No. 849,329. PATENTED APR. 2, 1907.

W. U. COLTHAR.

MANUFACTURE OF CUTTING DISKS.

APPLICATION FILED NOV. 13, 1905.

Fig. 8.

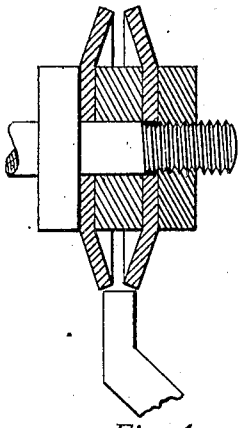


Fig. 1

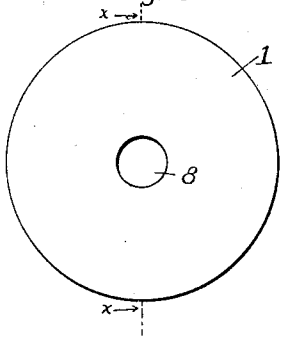


Fig. 2

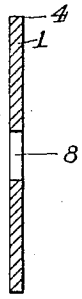


Fig. 3

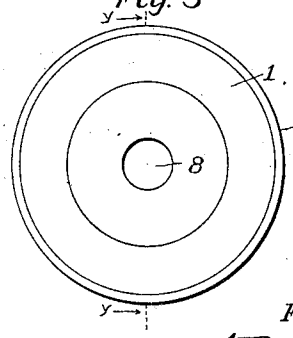


Fig. 4

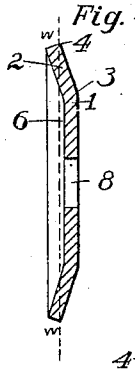


Fig. 5

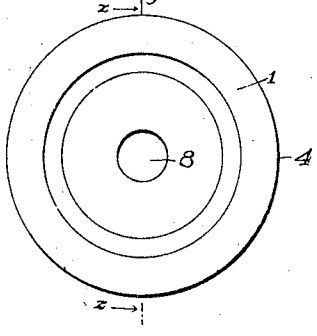


Fig. 6

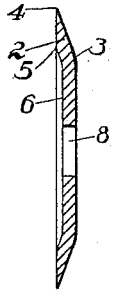
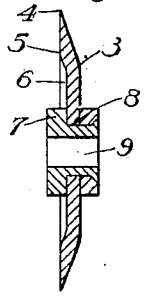


Fig. 7



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MANUFACTURE OF CUTTING-DISKS.

No. 849,329. Specification of Letters Patent. Patented April 2, 1907.

Original application filed August 10, 1904, Serial No. 220,185. Divided and this application filed November 13, 1905. Serial No. 287,157.

To all whom it may concern:

Be it known that I, WILLIAM U. COLTHAR, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Manufacture of Cutting-Disks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to the manufacture of cutting-disks, and has for its object to provide a simple and inexpensive method of manufacturing a cutting-disk adapted for use in cutting paper and other material.

The particular type of disk to which my invention relates is a well-known form in which the periphery or cutting edge is formed by a bevel or incline extending from one side of the disk to the other, so that the cutting edge is coincident with or lies in the same plane as one side of the disk, said side of the disk being recessed at its central portion so as to leave a flat annular grinding-surface on the side of the disk constituting the marginal portion of said side, so as to facilitate the sharpening of the disk. This sharpening is effected by grinding said flat annular portion, which is readily ground by reason of the fact that it is relatively narrow and that the central portion of the disk is recessed. Cutters of this type have heretofore been machined or wrought by milling or similar processes from tool-steel, and their production has consequently been necessarily slow and expensive.

It is the object of my present invention to provide a rapid, inexpensive, and effective method of producing such cutters; and to that end my present invention consists in the process which I will now proceed to describe and will then particularly point out in the claim.

In the accompanying drawings, Figure 1 is a view showing the initial condition of the blank from which the cutter is made. Fig. 2 is a sectional view of the same, taken on the line *x x* of Fig. 1. Fig. 3 is an elevation of the blank after it has been subjected to the first step of the process. Fig. 4 is a sectional view of the same, taken on the line *y y* of Fig. 3. Fig. 5 is a view of the completed disk before the hub or bushing is applied thereto. Fig. 6 is a sectional view taken on the line *z z* of Fig. 5. Fig. 7 is a view similar to Fig. 6, showing the hub or bushing applied to the cutting-disk; and Fig. 8 is a detail view illustrating the preferred method of removing the superfluous metal from the disks.

The present invention is a division of the application filed by me August 10, 1904, and issued on November 14, 1905, as Patent No. 804,520, for improvements in cutting implements, and in carrying out this invention I employ sheet-steel of suitable thickness as the material from which to make the cutting-disk instead of the bar-steel or tool-steel usually employed. This sheet-steel is first formed by any suitable cutting or punching process into flat blanks circular in form of a diameter somewhat greater than the final diameter of the finished cutting-disk. Preferably the central aperture which receives the hub or bushing of the disk is formed at this time. One of these blanks in its initial state is shown in elevation and section in Figs. 1 and 2, respectively. The flat blank thus formed next has its marginal portion bent laterally at an angle to the body of the blank, the bending being accomplished by suitable dies or any other approved means, this bending giving to said marginal portion a uniform inclination to the planes of the sides of the central portion of the blank. The blank now has the form shown in elevation and section in Figs. 3 and 4, respectively, the body of the blank being indicated by the reference-numeral 1 and the bent marginal portion by the reference-numeral 2. This bending of the blank forms the bevel of the cutting edge, the annular surface included between the edges 3 and 4 constituting said bevel. The body of the cutting-disk is then completed by removing that portion of the blank which lies outward beyond the plane indicated by the dotted line *w w* of Fig. 4. In other words, the material is removed so as to produce a flat annular surface parallel with the sides of the body of the disk, all material lying on one side of the plane of the edge 4, which is that edge of the blank which is at the greatest distance from the central axis of the blank, being thus removed. This removal is preferably effected by securing two of the disks upon a rotatable arbor with their concave faces toward each other and spaced apart by the interposition between them of a washer or sleeve. A cutting-tool is then introduced between the disks, and by this means the metal to be removed

is cut away. This operation is illustrated in Fig. 8 of the drawings. Preferably a portion of the metal to be removed is not cut away by the boring-tool, a thickness of about one sixty-fourth ($\frac{1}{64}$) of an inch being allowed to remain. This is done because it is preferred to temper the disks at this time, and some slight distortion frequently occurs from the tempering operation. After the disks are tempered the small remainder of the surplus metal is removed by grinding, thus simultaneously bringing the cutter to its ultimate form, sharpening the cutting edge thereof, and removing any inequalities of the grinding-surface arising from the possible distortion just referred to. The edge 4 thus becomes the cutting edge, and the flat annular surface between the edge 4 and the edge 5 becomes the grinding-surface, by the grinding of which the cutting edge is kept properly sharpened.

The bending of the marginal portion of the disk hereinbefore referred to not only forms the bevel of the cutting edge, as hereinbefore stated, but also forms the central recess 6 on the other side of the disk, which recess gives to the grinding-surface its annular form. The completed body of the cutting-disk is shown in elevation and section in Figs. 5 and 6, respectively. This body is preferably completed by providing therefor a hub or bushing 7, extending through the central aperture 8 of the disk and gripping the sides thereof, said hub or bushing having a bearing-aperture 9 formed therein, which by reason of the length of the hub or bushing gives a firm and efficient bearing-support for the disk upon the arbor or shaft on which it is mounted. The bushing shown in the present instance is one set forth in Letters Patent No. 804,520, granted to me November 14, 1905; but any suitable form of bushing may be employed.

It will be seen that I am enabled to employ a relatively inexpensive material—to wit, sheet-steel—instead of the more expensive bar or tool steel usually employed in the manufacture of these cutting-disks. Furthermore, no milling or other expensive machine-work is required, and the entire production of the body of the cutting-disk may be effected by operations which are rapid and relatively inexpensive, so that the entire cost of production of the disk is materially reduced and the work greatly simplified.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The hereinbefore-described process of manufacturing cutting-disks, consisting in providing flat circular sheet-metal blanks having central apertures, bending the marginal portion of said blanks laterally to a uniform inclination to the planes of the sides of the central portion thereof, whereby a marginal bevel is formed on one side of the blank and a central recess on the other side, then revolving said disks in pairs with their concave faces toward each other and introducing between them a cutting-tool to remove all but a small portion of the metal lying beyond the said bevel on the recess side of each disk, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM U. COLTHAR.

Witnesses:
E. O. HAGAN,
F. W. SCHAEFER.