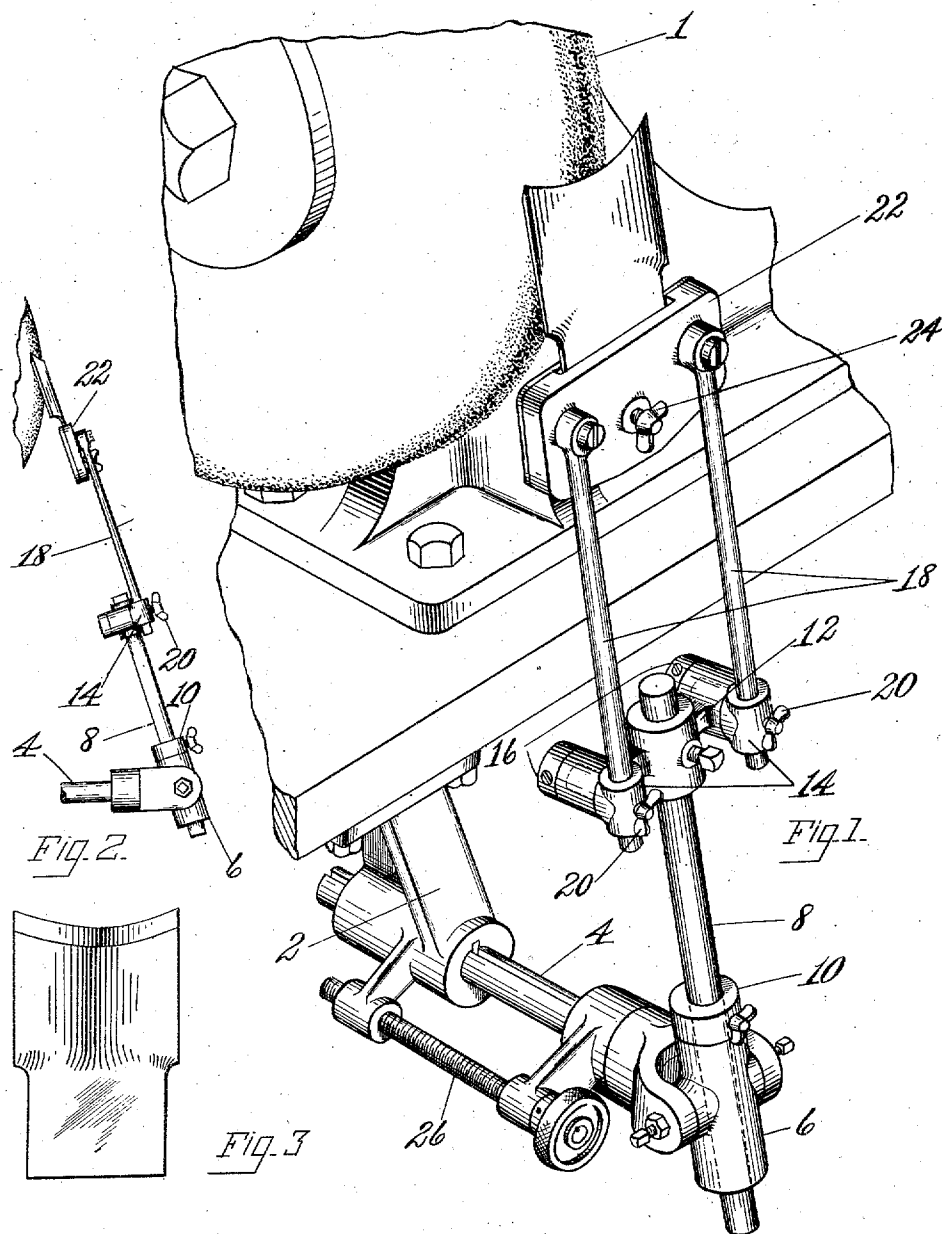


A. B. FOWLER.
GRINDING MACHINE.

APPLICATION FILED NOV. 27, 1907. RENEWED JAN. 18, 1912.

1,019,887.

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WITNESSES:

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GRINDING-MACHINE.

1,019,887.

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To all whom it may concern:

Be it known that I, ALFRED B. FOWLER, a citizen of the United States, residing at Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements in Grinding-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to grinding machines and more particularly to machines for grinding heel breasting knives such as are employed in the manufacture of boots and shoes.

A heel breasting knife has a concave cutting edge and the blade of the knife is usually of a cylindrically curved contour. The end of the blade is beveled upon the concave side to form the cutting edge.

The primary object of the invention is to provide mechanism adapted to insure an accurate grinding operation in grinding articles of this form.

The invention will be hereinafter described with reference to the grinding of heel breasting knives, but it will be understood that it is not necessarily limited to this particular use.

According to the present invention successive portions of the surface to be ground are subjected to the action of a constantly moving grinding device by relative movement of the blade and said device, adapted to shift the blade along said surface. The relative movement of these elements is so controlled as to insure the production of a concavity of a predetermined curvature in the edge of the blade.

To this end an important feature of the invention consists in mechanism for controlling said relative movement adapted to cause the action of the grinding device upon said edge to be exerted at all times longitudinally of the blade, or in a plane through the axis of the blade. This feature is of advantage not only in avoiding grinding off unduly the corners of knives, an effect which is occasioned where the grinding device moves obliquely along the blade, but also in that it tends to secure a bevel of uniform width at points intermediate the corners. It will be understood that the production of a bevel of uniform width is desirable, since

variation in its width along the cutting edge renders difficult the production and maintenance of a predetermined concavity in the edge. The acting part of the grinding device moves at a predetermined angle to the axis of the blade to produce a bevel of a desired angle and this angular relation of the blade to the grinding device is maintained substantially the same in grinding all parts of the cutting edge.

I prefer to use as a grinding device a wheel mounted to rotate about a stationary axis. The arrangement is such that the knife to be ground is moved by hand across the face of the wheel, the axis of the blade being mechanically maintained at all points in its movement parallel to the plane of the wheel. The path of the blade is also such that in its movement across the wheel the portion of the cutting edge acted upon lies at all times in substantially the same portion of the path of the acting part of the wheel. The arrangement is accordingly such, that in grinding from one corner to the middle of the edge the knife is moved progressively in a direction approximately tangentially of the wheel toward the point at which it is desired the grinding action shall be effected, while in grinding the remaining half of the blade the knife is gradually moved away from said point. To permit the surface being ground to engage at all times substantially the same point in the width of the wheel, the knife is also arranged for movement about a longitudinal axis, the axis of the blade being preferably parallel to said longitudinal axis.

In the embodiment of the invention herein illustrated, a sustaining member is shown arranged for swinging movement in a plane parallel with the plane of the wheel. A knife holder is sustained upon said member by means of a parallel motion connection adapted to permit movement of the holder across the face of the wheel and arranged to maintain the holder in a vertical position, viewed from in front of the wheel. A convenient construction comprises two parallel links pivotally connected to the holder and to said member and having the same effective length. The links are preferably of such a length that the holder moves in a path of substantially the same curvature as the concavity of the knife. To permit knives having cutting edges of different degrees of

concavity to be ground, the arrangement is such that the effective length of the links may be adjusted. The curvature in the path of the holder is opposite to that of the edge of the knife carried by the holder and compensates for the concavity of the latter, so that in the grinding operation the portion of the cutting edge acted upon remains at all times in substantially the same part of the path of the wheel.

Other features of the invention will be hereinafter described and defined in the claims.

In the drawings which illustrate a machine constituting one embodiment of the invention,—Figure 1 is a view in perspective of the machine; Fig. 2 is a view in side elevation of said machine; and Fig. 3 illustrates a form of tool which may be ground by the machine.

Referring to the drawings, 1 indicates a grinding wheel supported for rotation about a horizontal axis upon any convenient support, the surface of said wheel being preferably transversely curved, and of a greater convexity than the cylindrical surface of the blade. To the underside of said support is secured a bracket 2 provided with a horizontal guideway arranged at right angles to the axis of the wheel 1 and adapted to receive a rod 4, said rod being splined in said guideway. In the forward forked end of the rod 4 is pivotally mounted for movement about a horizontal axis, parallel to the axis of the wheel 1, a sleeve 6. In the sleeve 6 is received an arm 8 provided with a collar 10 adjustably secured thereon. The arm 8 is free to turn in the sleeve 6 and is sustained in the sleeve by engagement of the collar 10 with said sleeve. Upon the upper end of the arm 8 is secured a cross piece 12 provided with transverse bores at each end. In said bores are arranged the stems of sleeves 14, arranged for pivotal movement in said bores and held therein by collars 16 secured upon the rear end of the stems. In the sleeves 14 are adjustably secured the links 18 by means of set screws 20. Upon the upper end of links 18 is mounted a knife holder 22 provided with a thumb screw 24 for retaining a knife in the holder. The connection between each link 18 and the holder 22 is a pivotal one, and the links are arranged in a parallel relation and their effective lengths are equal. The holder is therefore free to swing in a curved path across the face of the wheel 1 and in its movement said holder remains at all times in a vertical position, viewed from the front of the machine. As will appear from Fig. 2 a knife secured in the holder 22 is parallel with the axis of the arm 8.

To permit the angle of bevel formed upon the knife to be controlled, the rod 4 is arranged for adjustment in the bracket 2. It

have illustrated a screw 26 arranged to facilitate adjustment of said rod in its guideway.

In the operation of the machine above described, the parts are first adjusted in accordance with the form of the knife to be ground. The links 18 are adjusted in the sleeves 14, so that their effective length is approximately equal to the radius of the concavity desired in the edge of the knife. The arm 8 may be adjusted in the sleeve 6 to bring the edge of the knife at any particular elevation, and the screw 26 may be manipulated to provide a proper angle between the knife and the face of the wheel to produce a desired angle of bevel.

The parts being properly adjusted, the grinding operation is effected by moving the knife holder manually across the face of the wheel, pressing the knife against the wheel and turning the holder slightly to cause the knife at all times to have contact with the wheel at substantially the median line on its periphery. It will be observed that the wheel moves at all times substantially longitudinally of the blade and that the portion of the edge acted upon at all times lies in substantially the same part of the wheel's path. The angular relation which the knife bears to the wheel remains substantially unchanged in the grinding operation. The bevel formed upon the blade is therefore substantially uniform in width from point to point in its length and the production of a predetermined curvature in the edge of the knife is insured. The knife is preferably arranged at such an angle to the wheel that its convex side is tangent to the wheel, as shown in Fig. 2.

The term "axis of the blade" used above and also employed hereinafter in the claims is intended to mean the axis of the cylinder of which the blade of the knife constitutes a portion. It will also be understood that by the term "concavity" as referred to the edge of the knife is meant its contour viewed in front or rear elevation for example as illustrated in Fig. 3.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. A machine for grinding a concave edge upon a blade, having, in combination, a grinding wheel and means for guiding the blade across the face of the wheel in a path having an opposite curvature to that of the concave edge of the blade whereby the grinding action is effected at all times at a predetermined part of the path of the wheel, said means constructed to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel.

2. A machine for grinding a concave edge upon a cylindrically curved blade, having in

combination, a grinding wheel arranged to be continuously actuated, means for receiving and sustaining a blade, said wheel and sustaining means being arranged for relative movement to subject different portions of the blade to the action of said wheel, and means for controlling said relative movement constructed to cause the action of said wheel upon the blade to be exerted at all times substantially longitudinally of the blade and to be effected at a predetermined part of the path of the wheel.

3. A machine for grinding a concave edge upon a cylindrically curved blade, having in combination, a grinding wheel, and a holder for guiding the blade across the face of the wheel arranged to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel and constructed to cause the grinding action to be effected at all times at a predetermined part of the path of the wheel.

4. A machine for grinding a concave edge upon a blade, having, in combination, a grinding wheel and means for guiding the blade across the face of the wheel in a path having an opposite curvature to that of the concave edge of the blade whereby the grinding action is effected at all times at a predetermined part of the path of the wheel, said means constructed to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel and to permit movement of said blade about a longitudinal axis.

5. A machine for grinding a concave edge upon a cylindrically curved blade, having in combination, a grinding wheel, a member arranged for movement about an axis parallel to that of the wheel and held from movement laterally of the wheel, a blade holder, and a plurality of parallel links pivotally mounted upon said member, pivotally connected to the holder and having a predetermined effective length.

6. A machine for grinding a concave edge upon a blade, having, in combination, a grinding wheel and means for guiding the blade across the face of the wheel in a path having an opposite curvature to that of the

concave edge of the blade, said means having provision for adjustment whereby the curvature of said path may be varied to correspond with knives having different concavities in their cutting edges.

7. A machine for grinding a concave edge upon a blade, having, in combination, a grinding wheel and means for guiding the blade across the face of the wheel in a path having an opposite curvature to that of the concave edge of the blade having provision for adjustment whereby the curvature of said path may be varied to correspond with knives having different concavities in their cutting edges, said means being constructed to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel.

8. A machine for grinding a concave edge upon a blade, having in combination, a grinding wheel and means for guiding the blade across the face of the wheel in a path having an opposite curvature to that of the concave edge of the blade having provision for adjustment whereby the curvature of said path may be varied to correspond with knives having different concavities in their cutting edges, said means being constructed to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel and to permit movement of said blade about a longitudinal axis.

9. A machine for grinding a concave edge upon a transversely curved blade, having in combination, a grinding wheel and a holder for supporting a blade to be ground arranged to be manually moved across the face of the wheel and means for guiding the holder constructed to maintain the axis of the blade in a substantially parallel relation to the plane of movement of the wheel and to permit movement of said blade about a longitudinal axis.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED B. FOWLER.

Witnesses:

BERNARD BARROWS,
ALLAN H. BARROWS.