Feb. 6, 1940. J. W. STOLLE 2,188,928

DRILL FOR DRILLING HOLES IN WOOD

Original Filed June 20, 1936

Fig. 1.

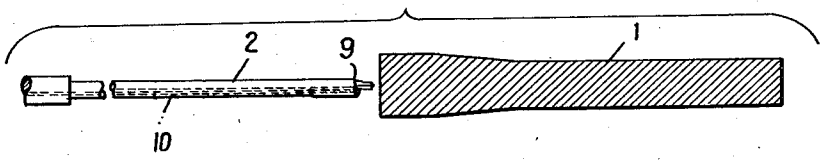


Fig. 3a.

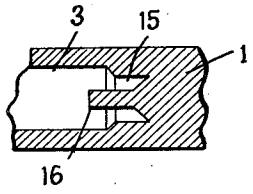


Fig. 2.

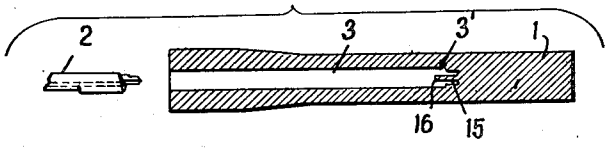


Fig. 3.

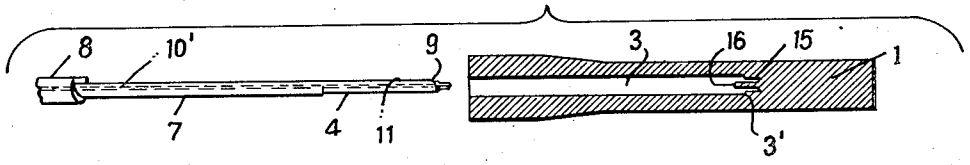
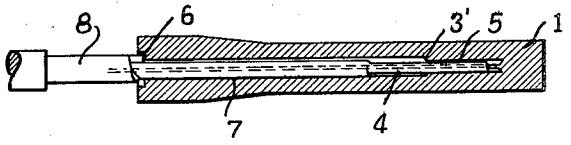


Fig. 4.



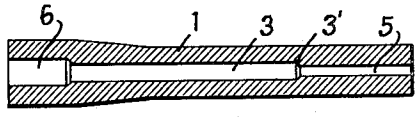


Fig. 5.

Fig. 6.

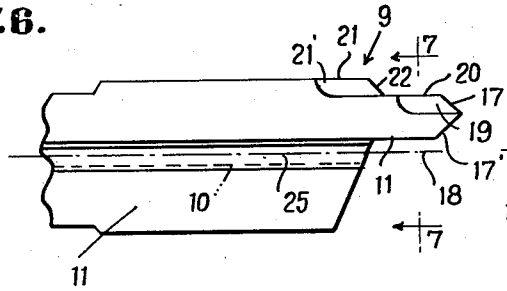
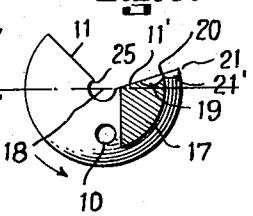


Fig. 7.



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DRILL FOR DRILLING HOLES IN WOOD

John William Stolle, Ashland, Maine, assignor to Charles W. Stevens, Danbury, Conn.

Original application June 20, 1936, Serial No. 86,244. Divided and this application October 26, 1938, Serial No. 236,998

3 Claims. (Cl. 145—119)

This application is a division of my application Serial No. 86,244, filed June 20, 1936.

This invention relates to the woodworking art, and particularly to the formation of holes in textile spools and bobbin blanks and the like, and particularly to the drilling of straight deep holes having sections of different diameter in elongated blanks by the use of relatively slender and flexible drills.

In the drilling of these blanks according to conventional practice there is a very substantial waste and loss of material due, among other things, to the long slender drill or boring tool being deflected from its rectilinear path by the grain of the wood which is not always parallel to the hole to be driven. This difficulty may be largely obviated by the use of the invention of my Patent No. 1,513,350, issued October 28, 1924, which comprises the use of a drill having a special cutting and shaving edge and a stream of liquid, such as water or oil, to wash out the chips which are formed during the drilling operation, and to moisten and soften the wood to be bored. While the liquid step is satisfactory in some branches of the wood boring art, such as the boring of hook handles, whiffletrees, wood machine rolls, etc., I have found that in the drilling of textile spools and bobbin blanks that the oil or soap water employed has a deleterious effect upon the wood.

One object of the invention, therefore, is the provision of means for utilizing compressed air and the like to blow out the chips and cuttings during the boring operation, together with the provision of a special drill which, in addition to the patented features of my Patent 1,513,350, embodies features particularly adapted to the use of compressed air and capable of forming a hole in a manner which is self directing and guiding along a straight rectilinear path, notwithstanding the non-parallelism of the wood grains.

A further object of the invention is a drill of the above indicated character which leaves an uncut core of wood in the center of the blank surrounded by a cylindrical guiding groove for assuring the straight rectilinear progress of the drill through the blank, notwithstanding the fibrous character of the wood.

For a better understanding of the invention, reference may be had to the accompanying drawing forming a part of this application wherein:

Figs. 1 to 5 inclusive are diagrammatic views illustrating steps in the drilling of a blank according to the invention;

Fig. 3a is an enlarged sectional view showing the cylindrical central guiding core and the surrounding cylindrical guiding groove formed at the bottom of the bore;

Fig. 6 is a plan view substantially enlarged of the end of the drill; and

Fig. 7 is an end view thereof.

Referring to Figs. 1 to 5, I have indicated at 1 a textile bobbin blank or the like to be drilled and at 2 a drill according to the present invention for drilling and forming a hole 3 of the desired diameter in the middle section of the blank. This drill 2 forms the bore 3 to the point 3' where it is desired to discontinue the bore of that section.

At 4 I have shown a drill which continues the bore throughout the blank to form a bored section 5 at one end and simultaneously therewith to ream out a section 6 of a still larger bore at the other end; the completed drilling operation being indicated in the blank of Fig. 5. The multiple section bore 3, 5 and 6 of the blank is formed in two operations, the drill 2 forming the bore indicated in Figs. 2 and 3 and the drill 4 forming the bore 5 and 6 of Fig. 5. Fig. 4 shows the second drilling operation. The shank 7 of the drill 4 is of smaller diameter than the intermediate bore 3 of the blank.

I have found that by drilling the hole in the two operations by the two drills 2 and 4, that the tendency of the drill to be deflected from a rectilinear path during the relative longitudinal and rotational movements of the blank and the drill is substantially reduced. I believe this due to reduction in vibrations of the long slender drill which are present when a single drill is utilized for drilling simultaneously both larger and smaller bore sections, namely, when the drill is engaging the wood at two or more widely separated points longitudinally of the blank. According to one aspect of the invention the drill 2 is utilized for forming the intermediate bore 3, while the drill 4 is utilized for forming the end bores 5 and 6. The reaming part 8 of the drill 4 for forming the enlarged bore end 6 does not come into operation until the bore 5 is on its way to completion and, accordingly, the drilling operation of the two ends of the blank at this stage does not produce the same tendency to deflection as when the two operations occur at points closer to the middle section. By having the shank 7 of a smaller diameter than the bore 3 the rubbing of the shank against the walls of the bore 3 is prevented, thus removing any danger of vibration from the tip 9 of the drill, while it completes the bore 5.

For disposing of the chips and cuttings as the drill progresses, I supply fluid gaseous pressure, such as air, through the passages 10, 10' formed longitudinally of the drills. This passage or channel 10 (10') passes down through the tip 9 of the drill and the compressed air or other gaseous fluid blows the chips and cuttings backwardly along the drill, namely, along the groove 11 which is formed in the side of the drill.

As a further means for obviating deflection of

the long slender drill from a straight rectilinear path, notwithstanding the departure from parallelism of the wood grain, I have provided a drill tip 9 formed generally as indicated in Figs. 1 to 4, and as more specifically illustrated in Figs. 6 and 7. This improvement consists of forming the tip 9 of the drill so that it will form in advance of the bores 3 and 5 an annular groove 15 with an uncut core 16 surrounded by the annular groove 15 and disposed in the axes of the bores. For this purpose I have provided the tip 9 of the drill with a relatively short pilot cutting section 17 eccentric to or offset from the axis 18 of the drill and bores. This pilot section 17 is of lesser diameter than the main body tip 9 and forms the groove 15 and the core 16 in advance of and in alinement with the bores 3 and 5. The pilot section is formed on the advancing edge 11' of the drill, that is, relatively to the blank 1 and it may be milled or ground at 19 to form the cutting edge 20. The drill is provided with a cutting and reaming side edge 21 (preferably formed by milling or grinding, as indicated at 21') of my patent above referred to. Thus, two reaming edges 20, 21 and three boring edges 17, 17' and 22 are provided, the edges 17, 17' of the pilot section forming a salient. The groove 11 in the side of the drill should be deep enough to accommodate the uncut core 16 which is formed on the axis 18 of the blank and drill. This may be effected by having the sides of the groove 11 meet at a point far enough beyond the axis 18 to clear the core being formed; or, as is shown in Figs. 6 and 7, the drill may be provided with a central circular groove 25 to accommodate the core with the sides of the longitudinal circular groove 11 discontinued at the groove.

The dimensions of the groove 15 and the uncut core 16 may be varied to suit particular requirements, but generally the core should be of sufficient diameter and stiffness correlated with the depth of the groove 15 to aid in keeping the drill concentric with the axis of the relatively rotating drill and wooden blank. I have found in practice that a core one-fourth the diameter of the bore, namely, with the core 16 one-fourth the diameter of the bore 3, is effective, with the depth of groove indicated in the drawing in guiding and causing the drill tip 9 to follow a straight rectilinear path, notwithstanding the direction of the wooden fibres and the slenderness and flexibility of the drills.

The flexing of the long slender drills is prevented according to the method of drilling above set forth. In the first drilling operation, which is performed by the drill 2, only the bore part 3 is formed, namely, a bore of one cross-section throughout and the boring is effected only at one point throughout the length of the drill, namely, at the tip 9. Accordingly, the flexing of common practice, which I believe to be due in part to drilling two or more different sections simultaneously, is thereby prevented or minimized. Moreover, by forming the annular groove 15 slightly in advance of the bore 3 the uncut core 16 and groove form a guide and directing means for the drill tip tending to keep it in a straight rectilinear line, namely, along the axis of the blank and notwithstanding the particular fibrous character of the wood being worked upon. When the drill 4 is introduced into the bore 3 to form the smaller section bore 5, the guiding groove 15 and the uncut core 16 function to align and center this drill not only at the beginning of the operation but throughout the formation of the bore 5. The compressed air is supplied continuously through the passage 10 and blows out the chips and cuttings and clears the end of the bore for fresh cutting operations. The uncut core 16 is illustrated as of comparatively short length but in operation it may be longer. The drill itself is of very small diameter and in operation the outer free end of the core is gradually and progressively broken or twisted off, due to its very small diameter.

I claim:

1. For use in machines to drill relatively long and small diameter bores in wood and with the grain thereof and having a source of gaseous fluid supply to remove the chips and cuttings while the drilling proceeds, a relatively long and slender flexible drill for forming said bores in wood and substantially with the grain thereof, said drill having a chip channel for removal of chips and cuttings, a core channel merging into said chip channel, said core channel being of a diameter less than one third the diameter of the drill and being located in the center thereof, a cutting edge extending from the core channel to the periphery of the drill, a supply passage for supplying fluid under pressure through the drill, and a reamer edge along the periphery of the drill.

2. For use in machines to drill relatively long and small diameter bores in wood and with the grain thereof and having a source of gaseous fluid supply to remove the chips and cuttings while the drilling proceeds, a relatively long and slender flexible drill for forming said bores in wood and substantially with the grain thereof, said drill having a longitudinal groove on the side thereof forming a channel for the removal of chips and cuttings, said groove extending radially inwardly beyond the axis of the drill to accommodate a small central uncut core, a cutting edge forming the drill tip and extending inwardly from the peripheral edge of the drill to a point slightly short of the axis of the drill to leave said uncut core and a supply passage for supplying fluid under pressure through the drill.

3. A relatively long and slender drill for forming bores in textile bobbins and the like, said drill having a passage to supply gaseous fluid for the drilling operation, an exit path for chips and cuttings being conveyed by said fluid, an axial opening for an uncut core formed in the drilling operation, a cutting face, a pilot cutting section projecting forwardly of said cutting face and positioned eccentric to the axis of the drill, said pilot section being adapted to cut an annular groove in advance of said cutting face and to leave an uncut core extending into said axial drill opening, a sharp reaming edge on the side of said pilot section for shaving the wall of said groove to prevent binding of the pilot section in the drilling operation thereof, a cutting edge at said cutting face and extending laterally from said pilot cutting section to the drill periphery for enlarging said groove to form a hole of substantially the diameter to be cut by the drill, and a sharp reaming edge on the drill side and extending rearwardly of said cutting face, said drill side reaming edge being spaced from the drill axis throughout its active length by substantially the radius of the hole to be formed and adapted to shave the wall of the hole.

JOHN W. STOLLE.