June 19, 1934. H. P. BRUMELL ET AL 1,963,611

WOOD CUTTING ROUTER BIT

Filed March 5, 1932

Fig. 1

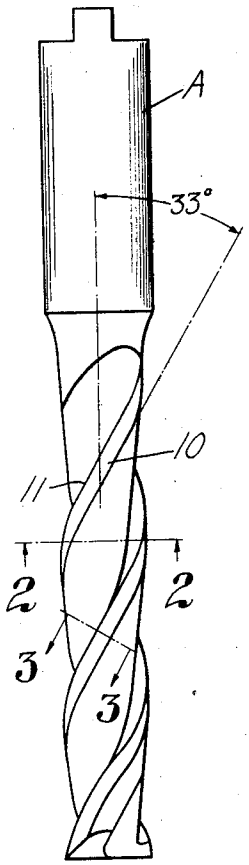


Fig. 2

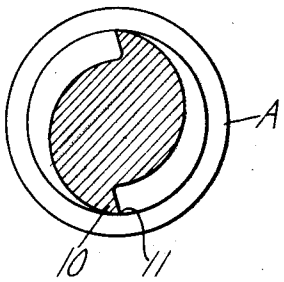


Fig. 3

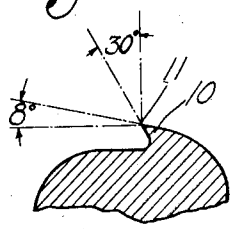


Fig. 4

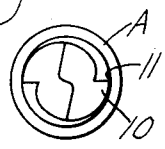
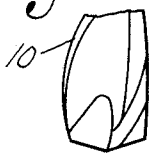


Fig. 5



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WOOD CUTTING ROUTER BIT

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2 Claims. (Cl. 144—219)

This invention relates to router bits and, particularly, to side cutting bits for forming grooves, slots, or the like in wood and similar materials.

It has been the universal practice to provide router bits for cutting grooves, slots, etc., in wood and the like with substantially straight cutting edges, but such bits have numerous disadvantages and objections due to the character of the cuts taken and the failure of the bits to clear the chips from the cut and, therefore, such bits have limitations in their uses. With standard straight fluted bits, each cutting edge, through a length equal to the depth of the cut, comes, at once, into engagement with the work resulting in a gouging action, so to speak, and setting up shocks and strains in the bit and the work; also, the chips generated accumulate in the cut in a more or less packed condition since they occupy a greater space than the original material from which they are formed. Owing to these deficiencies, the depth to which a straight fluted router bit can cut is limited; the speed of cutting is limited due to the danger of breaking the bit and damaging the wood; considerable power is required; the cut taken is relatively rough and burred, and intricate shapes cannot be cut where the material left at the side of the cut is thin in cross section.

The aim of the present invention is to provide a side cutting router tool which is far superior in its action than a standard straight fluted router bit, and which is not open to the above and other disadvantages and objections.

More particularly, the aim of the invention is to provide a router bit with spiral side cutting edges so arranged and proportioned that the edges, when the tool is fed laterally, will take smooth slicing cuts in the work and rapidly clear the chips from the cut being taken. With this improved arrangement, the speed of cutting may be materially increased, and the depth of cut may be greater than has heretofore been possible, A very smooth finish is obtained and very intricate designs may be made having thin strips, fingers or ribs between successive cuts across the grain of the wood. Our improved bits require less power, and bit breakage is reduced to a minimum. A spiral bit constructed in accordance with the present invention will maintain a keen sharp cutting edge longer than the standard straight fluted bits, and they are less hazardous to operate as they will not tend to dig and tear the piece being worked on from the operator's hand. Furthermore, with a standard straight fluted bit, if the operator stops feeding the work for only an instant, the work will be discolored or burned by friction with resultant danger to the tool, but, with our improved spiral bits, this effect is eliminated.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing, wherein is shown one embodiment which the present invention may take:

Figure 1 is an enlarged side elevational view of the bit;

Fig. 2 is a transverse section through the bit taken on a plane normal to the axis and indicated by the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary cross sectional view taken on a plane which is at right angles to the length of the cutting edge and which plane is designated by the line 3—3 of Fig. 1;

Fig. 4 is a forward end view of the router bit; and

Fig. 5 is a fragmentary view showing the forward portion of the bit in side elevation, this view being taken on a plane substantially at right angles to that on which Fig. 1 is taken.

Referring to the drawing in detail, the router is shown as having a shank A and an aligned cutter portion, the latter being provided with a plurality of spiral threads 10 each provided with a cutting edge 11, there being two such threads shown in the present instance. It is to be understood, however, that the tool may have more than two threads. The helix angle of each cutting edge is such that these edges will have a slicing or shearing action of the most efficient character and will effectively remove the chips instantly so that no trouble will be experienced with the chips clogging the cutter. We have found the helix angle of the cutting edges should be at least 30°, and, preferably, between 30° and 40°, the best results probably being obtained when the angle of helix is between 33° and 37°. In the drawing, the angle of helix is illustrated as being approximately 33°. The spiral cutting edges are given a very substantial angle of rake, the angle of rake preferably being about 30° taken normal to the cutting edge, as shown most clearly in Fig. 3. The lands or threads may have a suitable clearance which is preferably between 8° and 10° to the tangent, as shown most clearly in Fig. 3. The cutting threads or lands may, of

course, be either right or left handed, as desired. The length of the cutting portion of the bit, as compared to its diameter, may be considerably longer than bits as heretofore made in order to take a relatively deeper cut, in the present instance, the length of the cutting portion of the bit being substantially five or six times its diameter. The bit, in use, is adapted to be driven at a relatively high speed, it being found it can be efficiently employed at 9,000 to 20,000 R. P. M., and it can be driven at a lip speed of substantially 600 feet per minute. In the drawing, the bit is shown on an enlarged scale.

In using our improved bit, suitable templates may be employed for guiding the same; cuts may be taken either in one surface of the work or entirely through the work; and the cutting action may be started at the edge of the work or within the edge of the work. Where the cutting operation starts at the edge of the work, the cutter may be fed laterally up to and into the work whereas, when starting a cut within the edge of the work, the tool may be first fed down to the desired depth and then moved laterally. When a design is to be cut by following a facsimile thereof laid upon the material, left hand bits may be employed which will leave not burr on the top surface of the work. During the cutting operation, the cutting edges take shearing or slicing cuts and, in ordinary routing operations where the depth of the cut equals or exceeds the pitch of the cutting edges, one blade or cutting edge is constantly engaged with the work, thus eliminating shock caused by the cutting edges of the standard straight fluted bit when such edges come into contact with the work. This minimizes bit breakage due to flexing of the bit or crystallization, and is one of the features which permits of cutting thin deep cross sections. At recommended speeds at which the spiral bits should be used, the spiral lands act as screw conveyors for clearing the chips from the cuts so that clogging of the cutter and resultant resistance thereto is, to a large extent, eliminated. With our arrangement, the chips are carried away so rapidly that the spiral cutter acts, to some extent, like a fan causing a circulation of air which keeps both the bit and the wood cool. Thus, if the operator should stop feeding the work and tool, one relative to the other, discoloration or burning of the wood by friction would not result, and thus one objection to straight fluted tools is eliminated.

It is thus clear that our improved tool has various features of novelty and advantage which permit of increased efficiency and the production of better, smoother and more accurate and intricate work, and that cuts of greater depth at greater speeds and with less danger of breakage of the bit or damage to the work may be taken with the use of less power than has heretofore been possible. The bits are able to cut in depth up to six times their diameters in hard wood. Due to the slicing action of the cutting edges and the elimination of chip accumulation in the cuts, very intricate designs may be made, leaving a strip or rib of cross-grained wood between the cuts as thin as one-fourth to one-half the diameter of the bit and as deep as the cutting capacity of the bit.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

We claim as our invention:

1. A side cutting router bit for cutting wood and the like and having a plurality of spiral cutting edges provided with an angle of helix of at least thirty degrees and an angle of rake of substantially thirty degrees.

2. A side cutting router bit for cutting wood and the like and having a plurality of spiral relieved cutting edges each having an angle of spirality of substantially thirty-three degrees and an angle of rake of approximately thirty degrees.

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