F. S. McQUESTON.

ROTARY CUTTER.

APPLICATION FILED APR. 17, 1919.

1,332,736.

Patented Mar. 2, 1920.

Fig. 1

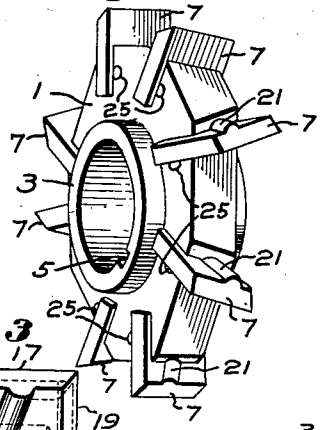


Fig. 2

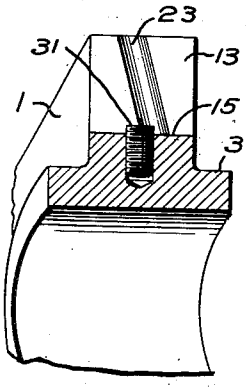


Fig. 3

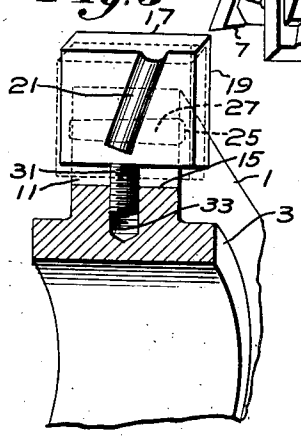


Fig. 5

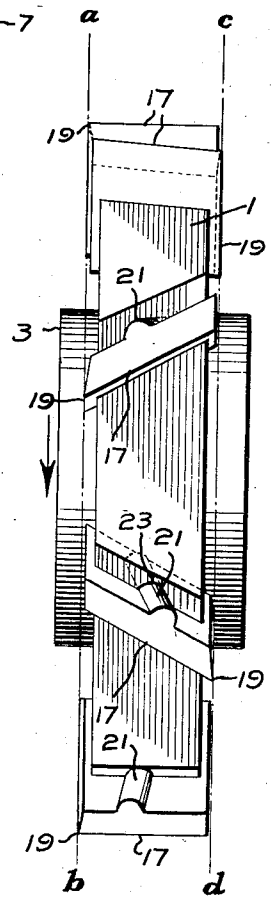
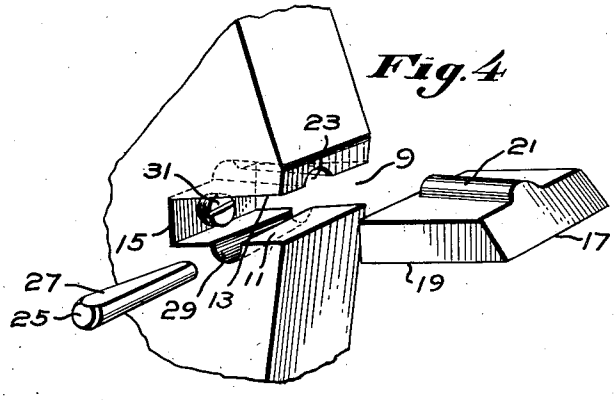


Fig. 4



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ROTARY CUTTER.

1,332,736. Specification of Letters Patent. Patented Mar. 2, 1920.

Application filed April 17, 1919. Serial No. 290,658.

To all whom it may concern:

Be it known that I, FRANK S. McQUESTON, a citizen of the United States, residing at Winchendon, in the county of Worcester and State of Massachusetts, have invented an Improvement in Rotary Cutters, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention to be hereinafter described relates to rotary cutters such, for example, as are used in milling machines.

In my copending application Serial No. 153,144, filed March 7, 1917, is shown, described and claimed a rotary cutter comprising a body having a series of transverse recesses at the periphery thereof in which are removably mounted blades having end cutting edges projecting beyond the periphery of said body. To secure the blades in said recesses, each is provided with a longitudinal rib on the rear face thereof which engages a longitudinal groove in the rear wall of the recess for the blade, and a tapered key is inserted in a transverse groove in the front wall of the recess and engages the front face of the blade and acts against the same to force the blade against the rear wall of the recess and the integral rib into its groove. The construction is such that the blades may be securely held in their recesses and may be readily removed therefrom as desired.

This is a good efficient construction for the purposes, but it is desirable that the blades may be adjusted from time to time to compensate for reduction thereof due to wear and grinding thereof to sharpen the same. The brunt of the work of cutting by each blade is borne by the end edge which projects beyond the periphery of the body of the cutter and by a side edge which projects laterally beyond the body of the cutter. The purpose of the present invention, therefore, is to provide simple and effective means for automatically adjusting the blades laterally in their recesses incidentally to the outward or longitudinal adjustment thereof in order that the blades may be quickly and readily adjusted to compensate for the reduction of both of said cutting edges.

The character of the invention will be best understood by reference to the following description of one good form thereof shown in the accompanying drawing, wherein:

Figure 1 is a perspective view of a rotary cutter embodying the invention;

Fig. 2 on an enlarged scale is a transverse section through a portion of the body of the cutter containing one of the blade receiving recesses;

Fig. 3 is a view similar to Fig. 2 showing a blade mounted in the recess and showing in full and dotted lines different adjustments of the blade;

Fig. 4 is a perspective view of a portion of the body of the cutter containing a recess and showing a blade and its key disassembled; and

Fig. 5 on an enlarged scale is a plan view of the cutter showing the staggered arrangement of the blades.

Referring to the drawing, the cutter shown as one good form of the invention, comprises a polygonal body 1 having a hub 3 with a key slot 5 for receiving the usual key for securing the cutter to a spindle of a milling or other machine.

The body 1 is suitably formed to receive cutting blades 7, and in the present instance of the invention, for this purpose the body is formed to present a series of peripheral recesses or slots 9 extending inward in a general but not truly radial direction toward the center of the body. Preferably they are somewhat oblique to the radii of the body and also oblique to the plane of the body of the cutter, in order that the recesses may dispose the cutting blades at a desirable efficient cutting angle. Preferably each of these slots is rectangular in form presenting a front wall 11, a rear wall 13 and a bottom 15.

Each of the blades 7 may be somewhat longer than the depth of its recess, and wider than the width of the body of the cutter, so that it will project somewhat outward from the periphery and laterally from the body of the cutter. Each cutter has an outer cutting edge 17 and a side cutting edge 19, and the outer end and the side of the blade adjacent said cutting edges respectively may be beveled somewhat to furnish the desired clearance in producing their cuts. One series of blades may project laterally beyond one face of the body of the cutter so that the side cutting edges 19 will be on the line *a*—*b* (Fig. 5), and another series of the

blades may project laterally beyond the opposite side of the cutter so that the side cutting edges will be on the line *c*—*d*. One series will cut one wall of a groove produced by the cutter, and the other series will produce the opposite wall of the groove, but the outer cutting edges of the blades of both series will produce the bottom of the groove. In the present instance, the blades of one series are arranged alternately with the blades of the other series, and therefore, adjacent blades are inclined at different angles, in order that their oppositely disposed side cutting edges may have the desirable efficient cutting angle.

Since the planes of the blades are oblique to the plane of the body of the cutter, there is a tendency in use for them to slide in their recesses transversely to the plane of the body. To prevent this movement, each of the blades is provided with a rib 21 preferably formed integral therewith, semi-circular in section, and projecting outward from the rear face of the blade. Coöperating with this rib is a similarly shaped groove 23 in the rear wall 13 of the recess for the blade. When the blade is inserted in its recess, the rib 21 enters the groove 23 and serves positively to prevent lateral shifting of the blade in its recess while the blade is active in making its cut. This is a desirable feature, since the cutting operation by the side cutting edge 19 of the blade produces a strong pressure tending to shift the blade transversely to the plane of the body.

Suitable means may be provided to prevent the blades from moving outward in their recesses. For this purpose each blade may be provided with a key 25 having a flat face 27 for engagement with the front face of the blade. A tapered groove 29 extends transversely to the plane of the cutter body crosswise of the recess and communicates therewith through the front wall of the recess. The key may be driven into the groove with its flat face engaging the front face of the blade and serve to press the rear face of the blade against the rear wall of its recess and maintain the rib 21 in its groove 23.

In use, the blades become worn, and therefore, it is desirable from time to time to grind or sharpen their end cutting edges 17 and side cutting edges 19. However, wear and sharpening of the blades reduces the same, and this reduction prevents said edges from projecting their original distances beyond the periphery and side of the body of the cutter. It is, therefore, desirable to adjust the blades from time to time to compensate for such reduction. To accomplish this, in the present instance of the invention, each of the blade receiving recesses is provided with an adjusting screw threaded in a hole 33 in the body of the cutter and communicating with the recesses through the bottom thereof, the screw being preferably located midway between the two faces of the body of the cutter. The screw may have a flat outer end against which the inner end of the blade may be seated, and the head may be formed to receive a screw driver which may be inserted into the recess to the screw to adjust the same and cause it to project out into the recess the extent required.

An important feature of the invention relates to means whereby the side cutting edge 19 is given a lateral adjustment automatically incidentally to the longitudinal adjustment of the blade in its recess. To accomplish this, the rib 21 referred to, of the blade, is formed obliquely with respect to the side cutting edge 19, and the groove 23 receiving said rib is formed obliquely with respect to the rear wall of the recess, the construction being such that when, for example, the blade is adjusted outwardly from its position shown in dotted lines in Fig. 3 to its position shown in full lines in said figure, it will automatically be shifted laterally to the right of said figure. As a consequence, the outward adjustment of the blade not only compensates for the reduction of the end cutting edge 17, but also compensates for the reduction of the side cutting edge 19.

By this adjusting means the blades can be equally adjusted by giving each of the adjusting screws a fraction of a turn, a complete turn, or a predetermined number of turns as desired, and the screw driver receiving grooves in the ends of the screws may in a sense serve as indexes of the extent of adjustment of the screws by virtue of the relation of such grooves with the walls of the recesses. However, it is not necessary to always adjust the blades accurately, since the cutting edges of the blades may be ground afterward, so that corresponding cutting edges of all of the blades will project the same distance beyond the body of the cutter. The construction is such that the blades can be positioned to produce a groove or slot of a predetermined width, and all of the blades will be in position to perform their part of the cutting operation. When the blades are reduced by wear and sharpening, they may be readily adjusted to compensate for the reduction by their outward and side movements so as to always produce the groove or slot of the predetermined width produced by their original adjustment.

Having described one embodiment of the invention without limiting the same thereto, what is claimed is:—

1. A rotary cutter, comprising, in combination, a body provided with outwardly extending recesses having front and rear walls closed at their inner ends, each recess having a groove extending obliquely to the

rear wall thereof and a transversely tapering groove extending crosswise of the front wall thereof; and blades adjustably mounted in said recesses, each having end and lateral cutting edges projecting out beyond the body, a front face to engage the front wall of the recess and a rear face having a rib extending obliquely thereon and coöperating with the oblique groove in the rear wall of the recess, automatically to adjust the blade laterally on longitudinal adjustment of the blade in its recess; and a tapered key fitting the tapered transverse groove in the front wall of the recess for locking each cutter blade in its recess, said tapered key having a portion to engage the front face of the cutter blade and act thereagainst to force the blade toward the rear wall of its holding recess and the rib thereof into its groove.

2. A rotary cutter comprising a body provided with a series of recesses formed with front and rear walls and having oblique grooves in the rear walls thereof; blades mounted in said recesses between the front and rear walls thereof and having end and lateral cutting edges projecting out beyond said body, and oblique ribs integral with said blades coöperating with the oblique grooves of the recesses automatically to adjust the blades laterally on longitudinal adjustment of the blades in their recesses; adjusting screws threaded into said body and projecting into said recesses for adjusting the blades longitudinally in their recesses; said body having tapered grooves extending transversely of the front walls of and communicating with said recesses; and tapered keys in said transversely extending grooves for engagement with the front faces of said blades and pressing the rear faces of the blades toward the rear walls of the recesses and the oblique integral ribs into the oblique grooves.

3. A rotary cutter, comprising, in combination, a body provided with two series of recesses differently inclined with respect to said body and each recess having front and rear walls, a bottom, a groove extending obliquely in the rear wall thereof and a transversely tapering groove extending crosswise of the front wall thereof; and blades adjustably mounted in said recesses, each having end and lateral cutting edges projecting out beyond the body, a front surface to engage the front wall of the recess and a rear surface having a rib extending obliquely thereon and coöperating with the oblique groove in the rear wall of the recess, automatically to adjust the blade laterally on longitudinal adjustment of the blade in its recess.

In testimony whereof I have signed my name to this specification.

FRANK S. McQUESTON.