

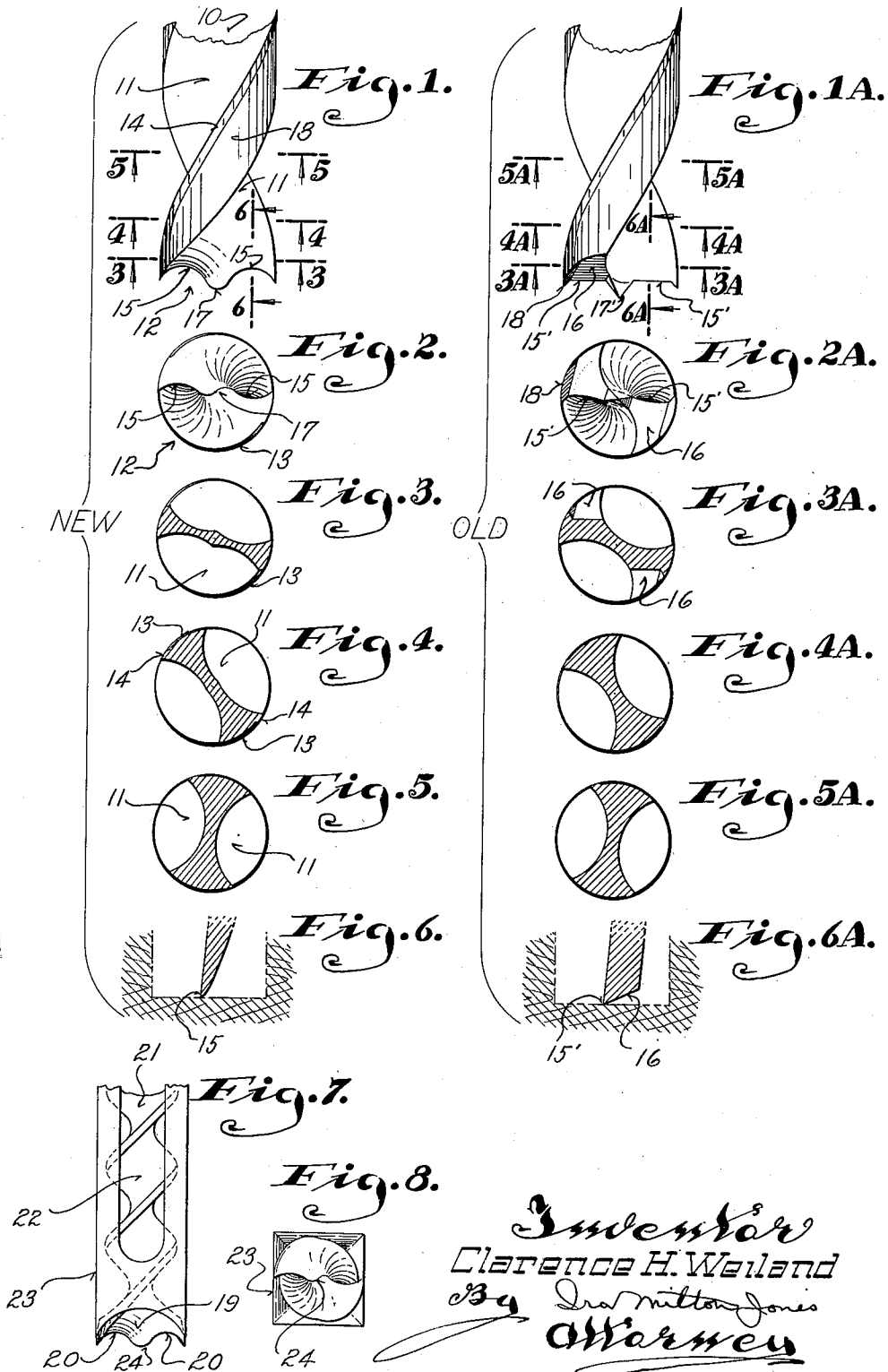
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C. H. WEILAND

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DRILL BIT

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Inventor
Clarence H. Weiland
By *Dr. Milton Jones*
Attorney

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DRILL BIT

Clarence H. Weiland, Oshkosh, Wis., assignor to
The Bell Machine Company, Oshkosh, Wis., a
corporation of Wisconsin

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This invention relates to improvements in drills and refers particularly to drill bits intended for use in wood.

Those skilled in the art are familiar with the way drills or drill bits heretofore available "burn" when used in hard wood, and with the resulting glazed, black surface of the drilled hole which makes it difficult to secure a good glue joint where the hole receives a dowel pin. The excessive heating of the bit, of course, also shortens the life of its cutting edge.

These objections are especially noticeable in the drills employed in mortising machines where the actual drill or bit operates in a square hollow chisel. In this case the hollow chisel, as well as the actual drill bit, "burns" so that the surface of the mortise cut into the work is glazed over making it difficult to secure a good glue joint between the mortise and tenon.

It is, therefore, an object of this invention to provide a drill bit which will not "burn" when used in a hard wood or equivalent material and which, therefore, overcomes the objections inherent in drill bits of the past.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side elevational view of the cutting end portion of a drill bit constructed in accordance with this invention;

Figure 1a is a similar view showing the old conventional brad point wood bit which this invention supercedes;

Figure 2 is an end view of the bit shown in Figure 1;

Figure 2a is an end view of the conventional bit shown in Figure 1a;

Figures 3 to 5 inclusive are cross-sectional views through Figure 1 on the planes of the lines 3—3 to 5—5 inclusive;

Figures 3a to 5a are similar cross-sectional views taken on the same planes but through Figure 1a;

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Figure 6 is a detail sectional view taken through Figure 1 on the plane of the line 6—6;

Figure 6a is a similar view but taken on the plane of the line 6a—6a of Figure 1a;

Figure 7 is a side view of a portion of a mortiser bit to illustrate the application of this invention thereto; and

Figure 8 is a bottom view of the mortiser bit shown in Figure 7.

Referring now particularly to the accompanying drawing, the numeral 10 designates the shank of a drill bit which, as is customary, has opposite arcuately bottomed flutes 11 extending helically back from its cutting end 12.

In view of the difficulty in portraying the invention, comparable views have been shown illustrating both the new and the old construction, and the numerals here used will be applied to both new and old constructions insofar as possible.

The side 13 of the drill directly back of its leading edge 14 is relieved, that is, it is of slightly smaller diameter than the edge portion 14 and with this invention the extent of this relief is increased at least for a substantial portion of the bit back from its cutting end. The larger distinction, however, between the construction of this invention and conventional drill bits lies in the fact that the back or heel portion of each of the cutting edges 15 is ground away so that the wall thickness between the flutes 11 gradually and uniformly increases from its cutting edge with the gradient of the increase so small that the full wall thickness between the flutes is not reached for a distance approximately equal to the diameter of the drill. This gradually increasing wall thickness is illustrated by a comparison of the cross-sectional views Figures 3, 4 and 5 with their counterparts Figures 3a, 4a, 5a, and by a comparison of Figures 6 and 6a. Attention is directed to the fact that the plane 5—5 represents the point of full wall thickness and that this point is back from the cutting edges a distance slightly greater than the diameter of the drill.

In view of this structural relationship, the relief or clearance for the chips cut during the action of the drill is far greater than that which obtains in the conventional construction wherein the heel 16 of each of the cutting edges is a flat surface disposed at approximately 60° to the axis of the bit as shown in Figure 6a.

Another feature of this invention resides in the fact that the cutting edges 15 at the bottom of the drill form concave curves with their adjacent

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ends joined by a convexly curved central point 17, and that the cutting edges 15 extend across the point 17 to form one continuous ogee curve when viewed from the bottom as shown in Figure 2. By virtue of this specific shape of the cutting edges the grain of the wood being cut invariably forms a chord to the cutting edges. As a result the chips are broken up into small pieces resembling sawdust as distinguished from the flat shaving-like chips produced by the conventional drill bit wherein the cutting edges 15' are straight and extend substantially radially from a diamond point 17' to outer circle inscribing edges 18.

It has not been determined why the new construction produces the improved results achieved thereby but by test and actual working conditions it has been demonstrated that the drill of this invention operates satisfactorily in the hardest wood without the slightest sign of "burning," whereas the conventional drill such as shown in Figure 1a becomes discolored and "burns" in a very few operations.

Moreover the holes drilled with the bit of this invention are clean and unglazed while those formed with the conventional bit are glazed over with a black glassy surface.

This invention is particularly advantageous when applied to mortisers as shown in Figures 7 and 8. In this case the drill is made in the same way as described, that is, the heel portion 19 back of the cutting edges 20 is relieved sufficiently to provide the gradually and uniformly increasing wall thickness between the flutes 21 hereinbefore described. The specific shape of the bit and more particularly the pitch and size of its flutes 22, however, is different from that of the conventional wood drill, being steeper and larger so as to afford greater clearance; and the entire bit operates within a hollow chisel 23.

It has been found that by grinding the cutting end of the drill so that its tip 24 is slightly off center (see Figure 8) improved results are obtained for, as a result of this eccentricity, the cutting end of the bit vibrates slightly within the chisel which facilitates cleaning out the stock from the corners of the square cut.

From the foregoing description taken in connection with the accompanying drawing, it will be apparent to those skilled in the art that this invention provides a substantial improvement in drill bits of the type designed primarily for the use in wood and that by eliminating the "burning" of the bit and the wood the bit has a longer useful life and the surface of the drilled hole is better suited for gluing.

What I claim as my invention is:

1. A drill bit characterized by diametrically opposite helically extending grooves gradually increasing in depth near and toward the cutting end of the bit with the bottoms of the flutes intersecting substantially along a longitudinal plane containing the axis of the bit to define the cutting edges of the bit, said cutting edges forming in effect one continuous edge of compound curvature lying along said plane and when viewed

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endwise of the bit, comprising equally but oppositely curved outer portions tangent to opposite sides of said plane and a central portion of substantially slight ogee curvature joining said curved outer portions, said central portion occupying substantially the center one-third of the diameter of the bit and providing an axially projecting point having a rounded profile at its extremity, and said outer portions having identical deeply concave curvature with their inner edge portions merging smoothly with the side edges of said point when the bit is viewed from the side at right angles to said plane.

2. A drill bit characterized by diametrically opposite helically extending grooves gradually increasing in depth and decreasing in curvature near and toward the cutting end of the bit with the bottoms of said flutes intersecting to define opposite outer concave cutting edges tangent to opposite sides of a longitudinal plane containing the axis of the bit when viewed endwise of the bit, but deeply concave and tangent to the same side of a radial plane of the bit when viewed from the side at right angles to said longitudinal plane, and to define a central portion having ogee curvature along but crossing said longitudinal plane at the axis of the bit, said central portion of ogee curvature joining the inner ends of said concave cutting edges and when viewed endwise of the bit producing in effect a single continuous undulatory edge of relatively shallow curvatures across the diameter of the bit in which the ogee portion comprises substantially the center one-third of the diameter of the bit, and said central portion providing a smooth surfaced forwardly projecting point rounded in profile at its extremity when viewed from the side at right angles to said longitudinal plane.

3. The drill bit set forth in claim 2 wherein the said gradual increase in depth and decrease in curvature of the flutes toward the cutting end of the bit begins substantially at a point of full wall thickness between the flutes spaced from said end of the bit a distance at least equal to the diameter of the bit.

CLARENCE H. WEILAND.

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