Oct. 13, 1936. G. G. HARRINGTON 2,057,026

DRILL BIT

Filed June 11, 1935

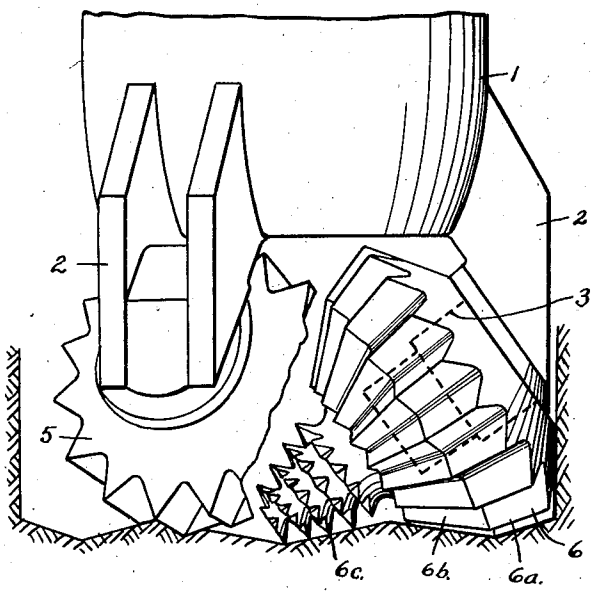

Fig. 1.

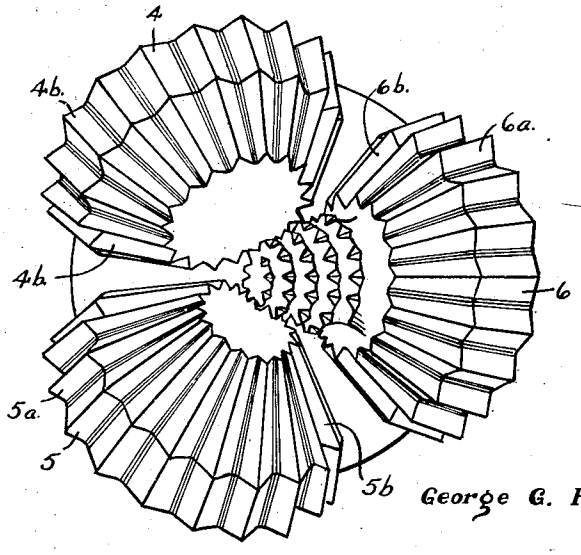

Fig. 2.

George G. Harrington
Inventor

By Vincent Martin
Attorneys.

Patented Oct. 13, 1936 2,057,026

UNITED STATES PATENT OFFICE

2,057,026

DRILL BIT

George G. Harrington, Houston, Tex., assignor to Reed Roller Bit Company, Houston, Tex., a corporation of Texas

Application June 11, 1935, Serial No. 26,062

11 Claims. (Cl. 255—71)

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

Some conventional deep well rock bits have substantially conical cutters rotatable on axes extending downwardly and inwardly toward the longitudinal axis of the head. The point portions of the conventional cutters are small and incapable of efficiently cutting away the central portion of the hole, and this results in a most inefficient operation of the drill.

The specific object of this invention is to provide a roller bit having the advantages of the cone bit but including cutters constructed and arranged in a new and improved manner to efficiently cut away said central portion as well as the remainder of the bottom of the well.

The preferred embodiment of the invention in a three cutter bit is illustrated by the accompanying drawing wherein Fig. 1 is a fragmentary elevaton of the bit, and Fig. 2 a bottom plan thereof.

The bit head 1 has three depending bearing projections 2 at about 120 degrees apart, and from each of these a conventional bearing, indicated by the dotted lines 3, projects downwardly and inwardly toward the longitudinal axis of the head.

The roller cutters 4, 5 and 6 extend inwardly from a point outside of the periphery of the head 1 and are constructed and arranged in a new and improved manner which will now be described.

The cutter 6 has a substantially frusto-conical base comprising outer and inner portions 6*a* and 6*b*, the teeth of the former of which are at a lesser angle to the axis of rotation of the cutter than are the teeth of the latter. These teeth are preferably of the chisel type being arranged substantially in the same plane with the axis of rotation of the cutter.

Extending inwardly from the inner base portion of cutter 6 is a point portion 6*c* having spiral cutting teeth that may be notched as shown. These spiral teeth extend to a point substantially at the longitudinal axis of the head to cut and remove the center of the bottom of the hole. The desired speed of rotation of the spiral tooth point section is assured by the traction of the chisel teeth of the base portions 6*a* and 6*b*. This new and improved combination eliminates in actual practice the problem of efficiently removing said central portion.

The other roller cutters 4 and 5 are substantially frusto-conical and have outer portions 4*a* and 5*a* and inner portions 4*b* and 5*b*, the teeth of the latter being at a greater angle to the axis of rotation than the teeth of the former. These teeth may be straight, as shown.

The straight teeth of the cutters 4 and 5 and the teeth of the base portions 6*a* and 6*b* of the cutter 6 cut away the major portion of the bottom of the hole and the spiral teeth of the point portion 6*c* of the cutter 6, driven by the traction of the straight teeth on said base portions 6*a* and 6*b* cuts and removes the central portion of the bottom of the hole, so that the entire area of formation is efficiently drilled.

The cutting edges of the teeth on the base portions 6*a* and 6*b* of the cutter 6 are shown in longitudinal alinement with the axis of the cutter but the angle may be somewhat varied if desired, while preserving the driving function.

Various other advantages of the invention will be apparent to those skilled in the art.

I claim:

1. A roller bit having a head and three roller cutters mounted on said head, rotatable on axes inclined downwardly and inwardly toward the longitudinal axis of said head, and arranged to traverse substantially the entire area of the bottom of the hole; each of said cutters extending beyond the periphery of the head; two of said cutters being substantially frusto-conical, each having an inner portion and an outer portion, the teeth on the outer portion being at a lesser angle to the axis of rotation than the teeth on the inner portion; and the other of said cutters having a point portion and a base, said base having inner and outer portions, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth on said base being substantially longitudinal to drive said point portion, the teeth on said inner base portion extending at a greater angle to the axis of rotation of said cutter than the teeth of said point portion, and the teeth of said outer base portion extending at a lesser angle to the axis of rotation of said cutter than the teeth of said inner base portion.

2. A roller bit having a head and three roller cutters mounted on said head, rotatable on axes inclined downwardly and inwardly toward the longitudinal axis of said head, and arranged to traverse substantially the entire area of the bottom of the hole; two of said cutters being substantially frusto-conical, each having an inner portion and an outer portion, the teeth on the outer portion being at a lesser angle to the axis of rotation than the teeth on the inner portion;

and the other of said cutters having a point portion and a base, said base having inner and outer portions, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth on said base being substantially longitudinal to drive said point portion, the teeth on said inner base portion extending at a greater angle to the axis of rotation of said cutter than the teeth of said point portion, and the teeth of said outer base portion extending at a lesser angle to the axis of rotation of said cutter than the teeth of said inner base portion.

3. A roller bit having a head and three roller cutters mounted on said head, rotatable on axes inclined downwardly and inwardly toward the longitudinal axis of said head, and arranged to traverse substantially the entire area of the bottom of the hole; two of said cutters being substantially frusto-conical, and the other of said cutters having a point portion and a substantially frusto-conical base, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth on said base being substantially longitudinal to drive said point portion.

4. A roller bit having a head and roller cutters mounted on said head, rotatable on axes inclined downwardly and inwardly toward the longitudinal axis of said head, and arranged to traverse substantially the entire area of the bottom of the hole; one of said cutters having a point portion and a substantially frusto-conical base, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth on said base being substantially longitudinal to drive said point portion.

5. A roller bit having a head and roller cutters mounted on said head, and arranged to traverse substantially the entire area of the bottom of the hole; one of said cutters being rotatable on an axis extending inwardly and downwardly substantially toward the longitudinal axis of said head, and having a point portion and a base, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth on said base being substantially longitudinal to drive said point portion.

6. A roller bit including a head, and roller cutters mounted on said head and arranged to traverse an area substantially equal to the transverse area of said head; one of said cutters having a substantially frusto-conical base portion and a point portion extending inwardly from said base portion, said base portion having longitudinal teeth and said point portion having spiral teeth, extending outwardly from a point substantially at the longitudinal axis of said head.

7. A roller cutter having a point portion and a substantially frusto-conical base portion, said point portion having spiral teeth and said base portion having longitudinal teeth.

8. A bit having a head and a roller cutter mounted to extend from the periphery of said head substantially to the longitudinal axis of said head and having spiral teeth on its point portion and longitudinal teeth on its base portion.

9. A roller bit having a head and three roller cutters mounted on said head, rotatable on axes inclined downwardly and inwardly toward the longitudinal axis of said head, and arranged to traverse substantially the entire area of the bottom of the hole, two of said cutters being substantially frusto conical, and the other of said cutters having a point portion and a base, said point portion having spiral cutting teeth extending upwardly and outwardly from a point substantially at the longitudinal axis of the head, the teeth of said base being substantially longitudinal to drive said point portion, and the teeth on the inner portion of said base extending at a greater angle to the axis of rotation of said cutter than the teeth on said point portion.

10. A roller cutter having a point portion and a substantially frusto-conical base portion, said point portion being of smaller diameter than said base portion, and having spiral teeth, and said base portion having longitudinal teeth.

11. A roller bit including a head and roller cutters mounted on said head and arranged to traverse an area substantially equal to the transverse area of said head, one of said cutters having a base portion and a point portion extending from said base portion substantially to the longitudinal axis of said head, said point portion having spiral cutting teeth, and said base portion having teeth the cutting edges of which extend at a much smaller angle to the axis of the cutter than the pitch angle of the spiral cutting teeth on the point portion, whereby the base teeth will grip the formation more firmly than the teeth on the point portion, and the teeth on the point portion, will therefore be driven by the teeth on the base portion.

GEORGE G. HARRINGTON.