Jan. 31, 1933. A. M. REMINGTON 1,895,819

CONVEX CUTTING METHOD AND APPARATUS

Filed Nov. 28, 1927

Fig. 1

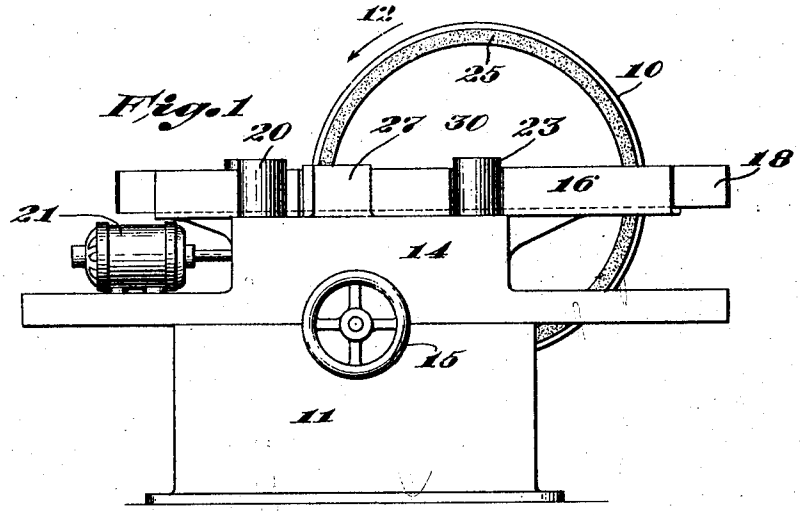
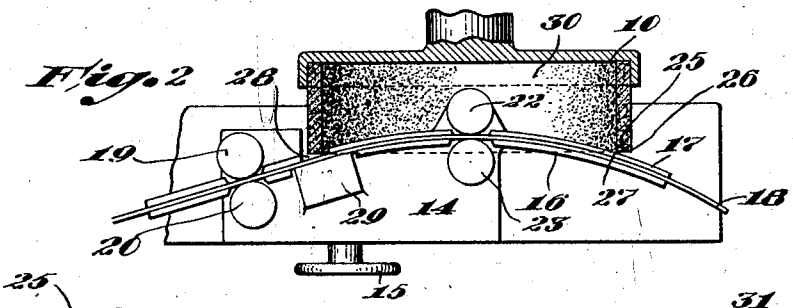


Fig. 2



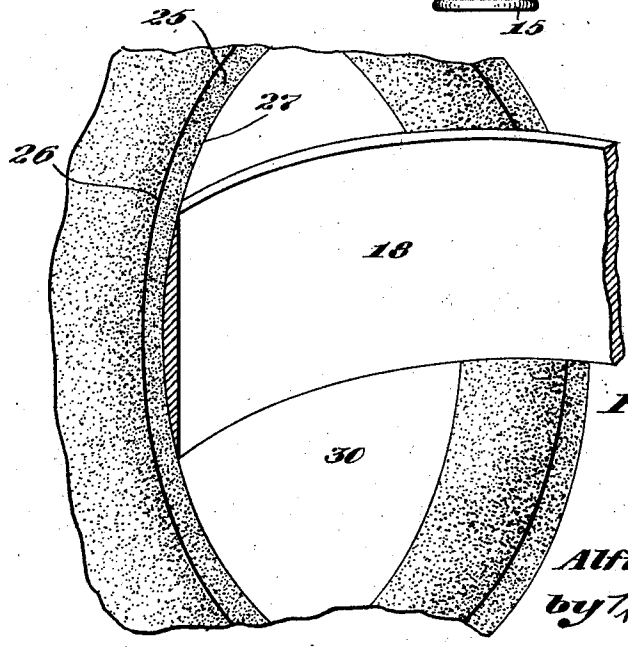


Fig. 4

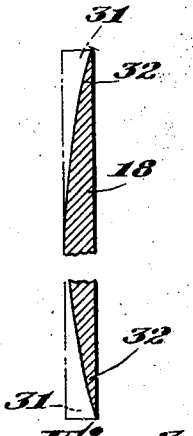


Fig. 3

Inventor
Alfred M. Remington
by Pruet Cushman & Woodberry
Attys.

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UNITED STATES PATENT OFFICE

ALFRED M. REMINGTON, OF FITCHBURG, MASSACHUSETTS, ASSIGNOR TO SIMONDS SAW & STEEL CO., OF FITCHBURG, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

CONVEX CUTTING METHOD AND APPARATUS

Application filed November 28, 1927. Serial No. 236,315.

This invention relates to convexly cutting a strip of stock and more particularly to the method of providing a convex surface on one side of such a strip and to the apparatus for carrying out such a method.

In the manufacture of blades, especially blades made of thin strips of steel, it is often desired to provide on one side of the strip a convex surface and particularly to provide such a surface by a transverse cutting operation whereby the cutting marks are crosswise.

The primary object of this invention is to cut strips of metal so that the lateral portions of one side are convex in contour. A further object of this invention is to remove the corners of one side of the strip along each edge so that the lateral portions of the side are convex in contour, such removal being the result of transverse cutting as the strip passes the cutting wheel.

For the purpose of setting forth more clearly this invention, one embodiment is illustrated in the accompanying drawing in which:

Fig. 1 is a side elevation of a machine by which this invention may be carried out;

Fig. 2 is a plan view partly in section of the machine shown in Fig. 1;

Fig. 3 is a transverse section on an enlarged scale of a strip of metal embodying this invention; and

Fig. 4 is an enlarged perspective view setting forth one step in the carrying out of the invention.

In the drawing is shown a cutting wheel 10 of the cup type suitably mounted upon a standard 11 and adapted to be rotated in the direction of the arrow 12 by any suitable means, which are not shown in detail since they form no part of the present invention. Mounted upon the pedestal 11 in front of the grinding wheel 10 is shown a platform 14 which can be advanced or retracted relative to the cutting wheel 10 by any known means which may be operated by the wheel 15.

Fixed upon the platform 14 are a pair of suitably spaced sectional guide plates 16 and 17 between which a strip of metal 18, which is to be treated in accordance with this invention, is fed by a pair of suitably formed rollers 19 and 20 which may be driven by means of a motor 21. A second pair of rollers 22 and 23 mounted between sections of the guide plates 16 and 17 engage the sides of the strip. These rollers are also positively driven by any suitable means.

The wheel 10 has an annular cutting face 25 having an outer edge 26 and an inner edge 27. As shown particularly in Fig. 2, sections of the guide plate 17 are spaced at 28 to permit the wheel to come into contact with one surface of the strip 18. A backing plate 29 is mounted opposite the space 28 between sections of the guide plate 16 to support that portion of the strip which is acted upon by the wheel 10. The strip of metal 18, when introduced into the machine, is preferably rectangular in cross section, as shown in Fig. 3 by the dotted lines.

Referring to Fig. 4, it will be noted that the strip 18 is fed into the interior 30 of the grinding wheel being held out of contact with the cutting face 25 by the guide plate 17 and then fed outwardly from the interior coming into contact with the inner edge 27 of the cutting face 25 at an acute angle thereto, so that the wheel 10 first contacts with the side edge of the strip. As the strip 18 passes the wheel 10, lateral portions 31 beginning at each edge are removed, leaving one side of the strip convex in contour as shown in Fig. 3. The metal strip operated upon, being thin, is consequently flexible and accordingly can be fed without difficulty in the curved path defined by the guide plates 16, 17, as shown in Fig. 2.

Obviously, by changing the angle at which the strip 18 contacts with the cutting face 25, the amount of convexity of the lateral portions 31 can be regulated and, furthermore, the width of such portions can be controlled so that the entire surface of one side is not convexed. This adjustment is preferably attained by setting the rollers 22, 23 at that position in the interior 30 of the wheel which will cause the strip 18 to be fed at the desired angle and by shifting the guide plates 16, 17 and the backing plate 29 accordingly.

In view of the fact that the wheel 10 is

rotated upon an axis substantially at right angles to the forward end of the strip of metal, it must follow that the cutting is performed transversely and that the cutting marks on the lateral portions will be crosswise. The drawing and description set forth a cutting wheel of the cup type but it will be understood that in place of the cup wheel, a cylinder wheel or a saucer wheel might be employed. The essential feature is that the surface by which the cutting is performed must be concave in order to give a convex contour to the surface and hence any cutting wheel having a concave cutting face can be employed in carrying out this invention.

As described and shown the strip 18 contacts with the cutting face 25 on its movement out of the interior 30 of the wheel. The direction of movement could be reversed if desired or the strip brought into contact with the cutting face twice without departing from the spirit and scope of the invention as set forth in the following claims.

I claim:

1. The method of treating a flexible strip of stock by a grinding wheel having an annular cutting face to form the lateral portions of one side of the strip convex in contour, consisting in flexing and feeding the strip into and out of the interior of said wheel and, during such feeding movement, bringing the corners of one side of said strip into contact with the concave inner edge of the cutting face at an acute angle thereto whereby the corners will be transversely removed.

2. The method of treating a flexible strip of stock by a grinding wheel having an annular cutting face to form the lateral portions of one side of the strip convex in contour, consisting in flexing and feeding the strip into and out of the interior of said wheel and, as the strip leaves the interior, bringing the corners of one side of the strip into contact with the concave inner edge of the cutting face at an acute angle thereto whereby the corners will be transversely removed.

3. Apparatus for cutting a flexible strip of stock to form lateral portions on one side of convex contour comprising a cutter revolving about an axis of rotation and having an annular cutting face, guiding means for flexing the stock within the annular cutting face, and means for feeding the stock outwardly along a curved path into engagement with the inner edge of the cutting face obliquely to the axis whereby the corners of one side will be removed by a transverse cutting operation.

4. Apparatus for cutting a flexible strip of stock to form lateral portions on one side of convex contour comprising a cutter revolving about an axis of rotation and having an annular cutting face, guiding means for flexing the stock within the cutter between the annular cutting face thereof, and means for feeding the stock outwardly along a curved path through the plane of the cutting face and outwardly into engagement with the inner edge of the cutting face obliquely to the axis whereby the corners of one side will be removed by a transverse cutting operation and means for adjusting the relation of the guiding and feeding means relative to the cutter for determining the extent of the cutting operation.

5. The method of grinding a flexible strip of stock on a grinding wheel having an annular face forming an inner concave grinding edge, which comprises advancing the strip successively across the annular face at two fixed points spaced circumferentially thereof, holding the strip out of contact with the wheel as the strip passes the first of these points, flexing the strip as it passes between these two points to cause the strip to advance from within the wheel at an acute angle to the plane of the annular face thereof, and guiding the strip as it passes the second of said points to cause the strip to intersect the path of rotation of the inner concave grinding edge formed by said annular face, whereby at least one of the longitudinal edges of the strip may be ground by engagement with said inner concave grinding edge.

6. The method of grinding a flexible strip of stock on a grinding wheel having an annular face forming an inner concave grinding edge, which comprises advancing the strip successively across substantially opposite portions of the annular face, maintaining the strip out of contact with the wheel as the strip passes the first of the substantially opposite portions of the annular face, flexing the strip longitudinally as it passes between the latter portions of the annular face to cause the strip to intersect the path of rotation of the inner concave grinding edge at an acute angle to the plane of the annular face, whereby the longitudinal edges of the strip may be ground by engagement with this inner concave grinding edge.

7. The combination with a grinding wheel having an annular face forming an inner concave cutting edge, of means for advancing a flexible strip of stock through an arcuate path extending within the wheel and intersecting the plane of the annular face at two points, the first of these points being located to maintain the strip of stock out of contact with the wheel and the second of the points being located to cause stock emerging from within the wheel to engage the inner concave cutting edge thereof so that at least one of the longitudinal edges of the strip of stock may be ground by this concave cutting edge as the stock passes from the wheel.

8. The combination with a grinding wheel having an annular face forming an inner con-

cave cutting edge, of means for advancing a flexible strip of stock through an arcuate path extending within the wheel and intersecting the plane of the annular face at two points disposed substantially on a diameter thereof, the first of these points being located to maintain the strip of stock out of contact with the wheel and the second of the points being located to cause stock emerging from within the wheel to engage the inner concave cutting edge thereof so that at least one of the longitudinal edges of the strip of stock may be ground by this concave cutting edge as the stock passes from the wheel.

9. Apparatus of the class described comprising a grinding wheel having its central portion cut away to form an inner concave cutting edge substantially concentric about the axis of rotation of the wheel, means for feeding stock transversely across different portions of the cutting edge in succession, means for flexing the stock convexly toward the axis of the wheel as it passes between these different portions of the cutting edge thereof, means for maintaining the stock out of contact with the wheel where the stock first passes the cutting edge, and means for guiding the stock to cause the latter to engage the cutting edge at an acute angle to the axis of rotation of the wheel as the stock emerges from the cut-away central portion thereof, so that at least one of the longitudinal edges of the stock may be ground convexly and the marks produced by the grinding may extend transversely of the stock.

10. Apparatus of the class described comprising a grinding wheel having its central portion cut away to form an inner concave cutting edge substantially concentric about the axis of rotation of the wheel, fixed guide members spaced to define an arcuate path leading into the cut-away central portion of the wheel and out across the concave cutting edge thereof, an inner guide member being broken away where the path crosses the concave cutting edge so that stock may be ground convexly by this edge as it passes thereby, and means for advancing stock through the arcuate path.

11. Apparatus of the class described comprising a grinding wheel having its central portion cut away to form an inner concave cutting edge substantially concentric about the axis of rotation of the wheel, fixed guide members spaced to define an arcuate path leading into the cut-away central portion of the wheel and out across the concave cutting edge thereof, an inner guide member being broken away where the path crosses the concave cutting edge so that stock may be ground convexly by this edge as it passes thereby, and substantially parallel feed rollers disposed on opposite sides of the path for advancing stock therethrough.

12. Apparatus of the class described comprising a grinding wheel having its central portion cut away to form an inner concave cutting edge substantially concentric about the axis of rotation of the wheel, fixed guide members spaced to define an arcuate path leading into the cut-away central portion of the wheel and out across the concave cutting edge thereof, an inner guide member being broken away where the path crosses the concave cutting edge so that stock may be ground convexly by this edge as it passes thereby, and substantially parallel feed rollers disposed on opposite sides of the path at a point outwardly of and beyond the concave cutting edge for pulling stock through this path and across the concave cutting edge.

Signed by me at Fitchburg, Massachusetts, this 21st day of November, 1927.

ALFRED M. REMINGTON.