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Patented Dec. 23, 1902.

H. E. KLINGENSMITH.

TUBULAR AUGER.

(Application filed Sept. 3, 1902.)

(No Model.)

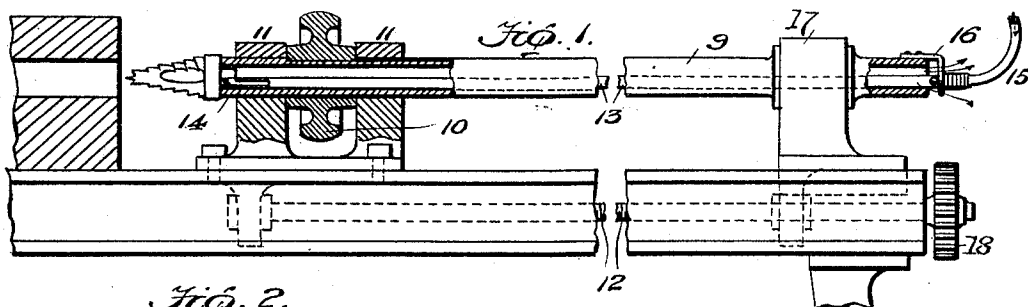


Fig. 2.

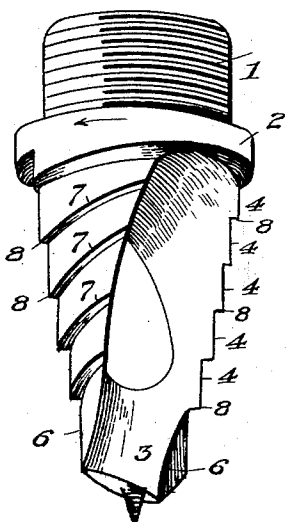


Fig. 3.

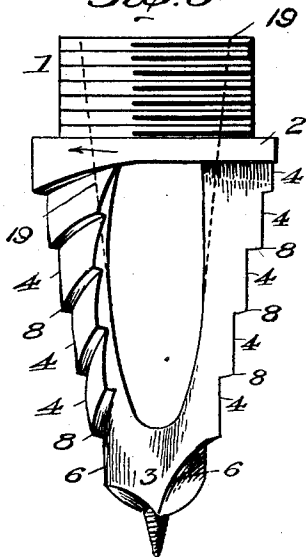


Fig. 4.

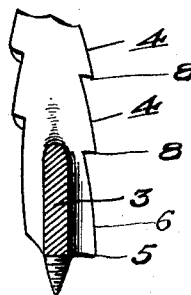


Fig. 5.

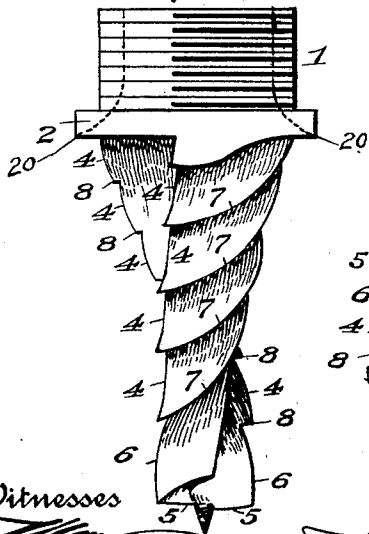


Fig. 6.

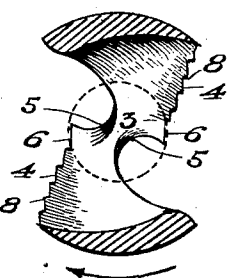
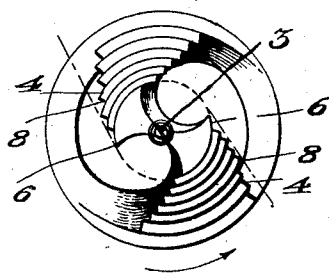


Fig. 7.



Witnesses

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TUBULAR AUGER.

SPECIFICATION forming part of Letters Patent No. 716,557, dated December 23, 1902.

Application filed September 3, 1902. Serial No. 121,929. (No model.)

To all whom it may concern:

Be it known that I, HIRAM E. KLINGENSMITH, a citizen of the United States, residing at Parnassus, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Tubular Augers, of which the following is a specification.

The improvement herein is directed to the production of a novel tubular boring-tool designed for use with a hollow chip-delivering mandrel, and the following description, read in connection with the drawings, will enable any one skilled in the art to which my invention relates to understand its nature and to practice it in the form in which I prefer to employ it.

Referring to the drawings, Figure 1 represents in longitudinal section a hollow rotating mandrel having my improved boring-tool and mounted for a sliding feed in boring. Fig. 2 shows a boring-tool in perspective. Fig. 3 is a side view of the same. Fig. 4 is a section showing the wall connecting the wings at the auger-point. Fig. 5 is a side view of the boring-tool. Fig. 6 is a cross-section of the tool, taken below the ring-shoulder, looking toward the point. Fig. 7 is an end view of the tool.

The tool is designed for boring wooden pipes, pump-stocks, columns, and the like, and its boring or bit part is formed integral with a tubular screw-threaded body part 1, which provides means for securing it to the end of a hollow mandrel, through which the chips are delivered from the tubular boring part, and for this purpose the mandrel is mounted in suitable bearings for a sliding boring-feed. A ring-shoulder 2 forms the base of the boring-tool and joins the tubular screw-threaded end of the hollow mandrel. From the ring-shoulder a pair of cutting-wings extend in right and left spirals and meet in a solid wall 3, the opposite sides of which are concave, as in Figs. 6, 7.

The width of each ring is preferably less than a quarter of the diameter of the tool, as in Fig. 6. Between the wings the tool is open on both sides, the width of the opening being preferably greater than the width of the

wings and extends from the ring-shoulder to the meeting transverse wall 3 of the wings at the point. These wings are of peculiar construction and arrangement and constitute the boring-body, each wing having a multiple of stepped cutting edges 4, extending in opposite spirals from the ring-shoulder to the point where each wing terminates in a cutting edge 5 at right angles, or nearly so, with a line axial to the tool. The inner walls of the wings are coincident with the inner walls of the attaching end of the tool and terminate in the solid wall 3 of the point, as in Figs. 3 and 4, while the inner walls of the screw-attaching end flare to the edges of the ring-shoulder at each side opening, as in Figs. 5 and 7, to allow free entrance of the chips at the edges of the ring-shoulder between the wings. Each wing at its junction with the cutting edges 5 of the point is formed with a cutting edge 6, substantially parallel with the axis of the tool, the outer surface joining these parallel cutting edges being convex, and the diameter of the tool at these parallel cutting edges is about one-half that of the interior of the screw end.

The wings have a right and left oblique relation their full length to each other and to the axis of the tool, so that the cutting edge of each wing stands oblique to a line axial with the tool, as in Figs. 5 and 7. The outer convex surface of each wing is stepped, each step forming a spiral shoulder 7, which forms a right-angle chisel-cutter 8 at its junction with the oblique cutting edge 4, and it will be understood that this stepped cutting edge is the forward edge of each wing in the boring operation. These stepped cutting edges 4 extend from the ring-shoulder and are continuous with the cutting edges 6 of the point and form a plurality of cutters, the oblique cutting edge of each joining the next oblique cutting edge by a chisel-cutter 8 at right angles substantially to the axis of the tool, the surface between the shoulders being substantially parallel with the axis of the tool. This construction gives an oblique cutting edge 4, interrupted with chisel-cutters 8, each cutter delivering the chips through the side openings into the tubular neck of the

tool. The convex surface of each cutter may diminish in width from the oblique cutting edges to the non-cutting edges of the wings, thereby giving a sort of clearance for the spiral shoulders 7 in the working of the tool, as in Fig. 5.

Looking at Fig. 7, the stepped form of the oblique cutting edges are seen as starting from the auger-point, each step forming a chisel-edge 4, the convex surface of all the cutters being concentric. In Fig. 6 is seen the novel relation to each other of the stepped chisel-cutters to the wings, to the opening formed between the cutting edges of the wings, and to the point-wall connecting the wings.

The mandrel 9 is rotated by a pulley 10, splined thereon between fixed bearings 11 11, while a screw-shaft 12, mounted in the supporting-frame, effects the feed of the mandrel by means of the slidable bearing 17, which engages the screw-shaft, which is operated by suitable gearing 18. The fixed bearings give a firm support to the boring end of the mandrel, while the slidable bearing engages the mandrel by collars and serves to drive the auger by the feed-screw.

For facilitating the delivery of the chips from the boring-tool through the mandrel I place a tube 13 therein, with its open end 14 at or near the screw end of the boring-tool, whereby air under pressure is delivered at this point into the mandrel and forces the chips out. For this purpose the outer end of this blow-tube is connected with a flexible tube 15, which is supplied with air under pressure or with steam in any suitable way. The air-tube rests upon the inner walls of the mandrel and is connected to the outer end of the latter, so as to move longitudinally with the mandrel, but does not rotate with it. Such connection is by a bracket 16 at the open end of the mandrel, so as not to obstruct the delivery.

The wall 3 stands across and connects the wings and is formed with a leading-screw, which, with the cutters 5 5, forms the auger-point, the concave sides of the wall terminating in the cutters 6 6, giving the boring action of the auger-point. It is important to note that the cutters 8 by the spiral right and left relation of the wings to each other give a draw-knife cut and lessen the resistance to the cutting action from the least to the greatest diameter of the tool. The joining of the oblique with the spiral gives the free entering point to the cutter 4.

In the delivery of the chips from the boring-tool into the mandrel the following structural elements cooperate the right and left twist of the wings, as seen in Figs. 5, 6, and 7, the concave form of the inner walls of the wings from the cutting edge, as in Fig. 6, the outward flaring of these walls through the screw end, as seen by the dotted lines 19 in Fig. 3, and the inward flaring of the inner walls of the ring-shoulder at the openings between

the wings to a circumferential edge, as seen in Fig. 5 by the dotted lines 20. This outward-forced feed of the chips starts from the cutters 6 6, which have a twisted relation to the concave sides of the point-wall, and from both sides of this wall the chips are directed into the openings between the wings.

The wings form a conical cutter, and each wing diminishes in width from the tubular body of the boring-point, while the openings between the wings increase in width from the point-wall to the tubular body, and as the wall 3 is concave on its opposite sides the opening between the wings receives the chips from each side of the wall, by reason of the spiral form of the cutters 6, one formed by each concave side of the wall, as seen in Figs. 2 and 3. The spiral concavity of the walls between the point-cutters 6 6, the outward flaring of the opening between the wings from the wall 3, and the inward flare of the inner walls of the tubular body at the openings between the wings cooperate to effect the free discharge of the chips from the point with a forced feed.

I claim—

1. A boring-tool consisting of a tubular body formed with a pair of wings projecting therefrom in right and left oblique relation to each other and to the axis of the tool, open at each side and meeting in a cutting-point, each wing having a plurality of oblique cutting edges extending from the body to the point.

2. A boring-tool consisting of a tubular body, a pair of outer wings having oblique relation to each other, forming a cone open at its opposite sides and meeting in a transverse wall having concave open sides, and end and side cutters.

3. A boring-tool consisting of a tubular body, a pair of cutter-wings having oblique relation to each other and formed with the body, open at opposite sides, meeting in a cutting-point formed by a transverse wall having concave sides terminating in end and side cutters and having a mediate leading-screw point.

4. A boring-tool consisting of a tubular body, a pair of cutter-wings formed therewith and having oblique relation to each other, open at opposite sides and meeting in a cutting-point, the inner walls of the wings flaring outward from the cutting-point, the inner walls of the tubular body flaring inward at the side openings, whereby the chips are caused to have a free forced feed from the tubular body.

5. A boring-tool formed of a tubular body, a pair of wings projecting therefrom in spiral relation to each other and meeting at the boring-point in a transverse wall, each wing forming a plurality of cutting edges which terminate in side and end cutters in the transverse wall.

6. A boring-tool formed integral with a tubular screw-threaded body, a boring-point

comprising a wall of parallel sides, each side
expanded concave and formed with a side
cutting edge joining an end cutting edge, a
5 pair of wings extending from the tubular
body in right and left relation to each other
and terminating in the parallel concave walls
of the boring-point, each wing having a cut-
ting edge extending in spiral relation to each
10 other from the tubular body to the end cutter.
7. A boring-tool formed of a tubular body,
a pair of cutting-wings extending from the
body to the point in oblique relation to each
other, each wing formed with a plurality of
15 cutting edges and external spiral shoulders
the width between the shoulders diminishing
from the cutting to the non-cutting edge of
the wing.

8. A boring-tool consisting of a tubular
body formed with a pair of cutter-wings pro-
jecting therefrom in right and left oblique re- 20
lation to each other, a boring-point formed
with a middle wall the opposite sides of which
are concave and terminate each in an end
and a side cutter, the opening between the
wings flaring from the point-wall and the 25
inner walls of the tubular body flaring at the
open sides of the tool toward the point-wall.

In testimony whereof I affix my signature
in presence of two witnesses.

HIRAM E. KLINGENSMITH.

Witnesses:

HARRY C. WALLEY,
ST. CLAIR WILLIAMS.