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CIRCLE CUTTER FOR USE WITH POWERED HAND DRILLS

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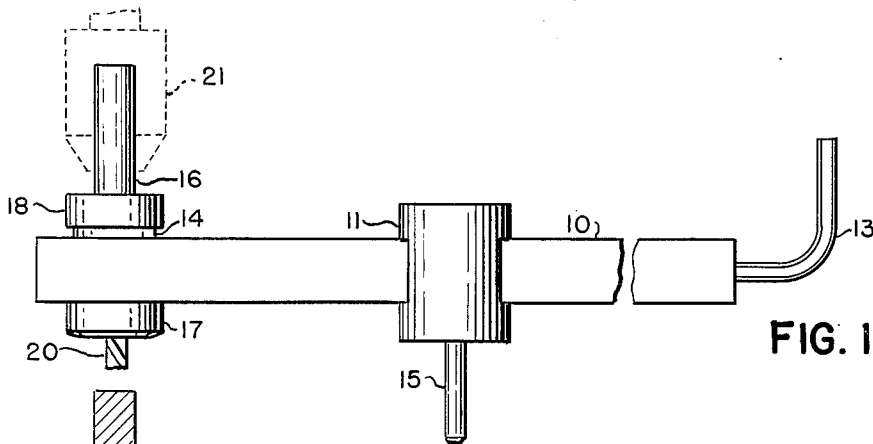


FIG. 1

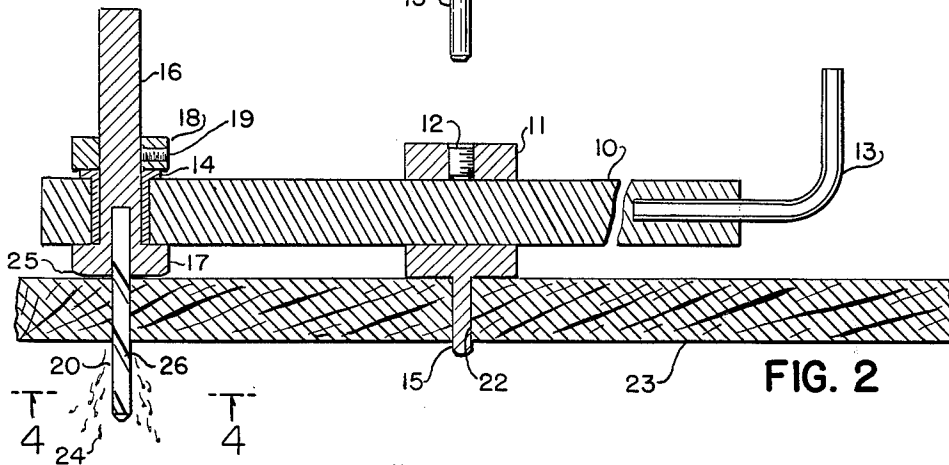


FIG. 2

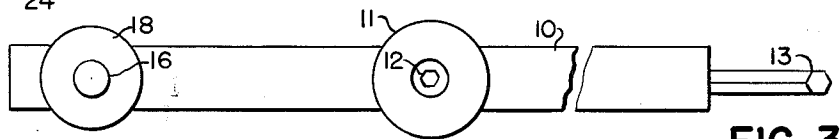


FIG. 3

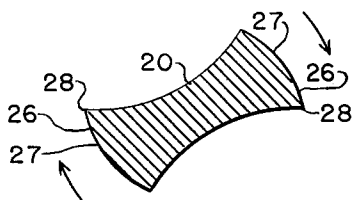


FIG. 4

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CIRCLE CUTTER FOR USE WITH POWERED HAND DRILLS

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4 Claims. (Cl. 145—121)

This invention relates in general to large diameter circle cutters and, more particularly, to circle cutters which are used with a conventional electric hand drill to cut large diameter circles in wood or the like.

It is often very desirable to cut large diameter circles in wood with light and easily portable hand tools. Since portable electric hand drills have become exceedingly common in both professional woodworking shops and in the tool boxes of home craftsmen, a large diameter circular hole cutter, which operates with an inexpensive hand drill, would be in great demand. For example, such a large diameter portable hole cutter could be used by amature or professional boat builders to cut portholes in a wooden boat during its construction. In addition, such a hole cutter could readily be used to cut disks from plywood to form chair bottoms or to cut disks from heavier wood to be used to make decorative lamp bases and the like. Thousands of other uses could be found for such a portable hole cutter.

It is, therefore, an object of this invention to provide a circle cutter for use with an electric drill which is a more efficient and easily used circle cutter.

Another object of this invention is to provide a circle cutter which more rapidly cuts a circle of a given size in a given type of wood.

Still another object of this invention is to provide a circle cutter which is easily adjusted to cut circles of different diameters.

A further object of this invention is to provide a more rugged circle cutter which may be more inexpensively manufactured.

Many other objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of my invention and its practice otherwise as will be understood from the following description and accompanying drawing wherein:

FIGURE 1 is a side view of a circle cutter according to my invention with the bottom portion of the cutting bit broken away and with the chuck of an electric drill shown in broken lines engaging the circle cutter;

FIGURE 2 is a longitudinal vertical section through my circle cutter and a fragment of a wooden workpiece which is being cut by the circle cutter;

FIGURE 3 is a top view of my circle cutter; and,

FIGURE 4 is a transverse section taken on line 4—4 of FIGURE 2 showing the cross section of a bit which may be most effectively used with my circle cutter.

Referring to the drawing in detail, FIGURES 1, 2 and 3 show my circle cutter. The circle cutter has a beam 10 which is substantially square in its cross section. Beam 10 extends slidably through the pivot member 11 so that the pivot member 11 may be positioned along the length of beam 10 and locked in any desired position by the tightening of set screw 12. Formed integrally with and extending downward from pivot member 11 is the center pin 15. A longitudinal hexagonal channel is broached in one end of beam 10 to receive the set screw wrench 13. Wrench 13 may be readily removed from beam 10 so that it may be used to tighten or loosen set screw 12.

A transverse vertical aperture is formed in the other end of beam 10 to receive the flanged bushing 14 of bronze or any other suitable bearing material. Extending upward through bushing 14 is the arbor shaft 16 having an enlarged lower portion 17 which extends beyond the lower

end of bushing 14 to bear against the lower surface of beam 10. A retaining ring 18 is slipped downward over shaft 16 and locked to shaft 16 by means of a set screw 19. The retaining ring 18 bears on the top of the flanged bushing 14 and holds the arbor shaft 16 within beam 10. A cutting bit 20 extends upward into a centrally located vertical aperture formed in the bottom of the enlarged lower portion 17 of shaft 16. Bit 20 is silver soldered or otherwise fixed in shaft 16. If it is desired, another set screw (not shown) could be turned laterally into the enlarged portion 17 to contact the upper end of bit 20 and lock it in shaft 16.

This invention is used in the following manner. As shown in FIGURE 2, cutting bit 20 extends considerably lower than does the end of the center pin 15. This must be a distance greater than the thickness of the wood to be cut. Therefore, as shown in FIGURE 1, shaft 16 may be fixed within the chuck 21 of a conventional electric hand drill. When the hand drill is activated, chuck 21 rotates shaft 16 and cutting bit 20 which may then be used to drill a center hole 22 in a wooden workpiece 23 in which a circular cut is to be made. So that bit 20 may drill a hole perpendicular to the top surface of workpiece 23, bit 20 must be sufficiently longer than center pin 15 to allow bit 20 to completely penetrate workpiece 23 before the end of center pin 15 contacts the workpiece. Bit 20 is then withdrawn from the center hole 22. Set screw wrench 13 may be slipped from the end of beam 10 and used to loosen set screw 12 so that pivot member 11 may be positioned along beam 10 to locate center pin 15 at a desired radial distance from the cutting bit 20. Set screw 12 is then tightened and set screw wrench 13 is replaced in the end of beam 10.

Center pin 15 is then placed over center hole 22 and the electric drill is started to rotate bit 20 to drill a circumferential hole in workpiece 23. Bit 20 completely penetrates workpiece 23 and center pin 15 seats within the center hole 22. The electric drill continues to rotate shaft 16 and bit 20. Set screw wrench 13 may now be used as a handle so that one hand of an operator contacts set screw wrench 13 and the other hand is held on the electric drill. By means of the drill and the set screw wrench 13, beam 10 is rotated about center pin 15. Bit 20 now functions as a side cutter and makes a circular cut in workpiece 23 as beam 10 is rotated. When bit 20 has been forced through a complete revolution about center pin 15, it will have completed a circular cut in workpiece 23.

If bit 20 has a right hand twist, chips of wood will be drawn upward and blocked by the lower portion 17 of shaft 16. These chips will be packed in the circular cut being made in the workpiece 23 and may slow down the rate of cutting and they will prevent the free and easy removal of the disk cut from workpiece 23. Therefore, as shown in FIGURE 2, cutting bit 20 has flukes 26 formed with a left hand twist so that wood chips 24 are urged downward and thrown clear and not packed against portion 17 of shaft 16. Since it is desirable to hold a pressure on the electric drill to urge shaft 16 against workpiece 23, the lower portion 17 of shaft 16 is forced against the top of workpiece 23 and would mar it unless the outer lower edges 25 of the lower portion 17 were curved smoothly upward. Thus the upward curved edge 25 of portion 17 cannot dig into the top of a workpiece being cut even when shaft 16 is unintentionally inclined away from a position perpendicular to workpiece 23.

FIGURE 4 shows a particularly satisfactory configuration for a cutting bit 20. The outer sides 27 of the flukes 26 rake backward at an angle from the cutting tips 28. This greatly assists in the side cutting action of bit 20.

Bit 20 should be of the same size or of slightly greater diameter than the center pin 15 so that center pin 15 will

easily fit snugly within a center hole 22 drilled by bit 20. Furthermore, bit 20 is preferably about $\frac{1}{8}$ inch in diameter although it may vary between $\frac{1}{16}$ and $\frac{1}{4}$ inch in diameter. A bit 20 which approaches or is smaller than $\frac{1}{16}$ inch in diameter is too thin and easily may be broken or snapped off in use. Further, at conventional rotational speeds, the cutting speed of such a small bit will be so low as to unduly prolong the cutting of a circle of a given diameter. If bit 20 is larger than $\frac{1}{4}$ inch in diameter, too much material is removed in making a circular cut so that the speed of the circle cutter is too greatly reduced. Therefore, in practice, using electric drills revolving between 650 and 2000 r.p.m., a $\frac{1}{8}$ inch bit 20 is the most satisfactory.

While I have disclosed my invention in the best form known to me, it will nevertheless be understood that this is purely exemplary and that modifications in the construction, arrangement and combination of parts may be made without departing from the spirit of the invention except as it may be more limited in the appended claims wherein I claim:

1. A circle cutter for use with a hand powered drill comprising, in combination,

- (a) a beam,
- (b) a pivot member slidably disposed on said beam,
- (c) locking means fixing said pivot member to said beam,
- (d) a center pin extending downward from said pivot member,
- (e) an arbor shaft extending rotatably and vertically

through one end of said beam, the upper end of said arbor shaft being engageable by a power drill, said arbor shaft having an enlarged lower portion below said beam,

(f) a collar disposed about said shaft above said beam, said collar having means fixing said collar to said shaft to secure said shaft within said beam, and

(g) a cutting bit of substantially the diameter of said center pin extending downward from said arbor shaft below said center pin.

2. The combination according to claim 1 wherein said enlarged lower portion of said arbor shaft is cylindrical and has a smoothly upward curving lower edge.

3. The combination according to claim 2 wherein said pivot member is a vertical cylinder and said beam passes transversely through said pivot member, said pivot member and said cylindrical lower portion of said arbor shaft extending an equal distance below said beam.

4. The combination according to claim 3 wherein said cutting bit has flukes with a left hand twist.

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