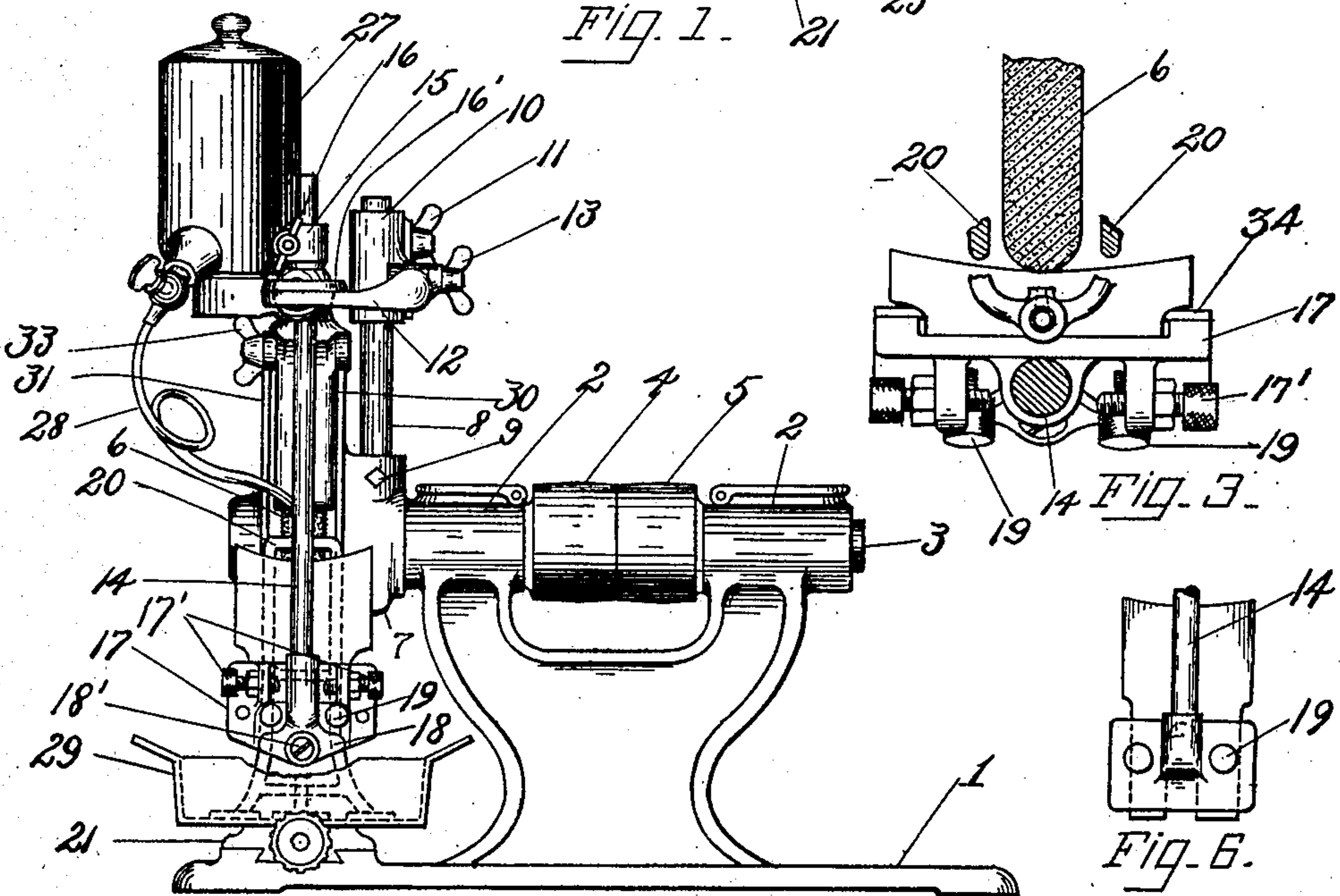
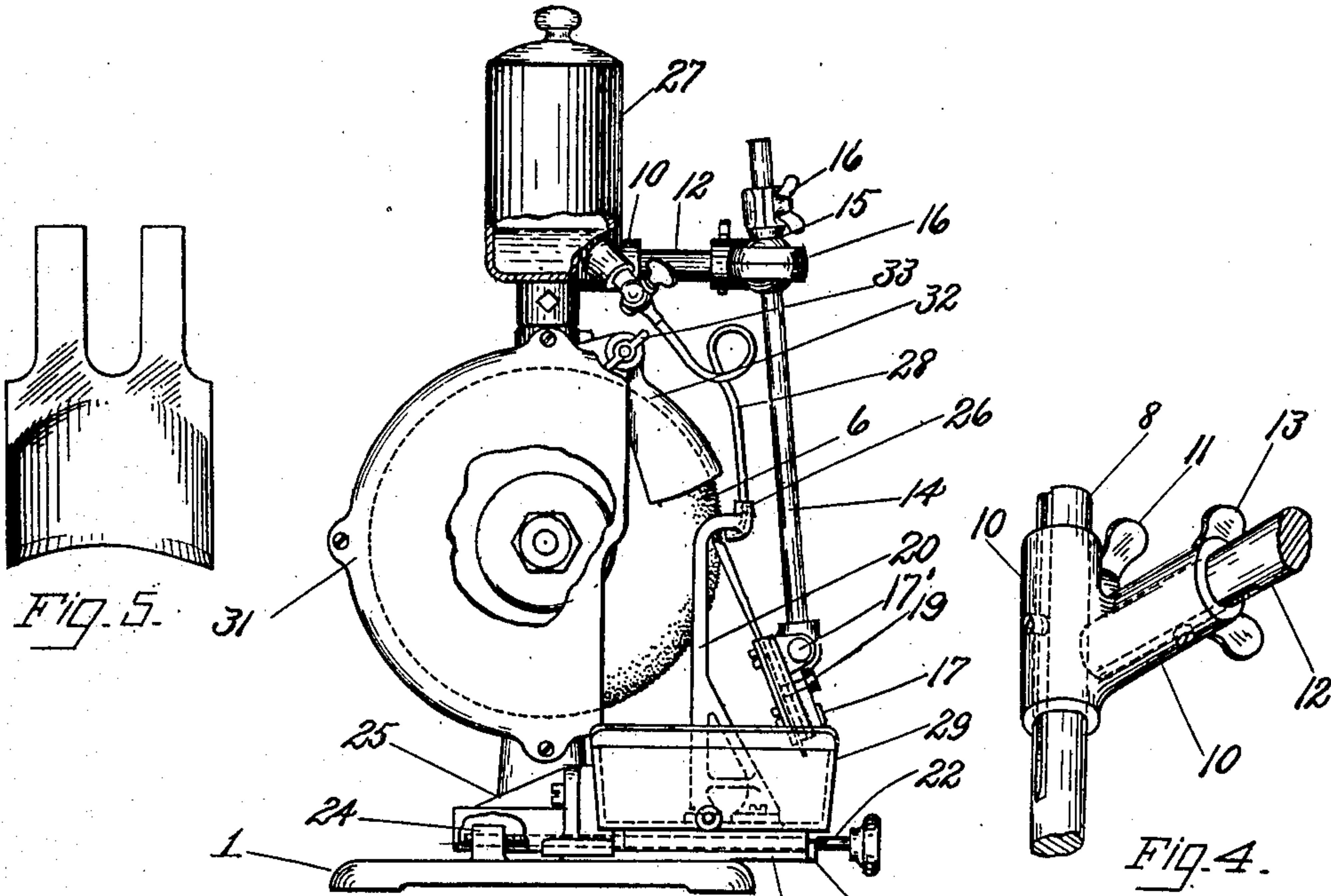


J. H. POPE.
GRINDING MACHINE.
APPLICATION FILED JAN. 18, 1906.

919,456.

Patented Apr. 27, 1909.



WITNESSES.

Betha L. Hannah
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Fig. 2.

INVENTOR.

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UNITED STATES PATENT OFFICE.

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GRINDING-MACHINE.

No. 919,456.

Specification of Letters Patent.

Patented April 27, 1909.

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To all whom it may concern:

Be it known that I, JOSEPH H. POPE, a citizen of the United States, residing at Brockton, in the county of Plymouth 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 articles of the class hereinafter referred to.

In the manufacture of boots and shoes, knives for breasting heels such as are commonly used on heel breasting machines and which require to be sharpened from time to time have heretofore been ground by presenting them by hand to a suitable grinding device. A breasting knife is frequently curved in transverse section and generally has its cutting edge concave in the direction of the length of the knife, the transverse curvature being to hollow the breast of the heel and the concavity in the edge of the knife permitting the knife to fit the shank of the sole, which is commonly curved transversely. The end of the knife is beveled upon its concave side to form a cutting edge. In sharpening a knife of this form it is important that the bevel upon the edge of the knife be made neither too sharp nor too blunt, for if too sharp the cutting edge may lack the strength required and if too blunt the knife does not cut readily and there is some liability of injury to the heel in the breasting operation. It is also important that the concavity in the cutting edge be of a certain contour, for if the cutting edge does not conform to the shank of the sole the sole may be marred by the knife or the stock to be removed may not be completely severed from the heel.

Heretofore, so far as I am aware, in grinding heel breasting knives by hand there has been nothing to insure a proper presentation of the knife to the grinding device and the knives have been frequently ground in an improper manner.

My invention is concerned more particularly with the production of a machine the use of which will insure the avoidance of

faults in grinding such as those above mentioned and which will also permit the knives to be ground more conveniently than by hand.

In carrying out my invention I employ a holder for the knife to be ground and a suitable grinding device. The holder and grinding device are mounted for relative movement, the holder being preferably movable and the grinding device occupying a fixed position. The holder is manipulated by hand in the act of grinding and its path is so controlled as to insure that the cutting edge will be ground with substantial accuracy. The holder is movably sustained in such a manner that the knife may be positioned with its concave side in contact with the grinding device and so that the acting part of the grinding device may move longitudinally of the knife.

The acting part of the grinding device is preferably considerably less in width than a heel breasting knife and the holder is arranged to be movable transversely of the grinding device to subject different portions of the knife to said device so that the cutting edge may be ground along its entire length. In the movement of the knife transversely of said device all parts of the cutting edge are presented to the grinding surface at substantially the same angle so that the bevel of the cutting edge is the same from point to point along its length.

The grinding device which I prefer to use is a rotary wheel and the arrangement of the holder and its guiding means may be such that in the movement of the knife transversely of the wheel the knife is presented at all times to substantially the same part of the wheel. To accommodate the concavity in the edge of the knife the path of the holder may be curved, the curvature being approximately the same as the curvature of the cutting edge longitudinally of the knife. The construction is preferably such that knives having their cutting edges of different degrees of concavity to fit shanks of different curvatures may be ground evenly from point to point on said cutting edges. To provide for a transverse curvature of the knife the holder is so mounted that in its movement of translation transversely of the grinding wheel it may

be partially rotated so that the knife as it is moved across the wheel may be turned about an approximately longitudinal axis.

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

In the drawings:—Figure 1 is a view in end elevation of a machine forming a preferred embodiment of my invention; Fig. 2 is a view in side elevation; Figs. 3 and 4 are fragmentary detail views, Fig. 3 being a view in horizontal section showing the holder and its sustaining member and Fig. 4 a view in perspective of the arm hereinafter described together with its supporting means; Fig. 5 shows a common form of heel breasting knife; Fig. 6 is a view illustrating an alternative feature.

A suitable base 1 is provided to support the several parts hereinafter described. Journals 2 are supported on the base 1, and form bearings for the shaft 3, carrying the tight pulley 4, loose pulley 5, and grinding wheel 6. A collar 7 is shown as secured to one of the journals 2, to form a convenient support for means to be described for movably sustaining a knife holder. A standard 8 is secured to the collar 7, as by a set screw 9, and supports in vertically adjustable position a sleeve 10 which is clamped in position on the standard 8 by a clamp 11, and is preferably held from turning on said standard as by forming the meeting faces of the standard and sleeve with a spline and groove, as shown in Fig. 4. The sleeve 10 is provided with a horizontal opening to receive an arm 12, the arm being horizontally adjustable in said opening and clamped in position by a clamp 13, and being also held from turning movement in said opening, as by a spline and groove. Upon the arm 12 a rod 14, to which a knife holder is secured, is pivotally supported. The connection shown between arm 12 and rod 14 comprises a sleeve 15 having a partly spherical lower portion and adjustably clamped on the rod 14 by a clamp 16 carried by the upper portion of the sleeve 15. The curved portion of the sleeve 15 is held in a socket on the arm 12, this socket being conveniently formed by a circular aperture in said arm 12 cooperating with a plate 16' secured to the arm 12, and forming the upper part of the socket. It will be apparent that the ball and socket joint shown between the rod 14 and arm 12 permits a movement of the rod transversely of the wheel and a simultaneous rotatory movement of said rod 14. The position of the supporting means for the rod 14, which I have illustrated, I have found to be convenient. It is desirable that the parts which are subjected to wear, such as the ball and socket joint above referred to, should not be in the path of abrasive particles coming from the grinding wheel, as

the presence of these particles between surfaces having relative movement would cause much wear, and a consequent looseness, detracting from accuracy of grinding.

Any suitable form of knife holder may be employed to carry the knife to be ground. I have illustrated a convenient construction comprising a member 17 provided with a grooved face to receive a knife as shown in Fig. 3, a plate 34 secured to said member 17 to form with said member a socket for the knife, and thumb screws 19 to clamp the knife in its socket.

In Figs. 1, 2, and 3 the knife holder is shown as pivotally mounted upon the rod 14. As illustrated in these figures, to the lower end of the rod 14 is secured a boss 18 and the knife holder is pivotally secured to said boss as by a pin 18' passing through said boss and entering the holder. The holder may be provided with adjustable set screws 17' arranged above the pin 18' in position to engage the boss 18 and limit the extent of movement of the holder upon said pin 18'. It will be seen that by adjusting the set screws 17' the extent of pivotal movement permitted the holder upon the boss 18 may be varied and if desired the set screws 17' may be adjusted to secure the holder in fixed position upon said boss 18.

In Fig. 6 I have shown the knife holder rigidly secured to the rod 14, and this arrangement may be used where no pivotal movement of the holder upon the rod 14 is desired.

The adjustment of the rod 14 in the sleeve 15 permits the effective length of said rod to be varied. To secure the best results the distance from the edge of the knife to the point of support of the rod 14 should be increased when a knife having a cutting edge more nearly flat from end to end is to be ground.

The angle of bevel of the cutting edge of the knife is determined by the position in which the knife is presented to the grinding wheel. As will appear from Fig. 1, this angle may be readily varied by adjusting the arm 12 horizontally in the sleeve 10. When the arm 12 and rod 14 have been given a desired adjustment the edge of the knife may be given a desired elevation by adjusting vertically the sleeve 10 on the standard 8.

In the machine illustrated in the drawings I have shown two members 20 extending vertically from a support 21 and situated on opposite sides of the wheel 6. These members may, if desired, constitute a rest to limit the movement of the knife toward the acting face of the wheel and to serve as a guide for the knife in its movement over said face. I prefer, however, as a rule to arrange the members 20 at the rear of the acting face of the wheel out of con-

tact with the knife as I have found that the knife may be conveniently guided by hand in its movement across the wheel. The upper end of the members 20 may be curved outwardly as shown and may conveniently be located at approximately the same elevation as the axis of the wheel.

The support 21 is adjustable on the base 1, to move the members 20 out or in with relation to the face of the wheel. A convenient construction comprises a dove-tailed groove or guideway in the upper face of the base 1, entered by a correspondingly shaped portion of the support 21. A thumb screw rod 22 is rotatably held in the support 21 being held from longitudinal movement in said support by a detachable strip 23 entering a groove in the rod 22. A lug 24 on the base 1 has a tapped hole entered by the screw-threaded portion of the rod 22. A guard 25 may be secured to the support 21 to cover the end of the rod 22 and the lug 24. By rotating the rod 22 the members 20 may be adjusted in or out to the precise point desired. The members 20 are provided at their upper end with a passage 26 to deliver water to the acting face of the wheel in the vicinity of the edge to be ground, water being supplied to said passage from a tank 27, through a flexible pipe 28. A water pan 29 carried by the support 21 beneath the members 20 and shown as integral with said support may be used to receive the drip.

It is desirable that the discharge end of the water passage 26 be arranged in close relation to the face of the grinding wheel and the edge being ground. If it is too remote from the wheel there is liability of the water being prevented from reaching the wheel—for example, by air currents produced in the movement of the wheel. The adjustment permitted the members 20 enables the passage 26 to be positioned in correct relation to the wheel.

The grinding wheel is preferably provided with a casing. This may comprise a section 30 secured to the collar 7, and a section 31 attached to the section 30 to form the outer side of the casing. The front part of the wheel extends outwardly from said casing and the upper part of the front may be covered by a hood 32 hinged to the casing and clamped in position by a clamp 33. As shown, this hood may be adjusted inwardly when the diameter of the wheel is changed as by the wear due to use of the machine.

In the operation of the machine shown, a knife having been inserted in the holder, the holder may be adjusted, if necessary, with relation to the point of pivotal support of the rod 14 by manipulating the clamp 16. By loosening clamp 13 this point of support of the rod 14 may be moved out

or in to insure the proper angular position of the knife with relation to the line of movement of the acting portion of the wheel for producing the particular bevel desired. The holder may then, if desired, be adjusted in vertical position by manipulating clamp 11, so that in the act of grinding the edge of the knife will be at some particular elevation, herein shown as substantially that of the axis of the wheel. The act of grinding is accomplished by moving the holder along the acting face of the wheel, bringing different portions of the edge to be ground into contact with the wheel, the holder when the knife is curved transversely being simultaneously turned about a longitudinal axis. It will be apparent from Fig. 3 that by turning the knife about an approximately longitudinal axis as it is moved across the wheel the transverse curvature of the knife may be compensated for. The bevel of the knife at all points successively acted upon by the wheel may thus bear evenly upon the face of the wheel.

The discharge end of the water supply pipe, being carried by the members 20, is maintained at all times in proximity to the point where the act of grinding is performed. As will be obvious, the horizontal adjustment of the members 20 permits that reduction in diameter of the grinding wheel which is due to wear to be compensated for. It will be seen that when the holder is rigidly secured to the rod 14—for example, in the manner indicated in Fig. 5—the acting part of the wheel moves approximately radially of the longitudinal curvature of the cutting edge. If it is desired that the wheel shall act at all times longitudinally of the knife the construction shown in Figs. 1 to 3 may be used, wherein the holder is pivotally mounted upon the rod 14. With this arrangement the knife as it is moved transversely of the wheel may be maintained in a vertical position viewed from the front of the machine, so that the wheel at all times moves in the direction of the length of the knife. Where the wheel moves longitudinally of the knife the bevel upon the knife may be made more nearly uniform in width from point to point upon the edge of the knife than when the wheel moves radially of the cutting edge.

Whether the knife holder be rigidly or pivotally secured to the rod 14, it will be seen that the machine when properly adjusted insures that the bevel upon the knife will not be too blunt or too sharp since the inclination to the wheel of the part acted upon remains approximately uniform as the knife is moved across the wheel. The sustaining means for the rod 14 obviously enables the knife holder to be removed from proximity to the wheel and turned into a position convenient to permit the insertion or removal

of a knife or the inspection of the edge being ground.

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

1. A machine for grinding a concave edge upon a cylindrically curved blade, having, in combination, a rotary grinding device, a holder for the blade to be ground, a sustaining member for said holder pivotally mounted for swinging movement across the face of the grinding device and for simultaneous tilting movement about a longitudinal axis and constructed for adjustment to permit the radius of movement of the holder to be varied, and supporting means for said member arranged for adjustment to vary the angle between the holder and the periphery of the grinding device.

2. A machine for grinding a concave edge upon a cylindrically curved blade, having, in combination, a rotary grinding device, a holder for the blade to be ground and means for movably supporting said holder arranged to guide said holder in a curved path across the face of the device and to permit a simultaneous tilting movement of the holder about a longitudinal axis and constructed for adjustment to vary the radius of curvature of said path.

3. A machine for grinding a concave edge upon a cylindrically curved blade, having in combination, a grinding wheel, a holder and means for guiding the holder in a curved path across the face of the wheel comprising a supporting arm, a sleeve movably mounted in said arm and a sustaining member for the holder adjustably supported in said sleeve.

4. A machine for grinding a concave edge upon a cylindrically curved blade, having, in combination, a grinding wheel, a holder for the blade to be ground, a sustaining member for said holder and means for supporting said member for swinging move-

ment in a direction longitudinal of the axis of the wheel and toward and from the axis of said wheel, said means being arranged above the acting portion of the grinding device, and being constructed for vertical adjustment and for horizontal adjustment in a plane transverse to the axis of the wheel.

5. In a machine of the class described, a grinding wheel, a holder for the tool to be ground arranged to guide the tool across the face of the wheel; a support adjacent the periphery of said wheel arranged to be adjusted inwardly and outwardly with relation to the axis of said wheel independently of the holder, and a water supply means movable with said support and having a discharge orifice arranged to lie in proximity to the periphery of the wheel in the operative position of said support.

6. A grinding device, a holder and sustaining means for the holder comprising a member upon which the holder is mounted, and a support for said member situated approximately vertically above the acting portion of the grinding device and constructed to permit a pivotal movement of said member about said support in a direction transverse of the acting face of said grinding device.

7. A rotary grinding device, a holder and sustaining means for the holder comprising a member upon which the holder is mounted, and a support for said member situated approximately vertically above the acting portion of the grinding device and constructed to permit pivotal movement of said member about said support transversely and longitudinally of the axis of said device.

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

JOSEPH H. POPE.

Witnesses:

BERNARD BARROWS,
ELIZABETH C. COUPE.