

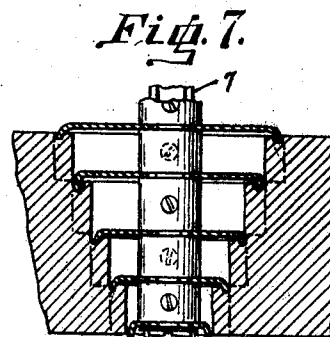
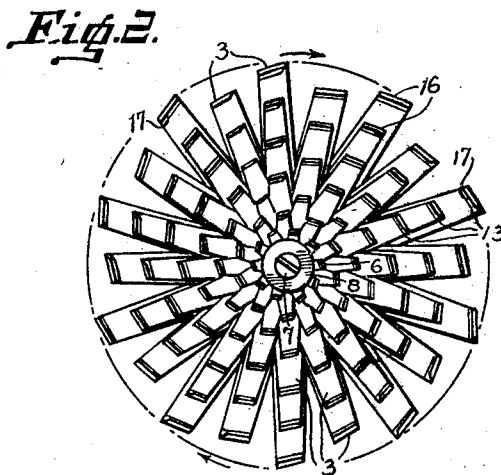
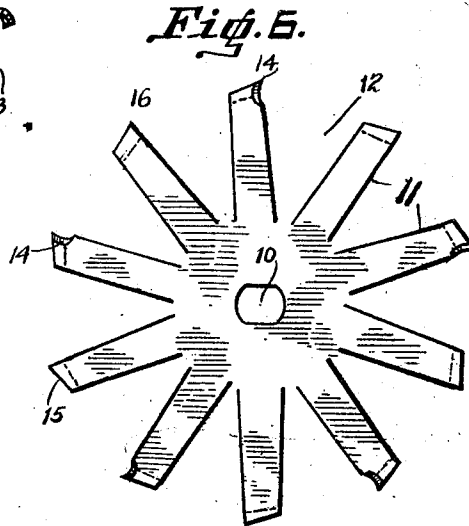
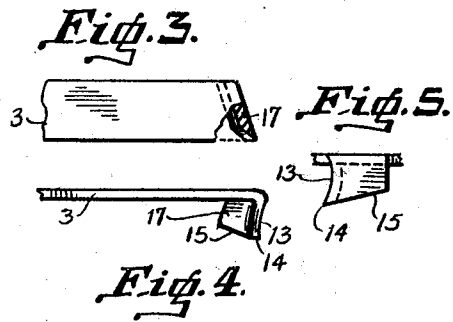
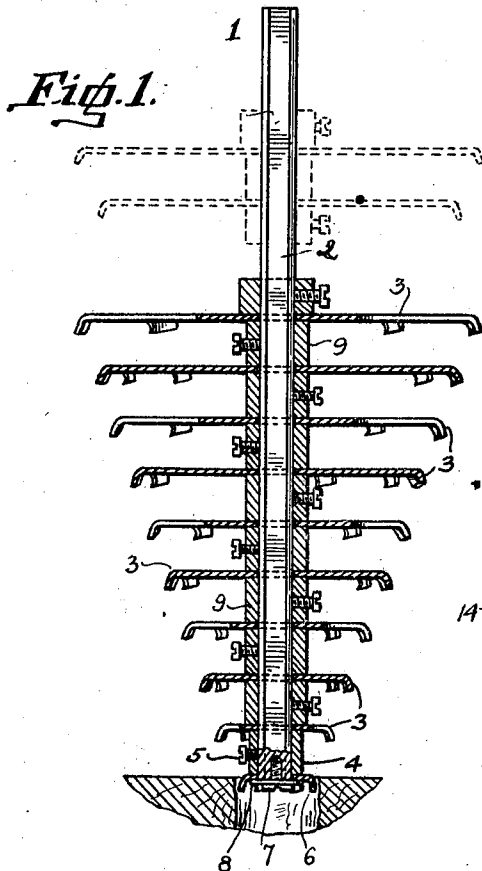
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S. C. DOEHRING

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BORING RIPPER

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BORING RIPPER

Application filed May 29, 1930. Serial No. 457,133.

This invention relates to wood working tools, and particularly to that type of tool, the object of which is to enlarge holes already bored.

It is extremely difficult to bore large holes, for instance in floors for the passage of water or heating pipes, with boring bits of large diameter such as expansion bits, on account of the fact that since the cutting edge of bits is on one side of the axis of the bit, the latter is tilted by the resistance of the wood so that the cutting edge does not penetrate.

Furthermore, after the screw point of the bit has penetrated through the wood there is no longer any force tending to advance the bit except such as is applied to it directly by the operator, and it is not only extremely laborious to bore a large hole, but the applied pressure causes the bit to burst through the final thickness of the wood, causing splitting around the lower end of the hole.

To avoid these difficulties, it is preferred to make the hole with a small bit and then enlarge it to the desired diameter by means of an auxiliary device, of which hole saws are known examples.

Hole saws for metal are known, consisting of a disk with teeth on a turned down peripheral flange, but these cut a narrow angular channel or kerf from which there is no outlet for the metal comminuted by the teeth, and while such saws are workable in sheet metal, they are not practicable when applied to wood on account of the quantity of saw dust raised, and the inability of freeing the kerf from this debris.

The present invention has for one of its objects, the provision of a plurality of saw blades of diminishing sizes arranged in conical gang formation along an operating shaft, the smallest blade being in advance position, and the diameters of adjacent blades differing by such an amount as to impose upon each blade, the burden of cutting only a narrow annulus from the wood.

Another object of the invention is to provide a construction in which the chips cut by the saw teeth are positively displaced by the teeth so as to be removed from the direct path of the teeth.

Still another object of the invention is to secure the blades with respect to the operating shaft in such manner that they may be shifted longitudinally thereof without removing them from the shaft to an inoperative position, whereby the hole enlarger may be adjusted to form any predetermined size of hole and whereby its blades, not in immediate use are kept in readiness on the shaft in positions from which they can be conveniently and successively shifted into operative position when wanted.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

Referring now to the sheet of drawings which accompanies and forms a part of the specification, and in the several figures of which similar characters of reference are used throughout to designate identical parts:

Figure 1 is a vertical section through a hole enlarger embodying the principles of my invention;

Figure 2 is a bottom plan view;

Figure 3 is a fragmentary top view of one of the teeth;

Figure 4 is a similar view showing the inside face of the tooth;

Figure 5 is a side elevation of a single tooth;

Figure 6 is a plan view of a blank from which one of the blades is made, showing an exemplary form of teeth before the latter are bent down; and

Figure 7 is a fragmentary side sectional view showing an arrangement in which the teeth of the several blades are in radial alignment instead of staggered relation as in Figure 2.

Referring now in detail to the several figures and first adverting to that form of the invention shown in Figures 1 to 6, inclusive, the numeral 1 represents a shaft. The upper end of this shaft is designed to be inserted into the chuck of the usual hand brace or of an electric drill by means of which rotation is imparted to the shaft.

The shaft is preferably provided with the flat side 2 extending throughout that zone of the shaft with which the saw blades will

be associated and extending some distance above the normal operative position of the gang of blades, also as shown. Instead the shaft being round, a polygonal shaft may be substituted therefor as desired without departing beyond the scope of the invention.

A plurality of saw blades 3 are slidably arranged upon the lower end of the shaft and retained thereon by any suitable means such, for instance as the collar 4 secured by the set screw 5. In the illustrative embodiment of the invention a washer 8 of somewhat larger diameter than the shaft 1 is shown secured in place by any suitable means such as the screw 7.

It is to be understood that if desired, the lowermost saw may be omitted and the projecting end of the shaft 1 be relied upon as an approximate guide for centering the hole enlarger. As shown, however, the smallest blade acts as a centering device and this is true of any of the blades which may be slightly smaller than the hole which it is desired to enlarge.

The saw blades are plural in number and of progressively diminishing size toward the lower or advance end of the tool, and are spaced apart from one another by spacing rings or collars 9. These are preferably fixed to the shaft by set screws but in certain adaptations of the invention, the set screws may be omitted if desired, excepting that the top-most collar must always be provided with some means for fixing it to prevent the gang of saw blades from slipping on the shaft when the tool is in operation.

It is apparent that when the lower end of the tool is introduced into the ready bored hole, the lower-most and smallest of the saw blades 3 first engages the wood a short distance from the edge of the hole and cuts a narrow annulus. As the cutting proceeds, the tool descends until the next blade 3 engages the material adjacent the edge of the now slightly enlarged hole and cuts out another narrow annulus. This step by step enlargement of the hole proceeds until it is of the desired size.

If it is desired to make the hole of the same diameter for instance, as the fourth of the saw blades 3, counting from the lower end of the tool, the set screws of the collars which secure the five upper-most blades are loosened and the five blades together with their collars are slid upwardly along the shaft 2 to such height that they will not interfere with the operation of the tool. If the hole is to be made one size larger, another one of the blades is let down into operative position. Those blades not in use are retained in elevated position by tightening the set screw of the collar associated with the lower-most out of use blades.

It is within the purview of the invention to make the blades in the form of circular disks

merely provided with the central perforations 10 of nonround shape corresponding to the cross section of the shaft 1 in the zone of the flatted portion. However, with circular disks there may be some likelihood of saw dust and debris packing between the blades and finally obstructing the exit of the saw dust. Therefore, it is preferred to cut the disks out in the form shown in Figure 6 providing radial arms 11 with spaces 12 therebetween. Figure 2 shows that the radial arms may be arranged in staggered relation on the several saw blades so that there is a free and progressively enlarged space for the discharge of the saw dust from the advance end to the upper end of the hole enlarger.

In that form of the invention shown in Figure 7, the space between the radial arms is also continuous from the forward to the rearward end of the tool, but in this instance, since the radial arms are above one another, restricted spaces are formed between said arms which may under certain conditions pack so that in practice this form of the invention may not be found so advantageous as that shown in Figure 2.

As previously stated, Figure 6 shows the saw blades in the form of a blank, the teeth being in the same plane as the radial arms. It will be noted that alternate teeth are slightly concaved on the advance edge as indicated at 13 in Figure 6 forming a keen chisel edge 14, the tooth inclining to the rear away from the work as indicated at 15, particularly in Figure 5. This edge is concerned principally with the depth cutting and it may be stated that all of the teeth may be made in this way, but it is found particularly useful to form only the alternate teeth in this manner and to construct the remaining teeth as shown at 16 in Figure 6 with straight advance edges which act against the side of the hole for smoothing and reaming the same.

It will be noted from Figures 3 and 4 that each tooth slopes from its forward edge in a direction toward the axis of the hole enlarger so that a chip severed by either the horizontal or vertical forward edges of the tooth is conveyed by the inclined inner face 17 away from the direct path of the teeth edges inwardly to the free space, in which the chips are permitted to accumulate without interfering with the cutting efficiency of the blades.

It is to be understood that the above forms of teeth are merely suggestive of other and well known tooth forms which may be adapted to the construction of the present saw blades without avoiding the invention.

Since the cutting edges are distributed uniformly all around, there is no tendency of the bit to be tilted and thrown out of the work by the resistance of the wood as is the case in expansion bits where the cutting edge is altogether on one side of the axis of the tool.

Furthermore, since only a narrow annular cut is made by each blade and at a single time, a comparatively light pressure is sufficient for the operation of the hole enlarger, and for the same reason, that a light cut is taken by each blade, splitting will not occur on the reverse side of the wood and the hole when finished will be smooth and cylindrical throughout.

While it is primarily intended that the shaft and blades will form a unitary structure which it is not ordinarily necessary to disassemble in the operation of the device, yet it may be readily appreciated that by loosening the set screws or any desired number of them any blade or any desired number of blades may be removed from the assembly for the purpose of replacement or sharpening and that if desired, the device may be designed for use with a particular thickness of wood, by constructing the collars 9 of such width that one blade will have cut entirely through the thickness of the wood by the time the next blade has come into operative engagement with the wood. This still further minimizes the amount of labor involved in the cutting operation.

While I have in the above invention described what I believe to be a preferred and practical embodiment of the invention, it is to be understood that the details of construction are merely by way of example and numerous variations in the structural details may be employed without transcending the comprehensiveness of the invention as claimed.

What I claim is:

1. In a boring ripper bit, a shaft and a series of disk forming blades slidably carried by the shaft and rotatable therewith, adjustable spacing collars positioned on the shaft for mounting the blades in spaced longitudinal adjustment thereon, the blades being of diminishing diameters toward the advance end of the bit, spaced arms extending radially from the disk, and provided at their outer ends with flanges extending toward the advance end of the bit, the flanges being formed with suitable teeth.

2. In a boring ripper according to claim 1, wherein any number of blades may be shiftable along said shaft to inoperative position and securable in that position by the spacing collars.

In testimony whereof I affix my signature.
STEPHEN CORNELIUS DOEHRING.