

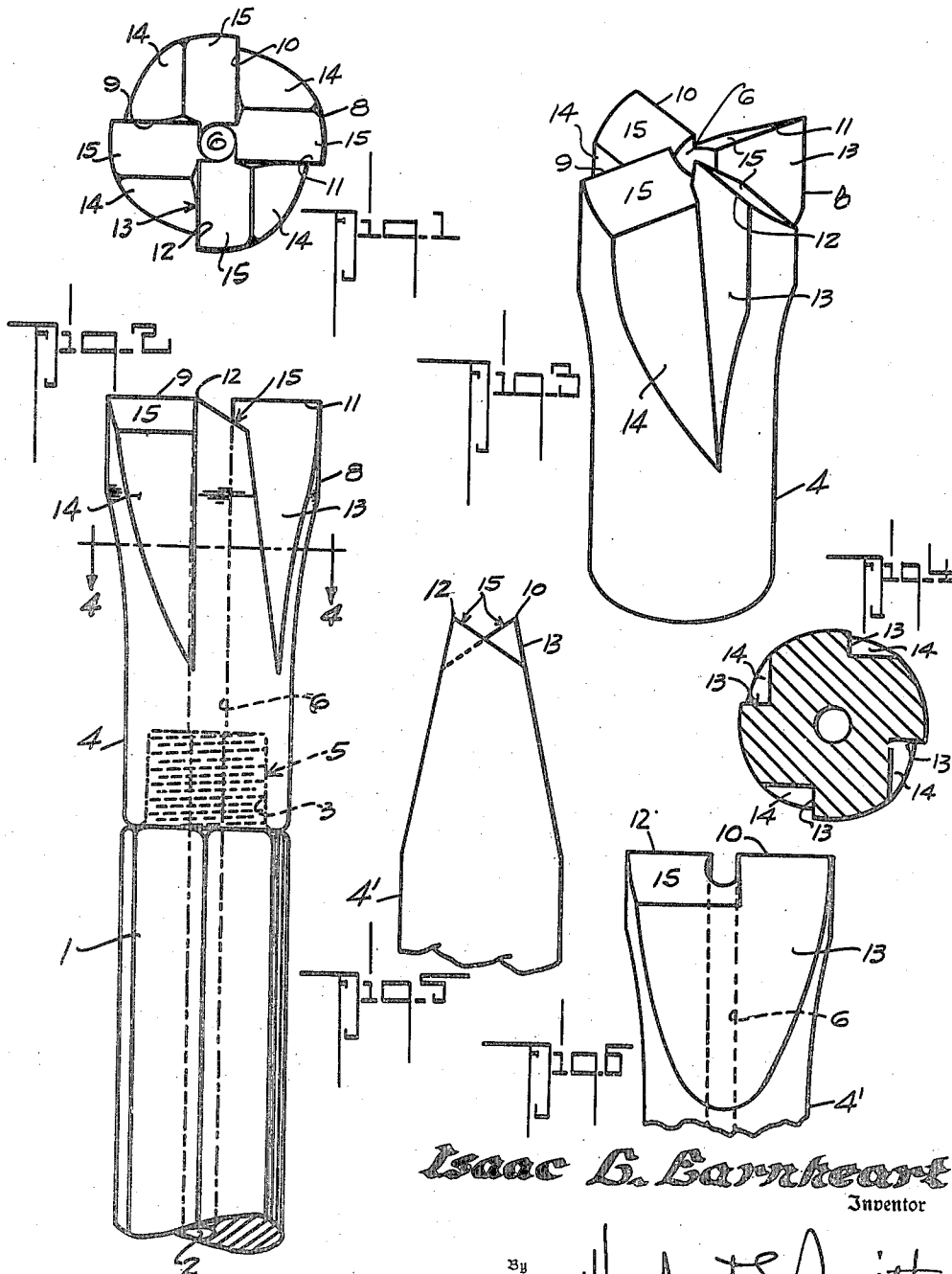
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DRILL BIT

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DRILL BIT

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My present invention relates to improvements in drill bits for use with power machines or tools in earth boring. The bit of my invention is especially designed for sinking holes in rocks etc., as in mining operations, and the bit is employed with an impact or endwise-concussion type of drilling machine-tool having a rotary feed, and water passages for conveying water to the cutters or cutting edges, and for conveying water and debris from the cutting edges of the bit.

In carrying out my invention I provide a bit which is readily detachable from its shank, drill-bar, or drill-stem, in order that the bit may be removed when necessary for sharpening; and the cutting edges or cutters of the bit are fashioned with a bevel-face, and a longitudinally extending front face forming part of a rearwardly extending notch, which facilitates sharpening and re-sharpening of the cutters or cutting edges. These bevel-end-faces of the cutters may repeatedly be ground down or sharpened, and in conjunction with the recess and the front longitudinal face of the cutter, each cutter may with facility be ground a number of times for re-sharpening, thereby increasing the durability of a drill bit, and securing a maximum service for a bit.

The plural cutting edges of the bit are arranged tangentially of the center hole and in parallel pairs, perpendicular in their relation to the axis of the bit, and these sharp cutting edges, under repeated impacts or end-concussions of the machine-tool, and the rotary feed of the bit, chip off the rock, rather than dig into the rock, thereby reducing the strain on the cutting edges or cutters, increasing the cutting speed of the bit, and facilitating both the impact and the rotary-feed operations of the machine tool. The rock thus chipped off forms a debris that may readily be conveyed from the cutting edges, and the flowing water clears away such debris from the cutters.

The invention consists in certain novel combinations and arrangements of parts involving the parallel pairs of tangentially offset cutting edges, the front longitudinally extending faces and the bevel-end faces of the cutters as will hereinafter be more fully set forth and claimed. In accompanying drawing I have illustrated one complete embodiment of my invention wherein the parts are combined and arranged according to modes I have thus far devised for the practical application of the principles of my invention, and it will be understood that changes and alterations may be made in this exemplifying drawing, with-

in the scope of my claim, without departing from the principles of my invention.

Figure 1 is a plan view of the impact or concussion face of the bit, showing the arrangement of two pairs of bevel-edge, or chisel-cutters of the bit.

Figure 2 is a side view of the bit showing it threaded to the reduced threaded end of a tool shank, stem, or drill bar.

Figure 3 is a perspective view showing the four cutters, with their bevel faces and front longitudinal faces.

Figure 4 is a transverse sectional detail view of the bit at line 4—4 of Figure 2.

Figure 5 and Figure 6 are side views of a modified form of the bit with one pair of tangentially offset, parallel, cutting edges.

In the assembly view of Figure 2 a well known type of drill-rod, stem, or shank 1, for a machine tool, is shown with its central water passage 2 extending longitudinally therethrough, and this stem has a reduced, threaded head 3 upon which the bit 4 is detachably mounted. The bit, in the form of a cylinder, is fashioned with a threaded socket 5 to fit over the head 3, and it is also fashioned with a central water passage or duct 6 forming an extension of the passage 2 for supplying water to the cutters, and for conveying the water and debris to the rear as the cutting progresses.

The shank 1 forms part of an impact or concussion tool that is provided with a rotary feed for the shank and bit, and these members are slowly rotated as the tool shank and bit are quickly agitated or reciprocated.

The impact end of the bit swells or flares out to form a diametrically enlarged bit-head 8, and the impact face of this head is fashioned with a plurality of cutting edges in diametrically-offset pairs that radiate from the central opening or duct 6. In Figure 1 it will be seen that the cutting edges 9, 10, 11, and 12 are arranged in tangentially-offset parallel cutters or cutting edges 9—11 and 10—12, which are in advance of the remainder of the bit, and these sharp edges, by impact, and due to the rotary feed of the bit, chip the rock, forming a perfect cylindrical hole, the debris being conveyed rearwardly therefrom through the water notches or debris notches fashioned exterior of the bit for that purpose. These exterior notches are formed between the flat, straight, longitudinally extending front faces 13 of the cutters, and the curved longitudinally extending faces 14, the latter being arranged to the rear of the bevel-

faces 15 of the cutters. These notches also provide clearance for the sharpening operations of the cutters, and the bevel faces 15 are ground down by a suitable machine tool, to form the sharp cutting edges. Thus the length of the straight, flat front faces 13 of the bit-head, and the bevel-edge or face 15, permit of re-sharpening the cutters, with facility, and the repeated sharpening operations prolong the life of the drill bit.

The chipping action of the sharp cutting edges, due to impact and the rotary-feed of the bit, insures the making of small cuttings, or fine debris, that is readily washed away, to clear the cutters, resulting in a maximum drilling speed for the bit, and efficiency in disposing of the cuttings. The tangentially-offset arrangement of the cutters of a pair, with the cutters in parallel planes, and only the cutting edge coming in contact with the rock, insures freedom in the cutting action, even in badly altered or fissured rock where difficulty is usually met in sinking a perfect cylindrical hole.

When the bit is penetrating a rock having a crevice at the side of a hole, and four cutting edges are employed as in Figure 1, it will be apparent that the work is uniformly distributed to three of the cutters, while the fourth cutter is passing through the crevice, thus equalizing the

impact by distributing the work of three of the cutters to stabilize the performance of the bit.

In Figures 5 and 6 the bit is designed for use with a single pair of tangentially-offset cutting edges or cutters 10 and 12 instead of the two pairs used in Figure 1, and this type of cutter is adapted for a variety of uses where conditions are met dissimilar to those encountered by the bit of Figure 1.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

In a drill bit having an enlarged head and a central longitudinal water passage therein, said bit comprising four cruciform cutters having rearwardly extending longitudinal notches between adjoining cutters, each cutter having a tangentially arranged cutting edge with its inner end terminating at the water passage, said cutting edges being arranged in coplanar pairs at opposite sides of the water passage, rearwardly beveled end faces on the cutters, said notches each being formed by a flat front face on one cutter and a rearwardly curved face on an adjoining cutter, and said notches diminishing in area from the cutting edges and each merging at a point in the periphery of the head.

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