Feb. 27, 1951 E. H. SMITH 2,543,206

HIGH-SPEED WOOD BORING BIT

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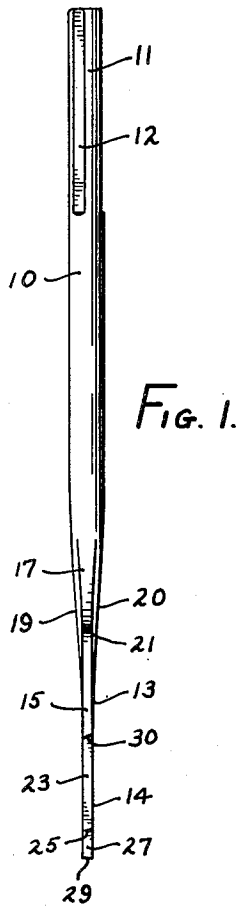

FIG. 1.

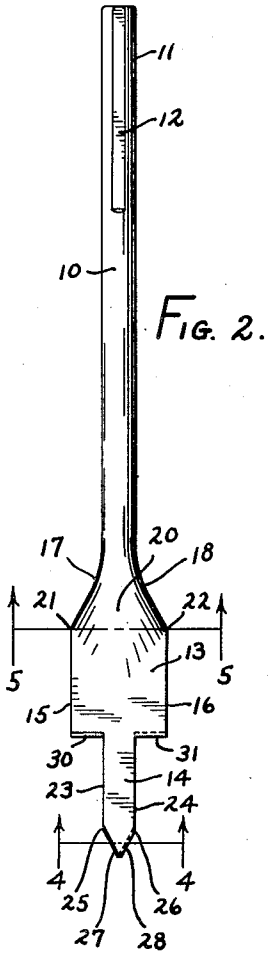

FIG. 2.

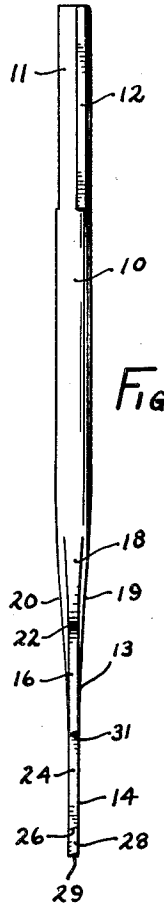

FIG. 3.

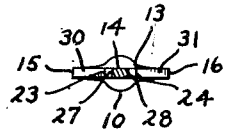

FIG. 4.

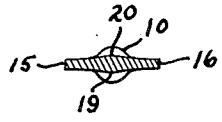

FIG. 5.

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HIGH-SPEED WOOD-BORING BIT

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3 Claims. (Cl. 145—116)

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This invention relates to a wood boring bit intended to be operated at relatively high speeds up to two thousand to three thousand five hundred revolutions per minute such as will prevail in the usual electric portable drill or in the stationary drill press. The invention embodies many advantages among which are to be found the absence of heating of the bit even though running at high speed; the absence of a screw feed to cause the bit to travel into the wood; the possibility of drilling or boring holes at angles to each other, and intersecting one hole with another, and even to boring of overlapping holes all without splitting end grain sections and the like; absence of chattering or squealing in the drilling operation; the formation of a perfectly cylindrical hole with the wall of that hole smooth and relatively polished; and most importantly, an operation with very low torque at the high speeds.

These and many other objects and advantages of the invention will become apparent to those skilled in the art in the following description of one particular form of the bit as illustrated in the accompanying drawing, in which

Fig. 1 is a view in edge elevation of a bit embodying the invention;

Fig. 2, a view in elevation from the flat side;

Fig. 3, a view in edge elevation 180 degrees removed from that view as shown in Fig. 1;

Fig. 4, a transverse section on the line 4—4 in Fig. 2; and

Fig. 5, a transverse section on the line 5—5 in Fig. 2.

Like characters of reference indicate like parts throughout the several views in the drawing. It is to be understood that the bit will be supplied to the trade in a wide range of sizes as may be desired for drilling the particular diameter holes required. The size of the bit illustrated in the accompanying drawing is that for boring a ¾ inch hole.

A stem 10 is provided to have an upper end portion 11 formed to fit within the usual chuck of the drill. In the form herein shown, this end portion 11 is provided with a number of flats 12 in order to hold the stem 10 against rotation within the chuck.

At the lower end of the stem 10 there is provided a flat portion 13 which is an integral portion of the stem 10, and flares outwardly laterally therefrom and is reduced to the desired thickness. From the lower end of this flat portion 13 and centered on the axis of the stem 10 is a second flat portion 14 here and after termed the pilot.

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The flat portion 13 is centered on the axis of the stem 10. The vertical edges of this flat portion 13, namely the edges 15 and 16 must be exactly parallel. Furthermore these edges 15 and 16 must each be at exactly 90 degrees to both the front and back faces of the flat portion 13. From the extreme top ends of these edges 15 and 16, the stem 10 is joined by the long radius fillets 17 and 18. Then between the stem 10 and the opposite faces of the flat portion 13 the stem 10 is carried down by the reducing portions 19 and 20 to terminate as suggested in Fig. 2 in a fan shape extending downwardly from the junctures of the fillets 17 and 18 with the top ends of the edges 15 and 16 whereby the flat portion 13 is reinforced in effect by these thickened portions 19 and 20 below the upper corners 21 and 22 of the respective edges 15 and 16. It is extremely important however that these edges 15 and 16 be of exactly constant width from top to bottom, else the holes will not be bored true, and chattering and heating might develop.

The pilot 14 has parallel edges 23 and 24 extending downwardly from the under edge portion of the flat 13. These edges 23 and 24 must be exactly parallel one to the other and also be at exactly right angles to the front and back faces of the pilot 14. The lower ends of these edges 23 and 24 terminate respectively at the lines 25 and 26, from which the pilot 14 has edges 27 and 28 extending downwardly and one toward the other to the axis extending through the stem 10 to form a lower point. This lower point of the pilot 14 terminates in a line 29 which is at right angles to the axis of the stem 10.

In order to better understand the proportioning of the various parts of the bit, for the particular size of ¾ inch bit (as above indicated the proportions will vary for each size of the bit in some respects) the vertical height of the edges 15 and 16 is substantially ⅞ of an inch to the corners 21 and 22; the over-all height of the pilot from the line 29 to the under edge portion of the flat 13 is substantially one inch; the transverse width of the portion 13 is ¾ of an inch; the transverse width of the pilot 14 is ¼ of an inch; and the thickness of the flat portion 13 and of the pilot 14 is substantially $\frac{3}{32}$ of an inch.

On each side of the pilot 14, at its upper end, there are provided the cutting edges 30 and 31, which constitute the under edge portions of the flat 13 extending respectively from the upper ends of the pilot edges 23 and 24. These cutting edges 30 and 31 are at exactly right angles to the edges

23 and 24, and hence at right angles to the extended axis of the stem 10.

The bit herein shown is intended to be turned in a clockwise direction. The edges 30 and 31 are ground to have a clearance or bottom rake of from 10 to 20 degrees, the top rake being zero. Then the included angle between the pilot lower edges 27 and 28 is between 55 and 60 degrees. Each of these pilot edges 27 and 28 is given a clearance rake of from 8 to 10 degrees. These clearance or bottom rakes of the edges 30, 31, and 27, 28 are critical within the ranges indicated. The vertical or axial length of the flat portion 13 and of the pilot 14 are provided to be such that the edges 30, 31, and 27, 28, may be reground from time to time as the cutting corners may be dulled through usage. In so sharpening the bit, the relative proportions however will be maintained. The diameter of the stem 10 is approximately ¼ of an inch for the size of the bit above indicated. By reason of this relatively small diameter of the stem, 10, there will be ample room for the shavings or chips cut by the edges 30, 31, and 27, 28 to be ejected upwardly through the hole without having to employ the usual augur or screw form of bit.

By reason of the long length of the pilot 14, the bit may be employed to enter wood at positions diagonally of the surface at relatively low angles. In fact the limiting angle would be that angle from the side edges 27 or 28 with the corners of the flat portion 13 between the edges 15, 30 or 16, 31 as the case may be.

The angles for the clearance or bottom rake of the pilot edges 27 and 28 must be within the limits indicated in order that the hole will be round and true. In other words the pilot determines the centering of the bit throughout the boring operation until the pilot passes through the wood if the hole is bored that deep. Then the cutting edges 30 and 31 in fact exert a scraping action in a rotary manner rather than actually cutting or lifting a shaving or chip as is the usual cutting action in other types of bits. This particular scraping action permits the bit to be operated at the high speed but with a very low torque, and yet be very effective and speedy in drilling the hole desired.

Emphasis as above indicated is placed upon maintaining the edges 15, 16 and 23, 24 in exact parallel alignment in those pairs, parallel with the extended axis through the stem 10, and at right angles to the faces of the flat portion 13 and of the pilot 14. This arrangement of these edges cause those edges to have their faces to be positioned as cords across the circle of the hole being bored. In other words both the leading and trailing corners of those edges are in contact with the wall of the hole being bored, first the hole bored initially by the pilot 14, and then the full sized hole being bored by the edges 30 and 31. This results in a reaming action to smooth the hole as the bit travels therein. The parallel edged, flat pilot 14, permits the boring of holes in overlapping relation, and in crossing through a previously drilled hole. Not only is this type or design of bit peculiarly effective in boring in wood, but it is ideal for boring fiber and plastic materials without digging or tearing out.

Reference is made to my co-pending application Serial Number 737,765, filed March 28, 1947, of which this application is a continuation in part.

While I have herein shown and described my invention in the one particular form and in the particularly set out relative proportions, it is obvious that structural changes and sizes may be employed and varied respectively without departing from the spirit of the invention, and I therefore do not desire to be limited to that exact form beyond the limitations which may be imposed by the following claims.

I claim:

1. A high speed wood boring bit comprising a driving stem; a flat plate portion, from the upper part of which said stem centrally emerges; a flat plate pilot extending centrally from the lower end of said portion with its side faces positioned in the planes of the corresponding faces of said portion, said planes being parallel to the axis of said stem; the vertical edge faces of said portion and of said pilot being disposed at ninety degrees to said portion and pilot faces; said pilot having a bottom pointed end defined by diagonally disposed edge faces, the included angle between which faces ranges from 55 to 60 degrees, said diagonal faces each having a clearance angle in respect to said side faces ranging between 8 to 10 degrees; and cutting edges along the bottom of said plate portion and extending respectively 90 degrees outwardly from the top ends of the vertical edges of said pilot, said cutting edges having a clearance angle of between 15 and 20 degrees.

2. A high speed wood boring bit comprising a driving stem; a flat plate portion, from the upper part of which said stem centrally emerges; a flat plate pilot extending centrally from the lower end of said portion with its side faces positioned in the planes of the corresponding faces of said portion, said planes being parallel to the axis of said stem; the vertical edge faces of said portion and of said pilot being disposed at ninety degrees to said portion and pilot faces; said pilot having a bottom pointed end defined by diagonally disposed edge faces, the included angle between which faces ranges from 55 to 60 degrees, said diagonal faces each having a clearance angle in respect to said side faces ranging between 8 to 10 degrees; and cutting edges along the bottom of said plate portion and extending respectively 90 degrees outwardly from the top ends of the vertical edges of said pilot, said cutting edges having a clearance angle in respect to said side faces of between 15 and 20 degrees; said vertical edge faces of both said portion and of said pilot being centered from and parallel to said stem axis.

3. A high speed wood boring bit comprising a driving stem; a plate portion, from the upper part of which, said stem centrally emerges; a plate pilot extending centrally from the lower edge of said plate portion, axially of said stem; all points in the lines of junctures of the front and back faces with the side edge faces of the plate portion being at the same common radial distance from the axis of said stem; said pilot being less in width than said plate portion and having a bottom pointed end defined by diagonally disposed bottom edge faces, the included angle between which faces ranges from 55 to 60 degrees, said bottom edge faces having a clearance angle in respect to the pilot front and back faces ranging between 8 to 10 degrees; and cutting edges along the bottom of said plate portion extending from said pilot respectively 90 degrees to said axis, said plate portion cutting edges having a clearance angle in respect to the front and back faces of between 15 and 20 de-

grees; said plate pilot having all points in the lines of junctures between its front and back faces and its edge faces at a common radius from said axis.

ESTON H. SMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
679,406	Watson	July 30, 1901

FOREIGN PATENTS

Number	Country	Date
27,710	Switzerland	Mar. 31, 1903
121,911	Great Britain	Jan. 9, 1919