W. F. & J. BARNES.
Rotary-Cutter.

No. 203,578. Patented May 14, 1878.

Fig. 1

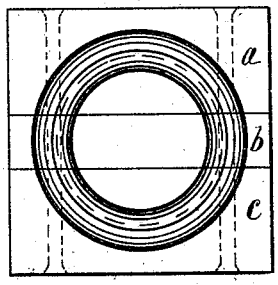


Fig. 2.

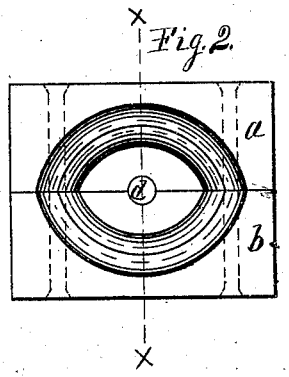


Fig. 4.

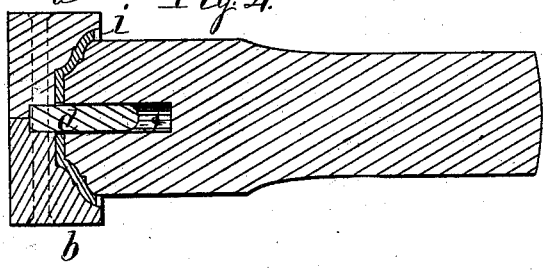


Fig. 5.

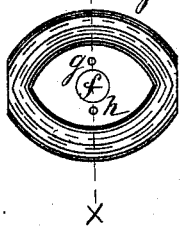


Fig 5

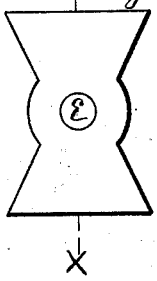


Fig. 6.

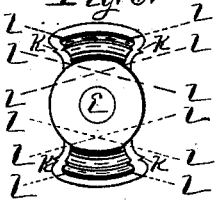
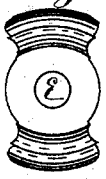


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM F. BARNES AND JOHN BARNES, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN ROTARY CUTTERS.

Specification forming part of Letters Patent No. **203,578**, dated May 14, 1878; application filed March 25, 1878.

To all whom it may concern:

Be it known that we, WILLIAM F. BARNES and JOHN BARNES, of the city of Rockford, in the county of Winnebago and State of Illinois, have invented a new and useful Improvement in Rotary Cutters for Planing-Machines, of which the following is a specification:

This invention relates to that class of rotary cutters designed for use mainly on machines in which the end of the spindle or arbor projects to receive the cutters, such as formers, shaping-machines, friezing-machines, stickers, and similar machines, and used for forming moldings, &c.; and consists of a cutter or cutters of various forms produced from plate material cut into blanks of proper form, or from prepared forgings swaged into the shape or form required by the use of suitable dies, and producing the cutting-edges by filing, grinding, or otherwise beveling their outer edges from the inside outward.

As an example of the method of producing our improved cutters, we have, in connection with our improved cutters, given a representation of the dies used in its formation, in which Figure 1 represents the face of the die as produced on the turning-lathe. Fig. 2 represents the face of the finished die to give the outside impression of the cutter. Fig. 3 represents the end view of the set or drop die by which the blank is set into the die. Fig. 4 is a sectional representation of the dies on dotted lines *x* when in position with the cutter pressed into shape between them. Fig. 5 represents the blank from which to shape the cutter. Fig. 6 represents an inside view, Fig. 7 an edge view, and Fig. 8 an outside view, of the finished cutter.

In the figures, *a*, *b*, and *c* are blocks of suitable material, of proper size, fitted and pinned together, as represented, and as removed from the lathe after the face has been sunken, with proper outlines to give the required form of the outside of the cutter. These blocks are then separated, the middle block *b* removed, and the two outer parts *a* and *c* placed together and firmly riveted to each other, as at Fig. 2, and are then hardened. This die is provided with a central guide-pin, *d*, fixed in its center, and rises above the face of the die to receive the perforated center *e* of the blank, and also the bored center *f* of the die set or drop, to hold and guide the parts centrally in forming the cutters. At Fig. 3 is represented the face of the die set or drop, which is formed in the turning-lathe one side or half at a time; and from each center *g* and *h* this die-set is centrally bored at *f* to receive the center steady-pin *d* in the die at Fig. 1. At Fig. 4 these parts are shown in central section on dotted line *x*, and are represented in position, with the cutter, in section on dotted line *x*, pressed into shape between them, as at *i*.

At Fig. 5 we have represented a blank of about the proper form from which to make a given-sized cutter. This blank is cut from plate material of any proper thickness, and is perforated centrally, as at *e*. It is then heated, and placed on the die in such a manner that its perforated center *e* receives the steady-pin *d* and the dotted lines *x* are over each other. Then the die-set is placed so that its bored center *f* will receive the steady-pin *d*, and that the dotted lines will all be in the same vertical plane. The parts are then forced or driven together into the position represented in Fig. 4, which gives to the blank the form of the dies to produce the required cutter. The parts are then separated, and the cutter, pressed into form, is then reduced to cutting-edges on the four sides *k* by filing, grinding, or otherwise beveling them from the inside at such an angle as to produce proper cutting-edges. The cutters are then hardened, tempered, and the scale properly removed, and we have a cutter ready for use on any suitable machine.

A suitable angle on which to bevel the edges from the inside to produce a good cutting-edge is represented in the oblique dotted lines *l* in Fig. 6; but this angle may be varied to meet the wishes of the user. This bevel from the inside, to sharpen the cutter throughout its length or the extent of the cutter, is on the same plane, and may be produced by a flat file, the side or periphery of an ordinary grinding-wheel, or a plain-faced whetstone, or any other ordinary device used for sharpening edge tools.

From the foregoing it will be observed that our improved cutter is about of equal thickness throughout the length of the cutting-wings, and their inner sides are concave, and

horizontally are about parallel with the outer curved surface of the cutter. This construction produces a strong cutter with but little material, and one that is easily kept in working order.

We do not wish to confine ourselves to the manufacture of our improved cutters from plate material, as they may be made from prepared forgings, and they may be made thicker in the center than at the extremities of the cutting-wings. This may be accomplished by providing proper material in bars having thick centers and thin edges—known in the trade as "high-center" bars—from which to cut the blanks; or this form of blank may be produced by forging; and by reducing the center of the die-set to correspond with the increased thickness of the center of the material, cutters with stronger centers may be produced.

From the foregoing description of the dies it will be seen that the outer curve of the cutting-wings of our improved cutter is produced with a radius of greater length than the radius of the cutter, by means of which we produce a cutter with cutting-edge inclined to the material to be operated upon, to provide clearance to prevent heating of the cutters in use.

Our improved cutters may be produced from plate material or from forgings in dies, substantially as herein described, by pressure or by swaging under a power or hand hammer, or under a drop, as drop forgings are produced.

By means of our improved method we are enabled to produce rotary cutters at a nominal cost compared with cutters produced from blocks or disks formed in the turning-lathe and then cut by milling-machines, files, and other similar appliances used in the manufacture of such cutters as now produced; and after the dies are prepared for any particular cutter we can produce such particular cutters in exact duplicates to any extent, limited only by the durability of the dies.

We claim as our invention—

1. The method of manufacturing rotary cutters, substantially as hereinbefore set forth, which consists in first cutting a sheet-metal blank of the desired form and size, and then striking up the wings of the blank, thereby imparting a concave form thereto, and forming the outer curve of the wings on a circle having a radius greater than the radius of the cutter, and afterward tempering the cutter, substantially as set forth.

2. A sheet-metal rotary cutter of uniform thickness throughout, provided with cutting-wings, each of which is concave, and provided with an outer curve the radius of which is of greater length than the radius of the cutter, substantially as set forth.

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