Sept. 25, 1928. 1,685,327

A. W. KAMMERER

WELL DRILLING BIT

Original Filed Nov. 12, 1924

Fig. 1.

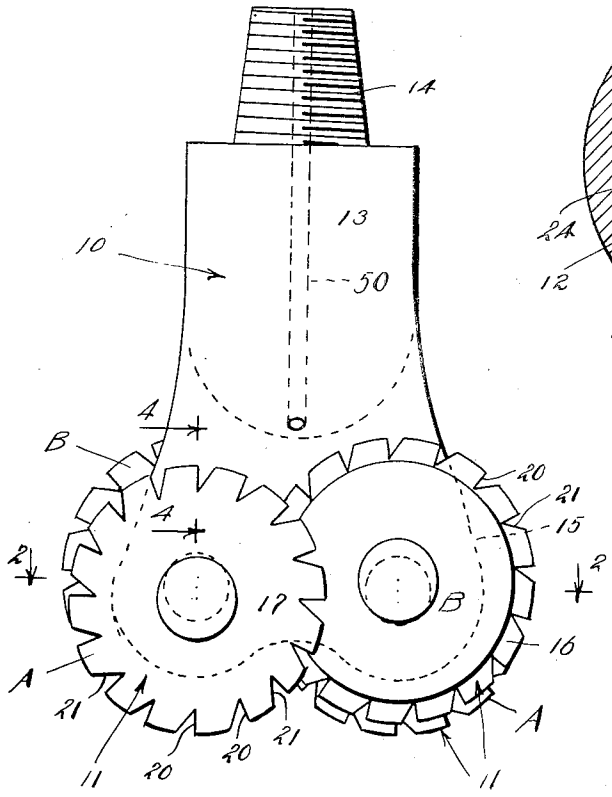


Fig. 3.

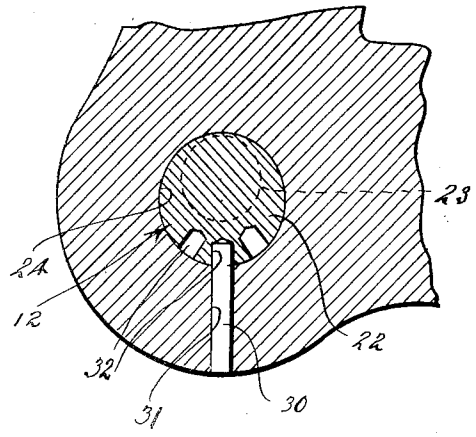


Fig. 4.

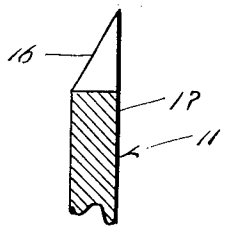
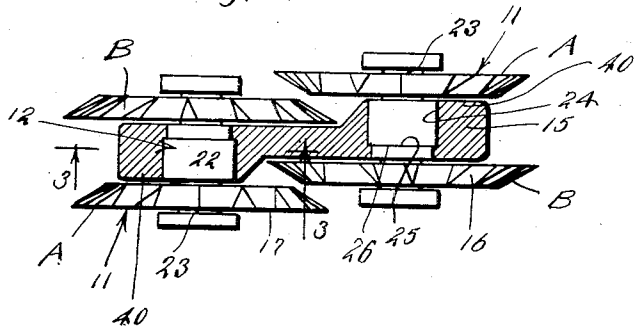


Fig. 2.



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Patented Sept. 25, 1928. 1,685,327

UNITED STATES PATENT OFFICE.

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WELL-DRILLING BIT.

Application filed November 12, 1924, Serial No. 749,389. Renewed May 1, 1928.

This invention has to do generally with a bit or boring tool particularly useful in drilling wells and it is a general object of the invention to provide a simple, practical and effective device of this character.

An object of this invention is to provide an improved cutting member or disc cutter for a bit of the disc type.

Another object of this invention is to provide a disc bit having a body with discs substantially opposite each other at the front and rear sides of the body.

A further object of this invention is to provide a bit having a plurality of discs arranged so that one comes into operation upon another being worn away.

Another object of this invention is to provide a simple, effective disc mounting, whereby the relationing of the discs can be varied.

The various objects and features of this invention will be best and more fully understood from the following detailed description of a typical preferred form of the invention throughout which description reference is had to the accompanying drawings in which

Fig. 1 is a view showing a typical well drilling bit embodying this invention.

Fig. 2 is a detailed plan section taken as indicated by line 2—2 on Fig. 1.

Fig. 3 is an enlarged detailed sectional view taken as indicated by line 3—3 on Fig. 2 and

Fig. 4 is an enlarged detailed sectional view taken as indicated by line 4—4 on Fig. 1.

The bit including the present invention comprises, generally, a shank or body 10, a plurality of disc-like cutters 11, and mounting means 12 for the cutters.

The body 10 may, in practice, be varied in shape and design, depending upon various conditions, such as the proportioning of the cutters, mounting means, the character of work for which the tool is to be used, etc. The particular body 10 illustrated in the drawings is of the general type employed in well drilling tools and has a round upper end portion 13 provided with a tapered screw threaded pin 14 by which the tool may be connected with an operating member or drill pipe. The lower portion 15 of the body is substantially flat and is disposed diametrically with relation to the vertical axis of the tool.

In accordance with my present invention each cutter 11 is in the form of a disc. The front or face of the disc illustrated in the drawings is flat while the periphery portion 16 of the back of the disc is finished or beveled off to join the periphery of the front face 17. The periphery portion of the back of the disc being finished to join the front face of the disc forms a sharp cutting periphery on the disc. In accordance with the broader aspects of this invention it is not essential that the front face of the disc be flat as I have illustrated in the drawings, nor that the disc in general be flat as I have shown in the drawings. It would be apparent that the desired sharp periphery may be obtained by shaping the periphery portions for the disc in various manners and that the general shape of the disc may be varied considerably.

The periphery portion of the disc is made irregular or is toothed. The desired teeth may be formed by cutting suitable indentations in the periphery portion of the disc. In the particular case illustrated in the drawings the teeth are formed by cutting indentations in the periphery of the disc, the indentations being so shaped that each tooth has a flat face 20 disposed radially with relation to the central axis of the disc and an inclined or beveled face 21 extending diagonally from the peak or outermost part of the tooth to the bottom or root of the next adjacent tooth. The general shape and relationing of the teeth will be fully understood from inspection of Figs. 1 and 4 of the drawings. It is to be understood that the broader aspects of my invention contemplate suitable variations in the shape and formation of the teeth as well as the periphery portion, generally, of the discs, to suit the operating conditions under which the tool is to be used. Further, the size of the teeth with relation to the diameter of the disc and the number of teeth applied to the disc may be readily varied to best suit conditions and the disposition of the teeth with reference to the direction of rotation of the discs may be made to best suit operating conditions.

In accordance with my invention the discs or cutters 11 are mounted on the body in pairs, each pair of discs including a disc located in the front side of the body, hereinafter designated the front disc A and a disc located at the rear side of the body, hereinafter designated the rear disc B. In the particular bit illustrated in the drawings there are two pairs of discs mounted on the flat portion 15 of the

body at opposite sides of the central axis of the body.

The mounting means 12 includes a disc carrier 22 mounted in the flat portion 15 of the body and projections or pins 23 extending from the carrier and carrying the discs. There is a carrier 22 for each pair of discs, which carrier is mounted in an opening 24 formed through the flat part 15 of the body. Each carrier is provided at its front end with a pin 23 to carry the front disc A, and at its rear end with a pin 23 to carry the rear disc B. The carrier 22 and opening 24 are round and the opening is provided with a forwardly facing shoulder 25 which receives a shoulder 26 on the carrier to prevent displacement of the carrier through the rear of the opening. In accordance with my invention the disc carrying pins 23 are formed on the carrier with their axes offset with relation to the axis of the carrier, or in other words, so that they are eccentric to the carrier. The two pins on the carrier may be offset in the same direction and to the same degree, or any desired relationing of the pins may be had. In the particular case illustrated in the drawings, the pins are both offset the same amount from the axis of the carrier and are offset in diametrically opposite directions from the axis of the carrier. With this relationing of pins the discs are thrown or moved in opposite directions upon rotation of the carrier in opening 24. Suitable means is provided for retaining the carrier 22 in the opening 24 in the desired rotating position. This means may include a pin 30 arranged through an opening 31 in the flat part 15 of the body to extend into a suitable opening 32 provided in the carrier. By providing a plurality of openings 32 at different rotative positions in the carrier the carrier can be set in different rotative positions. By varying or adjusting the position of the carrier in the opening the two discs or cutters of each pair may be varied with reference to the part 15 of the body, for instance, either cutter may be moved to a position to extend below the other or to a position to extend outwardly beyond the other. In the drawings, I have illustrated the carriers related and set so that the front discs A extend below the rear discs B, the front and rear discs both extending outwardly the same distance from the center of the tool. In this case, the front discs will be subjected to the most work until such time as they are worn down, whereupon the rear discs come into play.

In order that the discs may be comparatively large in diameter it is desirable to shape the flat portion 15 of the body so that the discs of the two pairs overlap. In the drawings I have illustrated the leading side parts 40 of the flat part 15 extended somewhat, so that the front discs A of the two pairs overlap or extend over the rear discs B. This relationing is clearly illustrated in Fig. 2 of the drawing.

In the drawings it will be noted that the two discs of each pair are of different sizes, that the two discs of each pair have different numbers of teeth, and that the teeth are of different sizes. With this construction I avoid all possibility of one cutter tracking in the path of another without operating. It will be understood, of course, that the body 10 may be provided with a suitable passage 50 for circulating fluid and that the passage may be made to discharge at or onto the cutters in the most advantageous manner.

Having described only a typical preferred form of my invention I do not wish to limit myself to the specific details hereinabove set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A bit including, a flat body, and two pairs of disc cutters carried by the body at diametrically opposite sides of its central axis, each pair of cutters including a cutter at the leading side of the body and a cutter at the trailing side of the body.

2. A bit including, a body, two cutters, and mounting means for the cutters including, a round carrier mounted in the body, and pins extending from opposite ends of the carrier to project from opposite sides of the body to carry the cutters, the axes of the pins being offset relative to the axis of the carrier.

3. A bit including, a body, two cutters, and mounting means for the cutters including, a round carrier mounted in the body, means for setting the carrier in different rotative positions in the body, and pins extending from opposite ends of the carrier to project from opposite sides of the body to carry the cutters, the axes of the pins being offset relative to the axis of the carrier.

In witness that I claim the foregoing I have hereunto subscribed my name this 28th day of Oct., 1924.

ARCHER W. KAMMERER.