July 6, 1937. F. A. THAHELD 2,086,397

DRILL BIT

Filed June 22, 1935

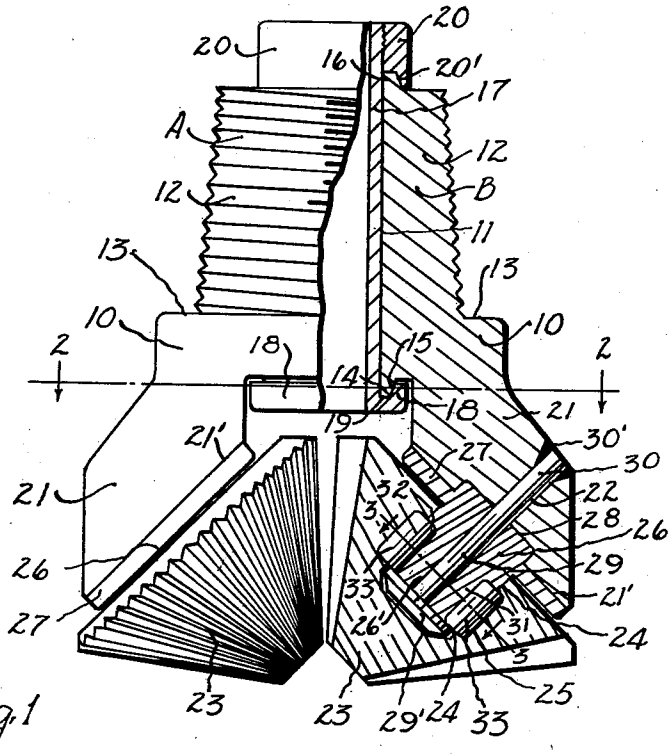



Fig. 1

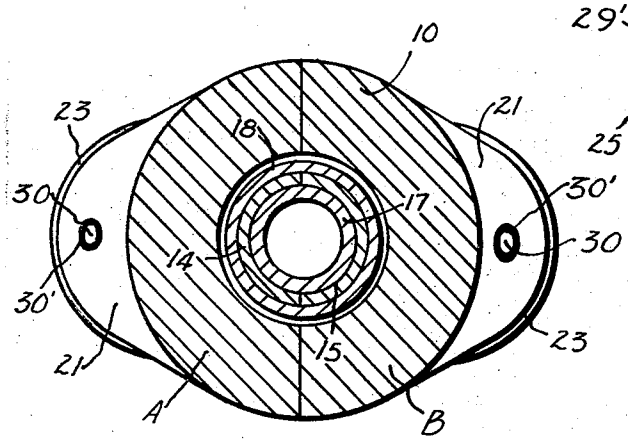



Fig. 2

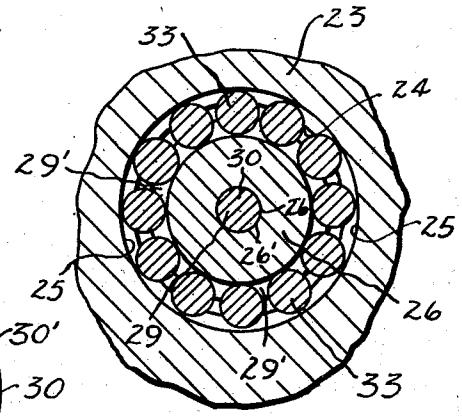



Fig. 3

Inventor

Feri A. Thaheld

By

Attorney

Patented July 6, 1937 2,086,397

# UNITED STATES PATENT OFFICE

2,086,397

## DRILL BIT

Feri A. Thaheld, Dallas, Tex., assignor to The Guiberson Corporation, Dallas, Tex., a corporation of Delaware

Application June 22, 1935, Serial No. 27,826

4 Claims. (Cl. 255—71)

This invention relates to new and useful improvements in drill bits.

One object of the invention is to provide an improved drill bit which may be readily assembled or dis-assembled and which carries the usual conical cutters and is particularly adapted for use in drilling in hard formation during well drilling, or the like.

An important object of the invention is to provide an improved mounting for the conical cutters of a drill bit which provides an increased area for bearing the thrust against said cutters occasioned by the drilling operation, whereby the life of the drill is increased.

A further object of the invention is to provide an improved drill bit having conical cutters mounted thereon, the mounting including elongated rollers on which the cutters are rotatable, whereby an increased bearing surface for each cutter is provided.

A still further object of the invention is to provide an improved drill bit having conical cutters and including a split body having the cutter shafts carried at its lower end, the split body permitting the easy dis-assembling of the bit to remove or replace cutters when worn, or for any other reason.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, in which an example of the invention is shown, and wherein:

Figure 1 is a view partly in elevation and partly in section of a drill bit constructed in accordance with the invention,

Figure 2 is a horizontal, cross sectional view, taken on the line 2—2 of Figure 1, and,

Figure 3 is a transverse, sectional view, taken on the line 3—3 of Figure 1.

In the drawing, the numeral 10 designates a split body including complementary sections or halves A and B. Each section is semi-circular in cross section, whereby when placed together a circular drill bit body or head having a vertical bore 11 extending therethrough, is formed. The upper end of the body is provided with a reduced, tapered pin 12 which is threaded to receive the drill stem. Since the pin is smaller in diameter than the body, an outwardly directed shoulder 13 surrounds the lower end of said pin. It is pointed out that the pin could be eliminated and any other suitable drill stem connection substituted therefor.

For securing the sections A and B together, the lower end of the bore 11 of the body is provided with an annular, depending flange 14. The outer end of the flange is beveled at 15 as is shown in Figure 1. The upper end of the bore is provided with a similar flange 16. An elongated tubular connecting sleeve 17 extends through the bore 11 and has an enlarged collar 18 on its lower end. This collar has an internal annular groove 19 which is arranged to be engaged by the annular flange 14 at the lower end of the bore. The groove has one face beveled complementary to the bevel 15 of said flange.

The upper end of the connecting sleeve extends upwardly above the upper end of the bore and is screw-threaded to receive a collar 20. The collar 20 is provided with an annular groove 20' in its under side and when said collar is tightened down, said groove is engaged by the annular beveled flange 16 at the upper end of the bore.

It will be seen by observing Figure 1, that when the connecting sleeve is passed through the bore 11 as shown, and the collar 20 screwed onto its upper end, the two sections A and B will be securely clamped together by the collars 18 and 20 engaging the annular flanges 14 and 16. It is noted that the complementary bevels of the flanges and grooves in said collars serve to draw the sections together, whereby a tight connection therebetween is provided. The engaging faces of the sections may be machined so that a fluid tight joint is had therebetween.

Each section is formed with a depending leg or hanger 21 and when the sections are secured together the hangers are located diametrically opposite each other. Since the hangers are constructed exactly alike a description of one will suffice. As is obvious by observing Figure 1, each hanger has its inner face 21' inclined upwardly toward the center of the body. This inner face is flat and substantially circular in cross section, being provided with an axial opening 22. Each hanger has the conical cutter 23 mounted thereon and this mounting is one of the features of the invention.

Each cutter is provided with an axial bore 24 which extends partially through said cutter from the base thereof and this bore is provided with an annular recess 25 in its side wall. The axle 26 on which the cutter is mounted is made separate from the hanger 21 and has an external, annular flange 27 formed thereon. An axial recess 28 is located in the face 21' of the hanger and this recess is of the same diameter as the adjacent upper end portion of the axle 26, whereby said upper end portion of the axle fits therein. The depth of the recess is such that when the upper end of the axle is engaging the inner end of said recess, the annular flange 27 of the axle is abutting the face 21' of the hanger (Fig. 1).

For holding each cutter on the axle and also for fastening the axle to the hanger a headed pin 29 is provided. The pin has its head 29' fitting

rather snugly the bottom of the bore 24 of the cutter and has its shank 30 extending upwardly through an axial bore 26' in said axle and through the opening 22 in the hanger. The upper end of the shank is welded at 30' to the outer face of the hanger. The lower end of the axle is reduced at 31 to form an internal annular shoulder 32, and when the cutter is on the axle, this reduced lower end registers with the annular recess 25 in the wall of the bore, the shoulder 32 being opposite the upper end of said recess.

Elongated rollers 33 are located within the raceway produced by the recess 25 and the reduced portion 31 of the axle, whereby the cone cutter is readily rotatable on the axle. The rollers carry the load imposed on the cutter during operation. It is pointed out that the head 29' of the pin 29 is of a larger diameter than the reduced lower end of the axle, whereby said head serves to prevent the rollers from moving downwardly out of the annular recess 25. The shoulder 32, of course, prevents their upward movement. It is obvious that with the above structure the pin not only serves to secure the cutter to the axle but also fastens said axle to the hanger.

In assembling the device, the cutters and axles are first secured to the hangers of each section. This is accomplished by positioning the head 29' of the pin in the bottom of the bore and then placing the elongated rollers 33 within the annular recess 25 of the bore. The axle is then slid down over the shank 30 of the pin, into position within the bore. The upper portion of the shank is then entered into the axial opening 22 in the hanger and welded therein at its upper end.

After each section has been assembled as above, the two sections are then placed around the connecting sleeve 17 and secured together as has been described. The assembling and disassembling is accomplished quickly and easily. There are a minimum of parts and by making the body 10 in sections, it is not only easier to mount the cutters but manufacturing is simplified.

It is pointed out that the particular mounting permits the use of the elongated rollers as a bearing surface for the cutters. This is a decided advantage because it is obvious that an increased bearing surface which prolongs the life of the bit and reduces replacements, is provided. Further, the rollers carry the thrust against the cutters during the cutting operation, and it is obvious that this increased surface makes for smoother cutting. Also the provision of the rollers permits the drill to be effectively used in drilling in hard formations because of increased strength and durability which is capable of withstanding the increased jar produced by such drilling.

What I claim and desire to secure by Letters Patent is:

1. A drill bit including, a pair of complementary members of semi-circular cross section arranged to fit together to form the bit body and having an axial bore when so assembled, semi-circular flanges at the upper and lower ends of the sections and arranged to form annular flanges at opposite ends of the axial bore when the sections are fitted together, a connecting sleeve having annular grooved heads at its upper and lower ends for engaging the flanges to hold the sections together, one of said heads being detachable and screw-threaded to the contiguous end portion of said sleeve, a cutter axle at the lower end of each section, and a rotatable cutter on each axle.

2. A drill bit including, a pair of complementary semi-circular sections arranged to fit together to form the bit body and having an axial bore when so assembled, semi-circular flanges at the upper and lower ends of the sections and arranged to form annular flanges when the sections are fitted together, a connecting sleeve having annular grooved heads at its upper and lower ends for engaging the flanges to hold the sections together, a cutter axle arranged to be fastened to the lower end of each section, a rotatable cutter arranged to be mounted on each axle, and securing means for said axle and cutter comprising a recess in the body section in which the axle is seated at one end, an annularly shouldered recess in the cutter, a series of rollers in said recess of the cutter, and a securing pin inserted through an axial bore in the axle and an opening provided in said body section, said pin having a headed end portion co-operating with said series of rollers to retain the cutter on the axle and the opposite end portion of said pin being fixedly secured to said body section.

3. In a drill bit of the character described, a body section, a rotatable cutter, an axle member having an annular flange abutting the face of said body section and an end portion fitted in a recess provided therefore in said body section, said axle member having a reduced opposite end portion providing a roller race with an annular shoulder, said cutter having an annularly shouldered recess therein, a series of rollers in said recess of the cutter and working upon the reduced portion of said axle member, and a retaining pin inserted in an axial bore of the axle member and an alined opening provided therefore in the body section, said pin having a head at one end engageable with said rollers, the annular shoulder in the cutter recess being engageable with the opposite ends of the rollers, and the opposite end portion of said pin being secured to said body section.

4. In a drill bit of the character described, a body section, said body section having a recess in the face thereof, an axle member having an end portion fitted in said recess and an adjacent external annular shoulder abutting the face of said body section, the outer end portion of said axle member being reduced in diameter with an annular thrust shoulder at the inner end of said reduced portion of the axle member, said axle member having an axial bore and the body section an alined opening, a rotatable cutter having an annularly shouldered recess therein, a series of rollers in said annularly shouldered recess of the cutter and working upon the reduced portion of said axle member, and a retaining pin inserted in the bore of said axle member and the alined opening of said body section, said pin having a head on one end engaging the adjacent end of the series of rollers in said cutter, the other end of the series of rollers engaging the shoulder on the cutter, and the opposite end portion of said pin being welded to said body section.

FERI A. THAHELD.