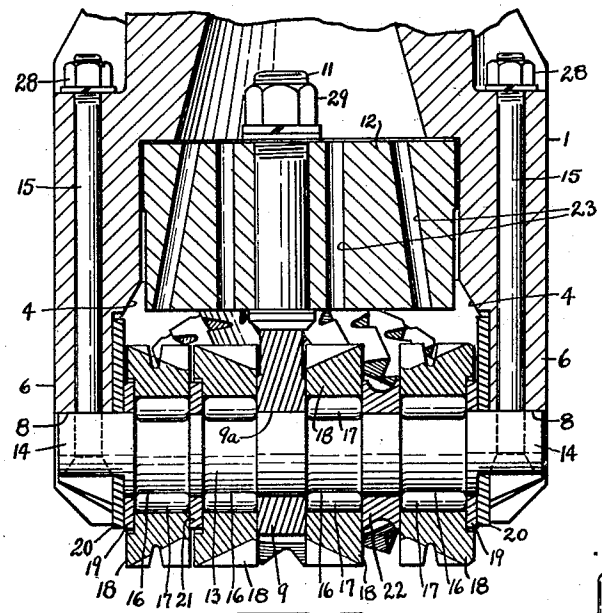


Fig. 3

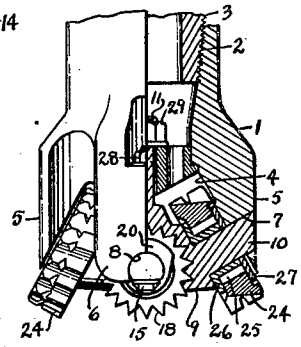


Fig. 1

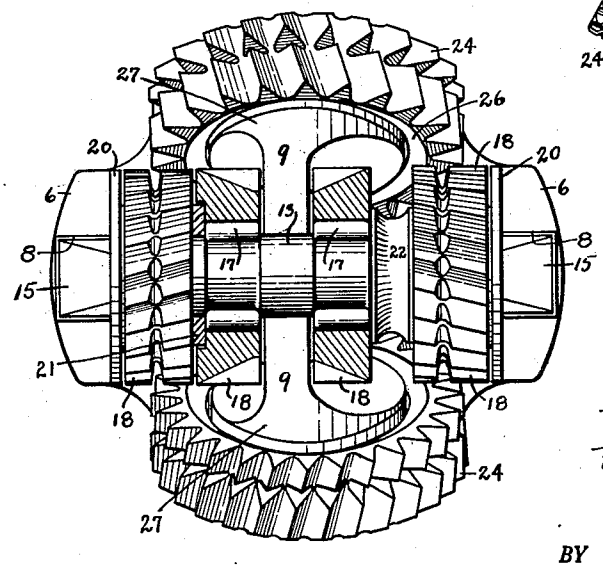


Fig. 2

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UNITED STATES PATENT OFFICE

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ROLLER BIT

Application filed May 15, 1931. Serial No. 537,534.

This invention relates generally to deep well drilling apparatus and specifically to roller bits.

Conventional rock bits embody a plurality of roller cutters that are frequently worn because they are not freely rotatable. New cutters must frequently be substituted for worn cutters; and if the lower portion of the conventional bit head is worn away the cutters fall out of it.

This invention has for its principal objects the provision of a new and improved cutter mounting adapted to insure the free rotation of the cutters; to permit the cutters to be quickly and easily mounted in and removed from the head; and to hold the cutters in the head even if the lower portion of the head has been worn away.

The preferred embodiment of the invention is illustrated by the accompanying drawing of which Fig. 1 is a partly sectional side elevation of the bit; Fig. 2, a partly sectional bottom plan view; and Fig. 3, a fragmentary sectional elevation taken at a right angle to Fig. 1.

In the drawing, the bit head is indicated at 1 and may be connected by suitable threads 2 to a drill stem 3. In its bottom, it has a cutter recess 4 formed by side roller cutter bearing extensions 5 and cross roller cutter bearing extensions 6. In the bearing extensions 5 are downwardly opening slots 7 and in the bearing extensions 6 are downwardly opening slots 8.

Within the cutter recess is a bridge 9 having upwardly and outwardly extending cross roller cutter pins 10, fitting in slots 7 of bearing extensions 5; and a central bolt 11 extending upwardly through the section 12 of the head which section is removably secured to the body of the head by means not shown.

Extending through an opening 9a in bridge 9 and at a right angle thereto is a cross roller cutter pin 13, the reduced ends 14 of which fit in slots 8 of bearing extensions 6. Extending upwardly in the head from the ends 14 of this pin are bolts 15.

The pin 13 has a plurality of annular grooves 16 therein, in which are disposed bearing rollers 17. Upon the bearing rollers are roller cutters 18. At both ends of the group of cutters are washers 19 and 20. Two of the cutters are separated by the washer 21 and the other two by the washer 22. The depth of the groove 16 being less than the diameter of the rollers 17, the washers 21 and 22 engage the rollers and cutters to hold the same in alignment. The washer 22 is made sufficiently wide and externally grooved to permit the passage thereabout of cleaning fluid issuing from passageways 23 of the section 12.

The side roller cutters are indicated at 24 and are mounted on bearing rollers 25 held between the flanged bushing 26 and washer 27; the bushing 26 bearing against the enlarged portions 27 of the bridge 9.

The cutters and associated parts (that is, everything except the bit head) are assembled at the factory. In order to mount the assembly in the head, it is only necessary to remove the nuts 28 of bolts 15 and the nut 29 of bolt 11. The bolts 15 and 11 may then be slipped into the head, whereupon the side roller cutter pins 10 will enter slots 7 and cross roller cutter pin 13 will enter slots 8. When the nuts are replaced, the bit is ready for use. It is important that all of the cutters be placed in the proper relative positions in the head, and this assembly eliminates all chance of the cutters being placed in improper relative positions by unskilled workmen in the field.

It will be apparent from the foregoing that the cutters may readily be mounted in and removed from the head; that the cutters are held in the head even when the bit is badly worn; and that there is little friction between the cutters and their pins.

We claim:

1. A roller bit having a pin, said pin having annular grooves therein, bearing rollers in said grooves, and roller cutters on said bearing rollers each of said cutters being revoluble on its rollers independently of the others of said cutters.

2. A roller bit having a pin, said pin having annular grooves therein, bearing rollers in said grooves, roller cutters on said bearing rollers, and a washer engaging said bear-

ing rollers and said roller cutters each of said cutters being revoluble on its rollers independently of the others of said cutters.

3. A roller bit having a cross roller cutter pin extending across the lower end thereof, said pin having annular grooves therein, bearing rollers in said grooves, roller cutters on said bearing rollers, and washers engaging said bearing rollers and said roller cutters each of said cutters being revoluble on its rollers independently of the others of said cutters.

4. A roller bit having a head, said head having a cutter recess defined by bearing extensions; a cutter pin fitting in said bearing extensions; end bolts connected to said pin and extending therefrom longitudinally of said head, into and removably secured in said bearing extensions; a central bolt connected to said pin between said end bolts and extending into and removably secured in said head; and roller cutters on said pin.

5. A roller bit having a head, said head having a cutter recess defined by bearing extensions, said bearing extensions having pin slots and longitudinal bolt openings; a cutter pin slidable into said slots; bearing rollers on said pin, roller cutters on said bearing rollers; and end bolts extending through and connected to said pin and slidable into said bolt openings.

6. A roller bit head having a bearing extension and a longitudinal opening in said extension; a cutter pin fitting in said extension; a cutter on said pin; and a bolt extending through and connected to said pin and removably secured in said opening.

7. A roller bit head having a bearing extension, a slot in said extension, and a longitudinal opening communicating with said slot; a cutter pin; a cutter on said pin; and a bolt extending through and connected to said pin; said pin and bolt being slidable simultaneously into said slot and opening, respectively.

8. A roller bit head having a cutter recess defined by bearing extensions, a slot in each extension, and a longitudinal opening communicating with each of said slots; a cutter pin; cutters on said pin; and end bolts extending through and connected to said pin; said cutters, pin and bolts being slidable simultaneously into said recess, slots and openings, respectively.

9. A roller bit having a head, said head having a cutter recess, the walls of said recess having therein cross roller cutter pin slots and side roller cutter pin slots; a bridge carrying side roller cutter pins slidable into said side roller cutter pin slots, and a central bolt slidable into and removably secured in said head; a cross roller cutter pin connected to said bridge and having ends slidable into said cross roller cutter pin slots; end bolts connected to said cross roller cutter pin and slidable into and removably secured in said head; cross roller cutters on said cross roller cutter pin; and side roller cutters on said side roller cutter pins.

10. In a roller bit, a head having a cutter recess, a central bolt opening communicating with said recess, cross roller cutter pin and side roller cutter pin slots in the walls of said recess, and end bolt openings communicating with said cross roller cutter pin slots; a bridge having side roller cutter pins slidable into said side roller cutter pin slots, and a bolt slidable into said central bolt opening; a cross roller cutter pin connected to said bridge and slidable into said cross roller cutter pin slots; end bolts connected to said cross roller cutter pin and slidable into said end bolt openings; side roller cutters on said side roller pins; and cross roller cutters on said cross roller pin.

11. A roller bit comprising a head having a cutter recess, a central bolt opening, end bolt openings, cross roller cutter pin and side roller cutter pin slots; a cutter assembly insertible in said head as a unit, and comprising: a bridge having inclined side roller cutter pins slidable into said side roller cutter pin slots, and a central bolt slidable into said central bolt opening; a cross roller cutter pin connected to said bridge and slidable into said cross roller cutter pin slots; end bolts connected to said cross roller cutter pin and slidable into said end bolt openings; and roller cutters on said pins.

In testimony whereof we hereunto affix our signatures.

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