

UNITED STATES PATENT OFFICE.

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MILLING-MACHINE CUTTER.

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To all whom it may concern:

Be it known that I, JULIUS MATTSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in a Milling-Machine Cutter, of which the following is a full, clear, and exact description.

My invention relates to improvements in milling machine cutters, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide milling machine cutters which are adapted to cut a piece of work faster than is possible with the ordinary cutters without sacrificing the uniform smooth cut which is accomplished by the ordinary cutters.

A further object of my invention is to provide a device of the type described in which the cutters may be readily secured in place and be rigidly clamped in position.

A further object of my invention is to provide a device of the type described which makes use of circular and non-circular cutters, the circular cutters being adapted to do the rough cutting, while the non-circular cutters are adapted to smooth the work which has been cut by the circular cutters.

A further object of my invention is to provide a device of the type described in which the cutters may be turned, whereby the same cutters may be used for a relatively long length of time.

A further object of my invention is to provide a device of the type described which is simple in construction, durable and efficient for the purpose intended, and which is not likely to easily get out of order.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which—

Figure 1 is a plan view of the device,

Figure 2 is a vertical section through the device,

Figure 3 is an end view of a portion of the device,

Figure 4 is a sectional view of another portion of the device,

Figure 5 is a view of a modified form of the device, and

Figures 6 and 7 are diagrammatic views

illustrating the various positions in which the cutters may be placed.

In carrying out my invention, I make use of a tool plate 1 which has a plurality of inwardly extending slots 2. The slots 2 project inwardly from the periphery of the plate 1, and are adapted to receive cutters. The tool plate 1 is secured to a spindle 3 in the ordinary manner, the openings 4 in the plate 1 permitting a wrench to be connected to the plate so that the plate may be readily attached to the spindle.

The slots 2 do not extend radially in the present form of the device, although the device may be constructed in this way. I then provide circular and non-circular cutters 5 and 6 which are in reality discs. The cutters 5 and 6 in the present form of the device are disposed in the slots 2 and alternate with respect to each other. The cutters 5 extend outwardly from the axis a greater distance than do the cutters 6. In Figure 1, I have shown this difference to an exaggerated degree so as to more clearly bring out the drawing. From Figure 2 it will be noted that the cutters 6 extend downwardly a greater distance than do the cutters 5. From this construction it will be apparent that the cutters 5 will gouge out the work and that the cutters 6 will smooth the work that has been cut. In Figure 2 I have shown one of the cutters 5 as cutting the work 7 while the cutter 6 also cuts the work 7, but to a less depth than does the cutter 5, the cutter 6 being adapted to smooth the surface 8.

It is obvious that the plate 1 may have all cutters 5 thereon, or all cutters 6, but I have found that the best results are obtained where the cutters 5 and 6 alternate with each other. With this assembly, a very rapid cut may be made and at the same time a smooth cut. The cutters are secured to the plate 1 by a novel means shown in Figures 3 and 4. It will be noted from Figure 1 that the plate 1 has slots 9 adjacent to the slots or recesses 2. The slots 9 extend transversely through the plate 1 and parallel with the plane of the recesses 2. As clearly shown in Figure 3, the plate 1 has inwardly extending bores 10, these bores lying in the plane of the slots 9. A wedge-shaped screw 11 is adapted to be received by the bores 10 and has its inner end 12 threaded. The inner ends of the bores 10 are also threaded at 13, whereby the screws 11 are held in place. It

will be obvious that when the screws 11 are disposed within the bores 10, they will force the piece of metal 14 firmly against the cutter, and thereby hold the cutter in place. A slot 15 extends inwardly from the recess 2, and is disposed parallel with the slot 9 that is disposed adjacent to the screw 11. The portion of metal 14 is relatively thin and is adapted to be flexed so as to firmly grip the cutter and hold the latter in place. In this manner, the cutter may be held in any position desired with respect to the plate 1.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. As heretofore stated, the cutters 5 and 6 are disposed within the recesses 2 and alternate with respect to each other. The cutters 5 extend a greater distance from the axis of the plate 1 than do the cutters 6. The cutters 6, however, extend to a greater depth than do the cutters 5. When the plate 1 is rotated the cutters 5 have their outer and lower portions of the cutting edges in engagement with the work. The cutters 6 are disposed nearer the center of the axis of rotation of the plate 1 than are the cutters 5, but extend slightly beyond the plane which is tangent to the under sides of the cutters 5. The sides of the cutters 6 which are disposed furthest from the axis of rotation will not engage with the work. The under sides of the cutters 6 will cut the surface which has already been cut by the cutters 5. The cutters 6 have a straight cutting edge which smooths and finishes the cut which has been made by the cutters 5. It will be noted from Figure 2 that the cutters 6 have small and large straight cutting surfaces 16 and 17, respectively. By merely rotating the cutters 6 with respect to the plate 1, either of these cutting edges may be brought into engagement with the work 7. It will also be obvious that the cutters 6 may last a relatively long time, since when one of the cutting edges is worn, the cutter may be rotated so as to bring another cutting edge into engagement with the work. In like manner, the cutter 5 may be rotated with respect to the plate 1 so as to bring a portion of the cutter that is still sharp into engagement with the work. The cutters 5 and 6 are provided with central openings 18, whereby the cutters may be held or secured to a spindle when the cutters are sharpened. It is easier to sharpen the cutters 5 than it is to sharpen the cutters 6. The cutters 5 do the greater amount of the work and therefore they will wear out more quickly than will the cutters 6. As heretofore stated, the cutters 6 are merely finishing cutters and provide a smooth surface 8 to the work. It will be seen from the foregoing statement that the cutters 5 have to be ground more often than the cutters 6, but that the cutters 5 are more readily ground than are the cut-

ters 6, since the cutters 5 are circular in shape. In the present form of the device, the recesses 2 extend angularly with respect to the periphery of the plate 1. This assembly permits the cutters to do more effective work than if the cutters extended radially with respect to the plate 1. It is obvious that the angle which the cutters assume with respect to the plate 1 may be varied. In the diagrammatic showing in Figure 7 I have shown the cutters as being disposed in various angles with respect to the radii of the plate 1. It should be noted, however, that the recesses 2 in one plate will all extend at the same angle. Figure 7 is merely for the purpose of illustrating the various angles in which the cutters may be disposed. The cutters may also extend angularly with respect to a vertical plane passing through the rotating axis of the plate 1. I have shown this in a diagrammatic view in Figure 6.

In some types of work, it is required to secure the cutters more firmly in place. In Figure 5 I have shown a means for accomplishing this purpose. It will be noted from this figure that there are two screws 20 provided in place of one screw 11. These screws lie in the same plane as the slot 21 and are adapted to force the portion of metal 22 into frictional engagement with the cutter when the screws are tightened. In this manner the cutters are securely held in place. The device is very simple in construction, and as heretofore stated, is adapted to make a rapid and clean cut. This is accomplished by the use of the two cutters 5 and 6, the cutter 5 doing the rough work and the cutter 6 doing the finishing work. The cutters are readily assembled to the plate 1 and are rigidly locked in place by means of the screws 20 when once assembled.

A distinct advantage is obtained by providing substantially circular cutters, since the cutters may be rotated with respect to the work so as to bring the sharp edge of the cutter into engagement with the work. In this manner the life of the cutter is extended between the sharpening operations. The device is very efficient for the purpose intended and is not likely to easily get out of order.

I claim:

1. A milling machine cutter comprising a circular plate adapted to be rotated, said plate having recesses in its outer periphery, cutters disposed in said recesses, and means for locking said cutters in place, certain of said cutters extending further from the axis of rotation of said plate than the other cutters, while the work engaging portions of the other cutters extend below the work engaging portions of the first named cutters.

2. A milling machine cutter comprising a circular plate adapted to be rotated, said plate having recesses in its outer periphery, cutters disposed in said recesses, means for

locking said cutters in place, certain of said cutters extending further from the axis of rotation of said plate than the other cutters, while the work engaging portions of the
5 other cutters extend below the work engaging portions of the first named cutters, said means comprising portions of metal adapted to be forced into frictional engagement with
10 said cutter, and screws for moving said portions into clamping engagement with said cutters.

3. A milling machine cutter comprising a circular plate adapted to be rotated, said plate having recesses extending inwardly
15 from its periphery, a plurality of circular and non-circular cutters disposed in said recesses, the circular and non-circular cutters alternating with respect to each other.

4. A milling machine cutter comprising
20 a circular plate adapted to be rotated, said plate having recesses extending inwardly

from its periphery, a plurality of circular and non-circular cutters disposed in said recesses, the circular and non-circular cutters
25 alternating with respect to each other, said circular cutters extending further from the axis of rotation of said plate than the non-circular cutters.

5. A milling machine cutter comprising a circular plate adapted to be rotated, said
30 plate having recesses extending inwardly from its periphery, a plurality of circular and non-circular cutters disposed in said recesses, the circular and non-circular cutters
35 alternating with respect to each other, said circular cutters extending further from the axis of rotation of said plate than the non-circular cutters, while the work engaging
40 portions of the non-circular cutters extend below the work engaging portions of the circular cutters.

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