No. 854,144. PATENTED MAY 21, 1907.

P. BROADBOOKS.

DRILL BIT.

APPLICATION FILED AUG. 3, 1906.

Fig. 1.

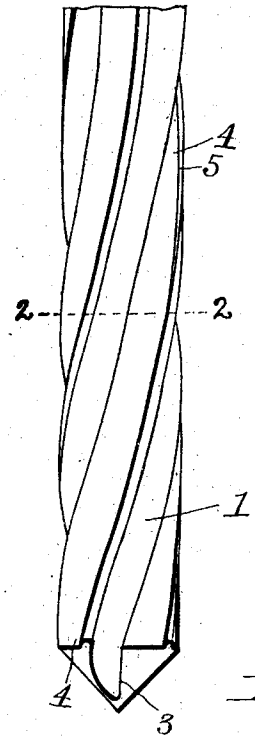


Fig. 2.

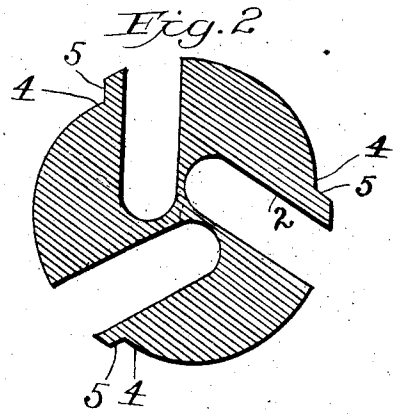


Fig. 3.

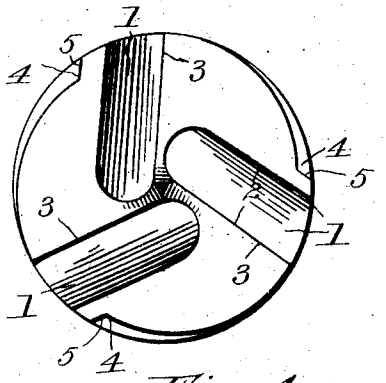


Fig. 4.

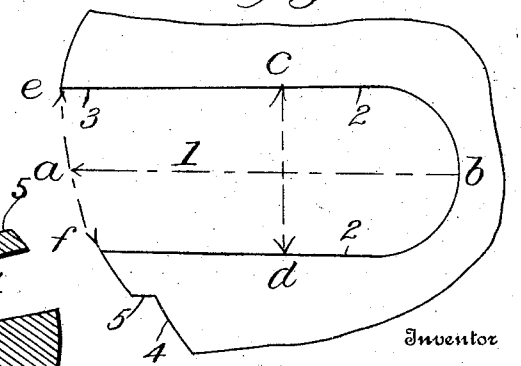
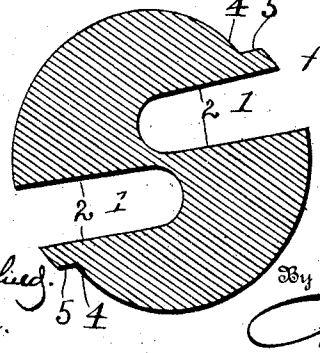


Fig. 5.



Witnesses

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DRILL-BIT.

No. 854,144. Specification of Letters Patent. Patented May 21, 1907.

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To all whom it may concern:

Be it known that I, PETER BROADBOOKS, of Batavia, in the county of Genesee and State of New York, have invented certain new and useful Improvements in Drill-Bits; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved twist-drill.

The objects of the invention are to so form the drill that the cuttings or chips will be more easily and certainly discharged therefrom; an increased number of cutting edges may be provided without lessening the strength of the drill; the point will be braced, and the cutting edges stiffened; also to construct the drill with self-clearing lubricating grooves whereby oil can be directed to the point and cutting edges thereof without passing through the chip channels.

Peculiar characteristic features of my drill are (1) the novel construction of the chip-channels which are deep and comparatively narrow, and extend preferably tangentially to a circle described around the axis of the bit stock and have substantially parallel plane-surfaced walls, and are deeper than they are wide, so that the chips will have larger area of contact with the rear wall of the channel, than with the walls of the hole which the drill is making in the stock—and by such construction the chips are directed inwardly and upwardly and naturally rise quickly and easily in the channels and are discharged without binding therein. (2) The drill also has an increased number of cutting edges which facilitates the cutting operations, and increases the effectiveness of the tool; (3) the drill is provided with eccentrically located peculiar grooves between the chip-channels, whereby the oil is directed to the cutting edges, and clogging of the oil grooves is prevented, by reason of the fact that any foreign matters entering the grooves will be directed upwardly by the spirally inclined plane-surfaced rear walls of such grooves and discharged.

The invention will be clearly understood from the accompanying drawings, and the following detailed description of the device illustrated therein, and I refer to the claims for summaries of the features for which protection is desired.

In the drawings—Figure 1 is a side view of a drill-bit embodying the invention, and having three chip-channels and three oil grooves; Fig. 2 is an enlarged sectional view thereof on line 2—2, Fig. 1. Fig. 3 is an enlarged point-end view of the bit; and Fig. 4 is an enlarged diagram of one of the chip-channels. Fig. 5 is a transverse sectional view of a drill having two channels and two grooves.

The drill is preferably formed with three equi-distant chip-channels 1, which channels are approximately slightly greater in depth (measured horizontally on the line *a*—*b*) than the radius of the drill, and said channels have their following or cutting walls 3 disposed at a tangent to the central core or web portion of the drill,—or to a small circle described around the axis of the drill. These channels may therefore be described as arranged tangentially, not radially, of the drill, and are deeper (measured on line *a*—*b*) than they are wide measured on line *c*—*d*, and deeper than their mouths (measured on line *e*—*f*) are wide, and preferably the opposite walls 2 of the channels are substantially plane-surfaced and parallel. This peculiar construction of the channels *a* is intentional and of great practical importance, for it will be obvious that the chips and cuttings collecting in the channels will have a much greater extent of surface to contact with on the rear or following wall 3 of the channels, than against the walls of the hole cut by the tool in the material on which it is operating, the extent of contact of the chips with the walls of the opening being limited by the width of the mouth (*e*—*f*) of the channel at the periphery of the drill; consequently the chips will readily ride up the plane-surfaced rear walls of the spiral channels, and be freely discharged, and will not be packed in the channels as they frequently do in the ordinary twist-drills wherein the chip-channels are approximately semi-circular, and much less in depth than the width of their mouths, so that the chips have a greater amount of frictional contact with the walls of the material at the mouths of the channels than they do with the walls of the channels.

The described tangential arrangement of channels in my drill enables me to make them deeper than they could be made if arranged on radial lines, and to use more than two channels if desired in one drill, as shown in Figs. 2 and 3 I use three channels, and also enables me to extend the cutting edge 3 at the lower edge of each channel, approximately across the entire radius of the drill-

stock,—which facilitates the cutting operation of the drill, and of course the increased number of cutting edges enhances the efficiency and rapidity of its operation.

In my improved drill all the borings and cuttings are continuously pushed upward between the parallel walls of the deep narrow slots 1, and the walls of said slots being plane-surfaced have no tendency to force the cuttings radially outward as the common half-round channels will do,—and there being but a small extent of contact between the cuttings and the walls of the hole in the material, owing to the comparatively narrow mouths of the channels, there is no liability of clogging the channels either by outward radial movements of the cuttings or by frictional binding thereof against the walls of the hole being drilled; but instead the cuttings ride up easily in the channels on the plane-surfaced rear walls thereof as fast as they leave the cutting edges of the bit and have no tendency to lodge against the walls of the hole. Further by making the channels narrow, I gain stock at the circumference of the bit to back up the cutting edges, and am enabled to increase the number of channels and cutting edges in a given size of drill, without lessening the extent of the cutting edges on its point. By using three channels I obtain three cutting edges on the point, and the walls between each channel forms a brace to the cutting edges at the point of the bit;—the three channels produce a sharper center point and cause the drill to run more truly on its axis; and the walls intermediate the channels form a triangle and brace each other at the axial core or web of the drill; and the three cutting edges do more work and are less liable to break than two cutting edges.

Another valuable feature of my improved drill is the provision of oil grooves of peculiar form in the periphery thereof; these oil grooves are shown at 4, and gradually increase in depth from the cutting or following edge 3 of one chip channel toward the forward edge of the next following chip channel, the oil grooves curving inward from near the cutting edge of one chip channel toward the forward edge of the next adjacent chip channel. The oil grooves therefore are approximately triangular in cross section and arranged eccentrically of the drill, and have the same spiral twist as the channels 1, and are deepest at the side adjacent the front walls of the channels; at this side the grooves preferably have a flat plane-surfaced wall or straight bearing surface 5, which forms an inclined way up which any cuttings or foreign matters which may enter the oil grooves will ride up until they are discharged above the material. The oil grooves being formed by eccentrically recessing the circumference of the drill intermediate the chip-channels, the oil will flow down these grooves, from any suitable supply, to the point of the drill at all times, and will lubricate the cutting edges in the most thorough manner; and the oil groove cannot become clogged and stop the flow of oil because any chips which may drop into such oil grooves will be thrown, by the motion of the drill, backward against the walls 5 and be carried up by the inclination of such walls, and thus clear the way for the oil; and the walls 5 of the oil grooves also prevent the oil from directly entering the chip-channels before it has reached the cutting edges of the drill.

While I prefer to use three or more chip-channels in the drills, their number might be increased for larger drills, and for smaller drills two channels might be used, as indicated in Fig. 5; the chip-channels and oil grooves however retain the characteristic features and advantages above explained.

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

1. A drill-bit having chip-channels and eccentrically disposed oil-grooves intermediate the chip-channels, said oil-grooves gradually increasing in depth from their forward edges to their rear edges, and having plane surfaced walls at their rear edges adapted to raise foreign matters in the grooves, substantially as described.

2. A drill-bit having a plurality of equidistant spiral chip-channels arranged at a tangent to a small circle described at the axis of the drill, said channels being of greater depth than width so that their mouths are narrower than their depth and their leading and following walls are substantially parallel.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

PETER BROADBOOKS.

In presence of—

C. B. PIXLEY,

FLORA B. WEED.