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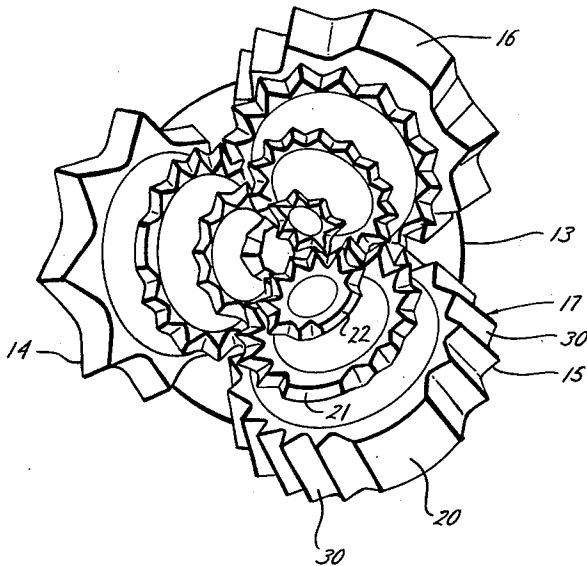
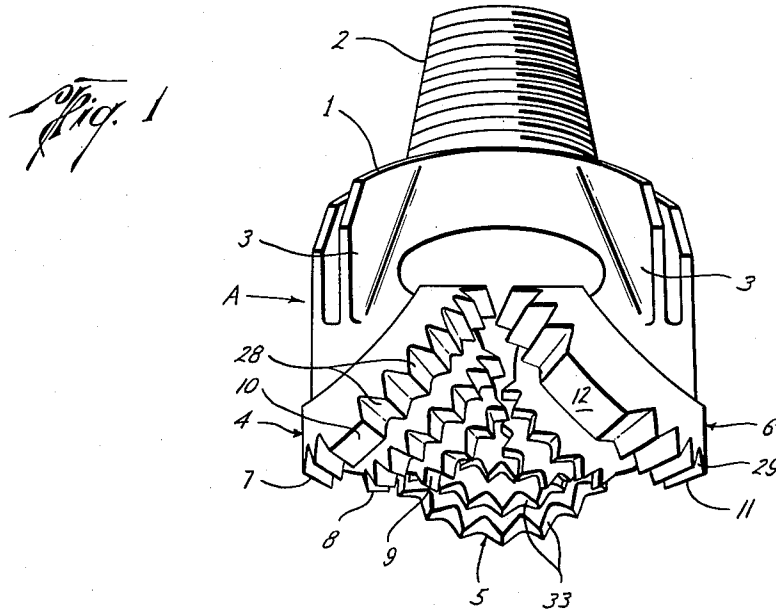
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DRILL BIT FOR PRODUCING AN IRREGULAR INDENTATION
PATTERN ON THE BOTTOM OF A WELL BORE

Filed Nov. 1, 1956

2 Sheets-Sheet 1



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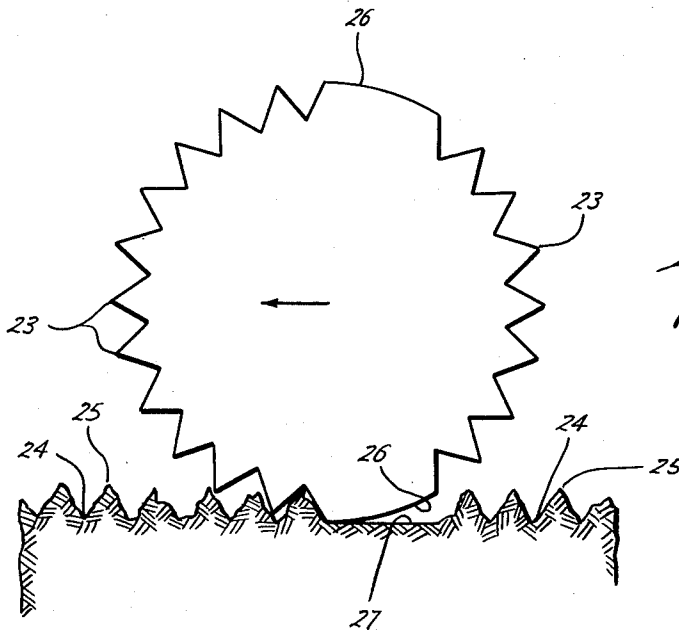
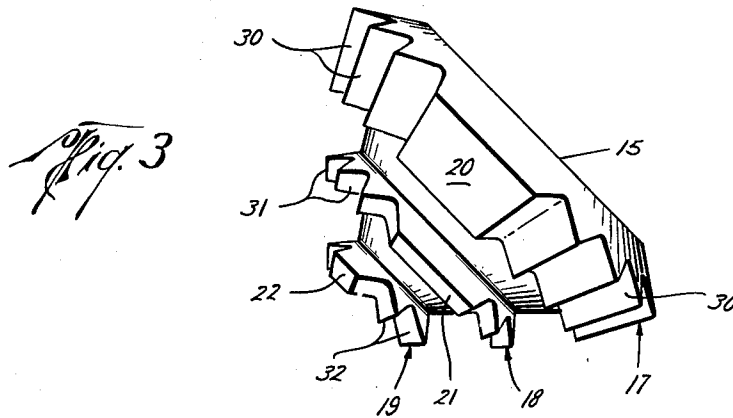
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3,018,835

DRILL BIT FOR PRODUCING AN IRREGULAR INDENTATION PATTERN ON THE BOTTOM OF A WELL BORE

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3 Claims. (Cl. 175-378)

This invention relates generally to drill bits for deep wells and more particularly to the arrangement of teeth on the cutters of roller type drill bits.

In the drilling of wells with roller type drill bits, the roller cutters are rolled around on the bottom of the hole being drilled. The roller cutter teeth may thus form indentations, with projecting "rock teeth" therebetween, in the earth formation being encountered. These indentations may be gradually deepened upon successive rounds by the roller cutter to a magnitude where the roller cutter teeth intermesh with the indentations in the formation in a manner similar to a gear, whereupon the progress of the drill bit through the formation may be impaired.

It is an object of this invention to provide a new and improved drill bit roller cutter which will during the operation thereof tend to alleviate the formation of projecting "rock teeth" on the bottom of a bore hole.

Another object is to provide a new and improved arrangement of teeth for a drill bit roller which during the operation thereof will produce an irregular indentation pattern on the bottom of a hole being drilled by the drill bit.

Another object is to provide a drill bit roller cutter having rows of cutting teeth thereon wherein in at least one of the said rows of teeth, at least one tooth will have an extremely wide crest to serve as a crushing element to break up projecting ridges of formation which may be formed on the bottom of a bore hole by the other teeth in the same row, or by the teeth of the other cutters on the drill bit.

Another object is to provide a drill bit having new and improved roller cutters thereon to enhance the rate of penetration of the drill bit.

Other objects will become apparent from the following descriptions and accompanying drawings, in which:

FIG. 1 is an isometric view of a drill bit employing cone-type roller cutters.

FIG. 2 is a bottom plan view of a cone-type drill bit employing the cutters of the invention.

FIG. 3 is a detail view of an approximately conical roller cutter having rows of teeth arranged in accordance with the invention.

FIG. 4 is a diagrammatic view illustrating how the cutter teeth operate on the formation being drilled.

Referring to FIG. 1, a three-cutter drill bit is shown generally at A. It has a bit head 1 and the usual threaded shank 2 adapted for connection to the lower end of a drill stem (not shown). The bit head 1 has a plurality of depending bearing extensions 3 upon which are rotatably mounted roller cutters 4, 5 and 6.

The cutter 4 has an outer row of teeth 7; an intermediate row of teeth 8; and an inner row of teeth 9. The outer row of teeth 7 has an enlarged tooth 10 and a plurality of conventional chisel-type teeth 28. As shown, the conventional teeth 28 are consecutively arranged in a group (or sets) and have generally uniform crests. The crest of the tooth 10 has a width approximately equal to the pitch distance between the conventional teeth 28 of the row 7.

The cutter 6 has an outer row of teeth 11 which con-

2

tains an enlarged tooth 12 and a plurality of conventional teeth 29. The crest width of the tooth 12 is approximately equal to one and one-half times the pitch distance between the teeth 29 in the row 11.

The cutter 5 has rows of teeth 33 substantially conventional in form.

Referring to FIG. 2, a drill bit similar to that shown in FIG. 1 is illustrated. The bit has a head 13 upon which are rotatably mounted roller cutters 14, 15 and 16.

Since all of the cutters of the invention shown on the drawings operate in a similar manner, a description of one will describe the others.

FIG. 3 is a detail view of the cutter 15 shown in FIG. 2. The cutter 15 has an outer row of teeth 17; an intermediate row of teeth 18; and an inner row of teeth 19. The outer row of teeth 17 has at least one enlarged tooth 20 the crest of which has a width, for example, equal to approximately twice the pitch distance between the conventional teeth 30 in the row 17. It is to be understood that the crest width of the tooth 20 may be varied as desired; however, I prefer to have the crest width of the tooth 20 equal to approximately one-half to two times the pitch distance of the teeth 30 in the row 17, it being understood that more than one enlarged tooth may be contained in the row if desired.

The intermediate row of teeth 18 has a wide crested tooth 21 and a plurality of conventional teeth 31, and the inner row of teeth 19 has a wide crested tooth 22 and a plurality of conventional teeth 32.

FIG. 4 illustrates the action of the cutters of the invention on the formation. When the sets of conventional cutter teeth 23 penetrate the formation, they leave indentations 24 and projecting ridges or "rock teeth" 25 therebetween. When these "rock teeth" 25 are encountered by the wide crested tooth 26, the "rock teeth" 25 are substantially crushed as indicated at 27, thus removing some of the formation and producing an irregular pattern in the formation being drilled.

The invention is not confined to the embodiments shown and described. Various changes, within the scope of the following claims, will become apparent to those skilled in the art.

I claim:

1. The drill bit having a plurality of rotatable cutters mounted thereon, each of the said cutters having circumferential rows of cutting teeth thereon, at least one of the said rows of cutting teeth on at least one of the cutters comprising a set of conventional chisel shaped teeth arranged consecutively and having a substantially uniform pitch and tooth crest, and at least one tooth having a crest width extending axially for a distance substantially equal to the width of the row as well as extending circumferentially and equal to at least half the pitch distance of the conventional teeth in the same row, to produce an irregular pattern on the bottom of the hole being drilled.

2. A drill bit having a plurality of rotatable cutters mounted thereon, each of the said cutters having circumferential rows of cutting teeth thereon, at least one row of cutting teeth on at least one of the said cutters having groups of consecutively arranged chisel type teeth and an enlarged crested tooth between each of the said groups of conventional teeth in the same row, the crest of said enlarged tooth extending axially for a distance substantially equal to the width of the row as well as extending circumferentially of the row for a distance substantially equal to at least one-half to two times the pitch distance of the said chisel type teeth.

3. A drill bit having a rotatable cutter thereon, the said cutter having circumferential rows of teeth thereon, at least one of the said rows of teeth comprising sets of

3

chisel shaped teeth wherein the teeth in the set are arranged consecutively, and enlarged crested teeth irregularly disposed in the row between the said sets, the crests of said enlarged teeth extending axially for a distance substantially equal to the width of the row as well as extending circumferentially of the row for a distance substantially equal to at least one-half to two times the pitch distance of the said chisel shaped teeth, to produce

5

4

an irregular pattern on the bottom of the hole being drilled.

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