J. J. HEYS.

BREASTER KNIFE GRINDING MACHINE.

APPLICATION FILED JULY 17, 1906.

944,238.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 1.

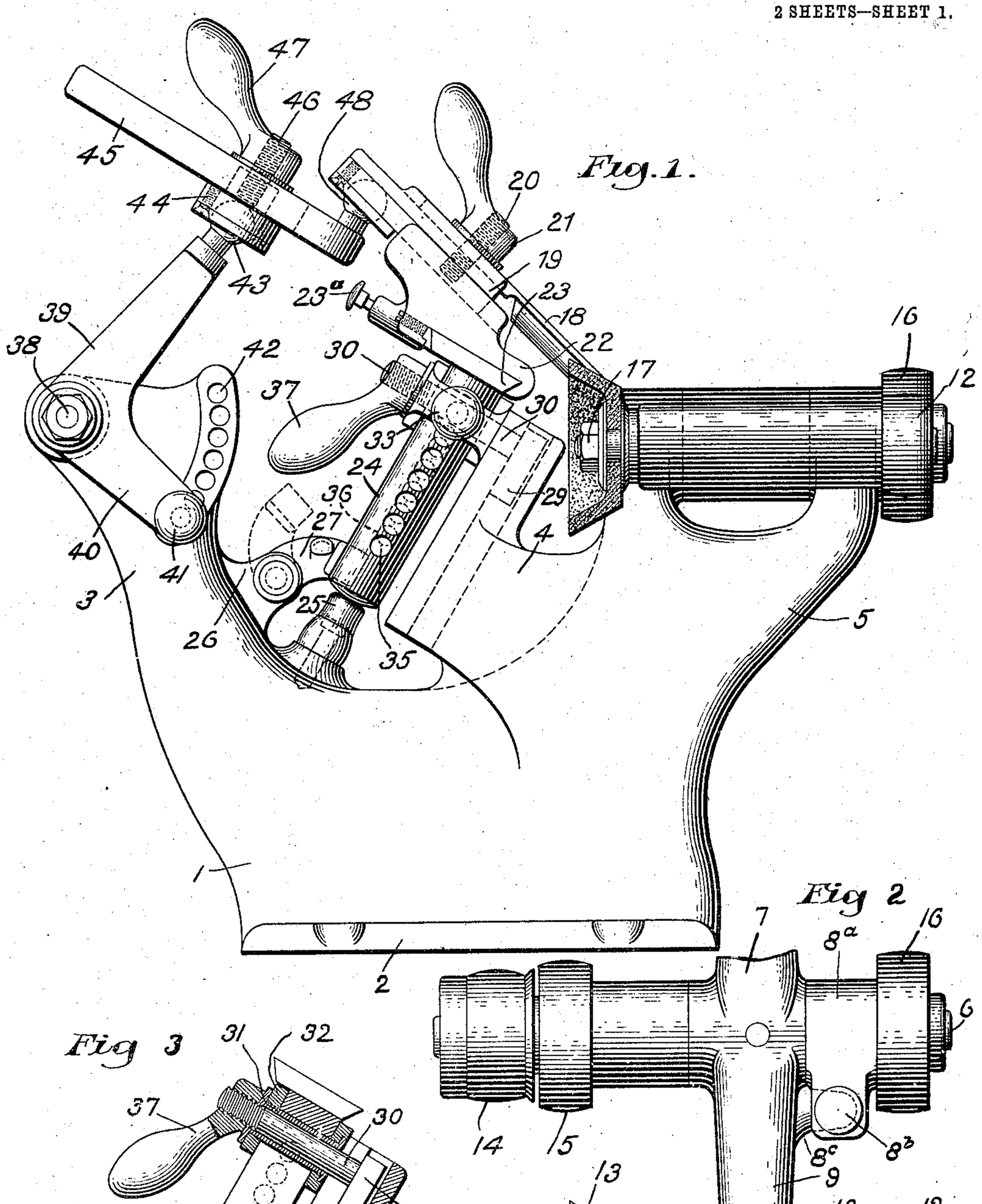


Fig. 1.

Fig 2




Fig 3




Witnesses

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by Emery and Booth

Atty's

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2 SHEETS—SHEET 2.

*Fig 4*

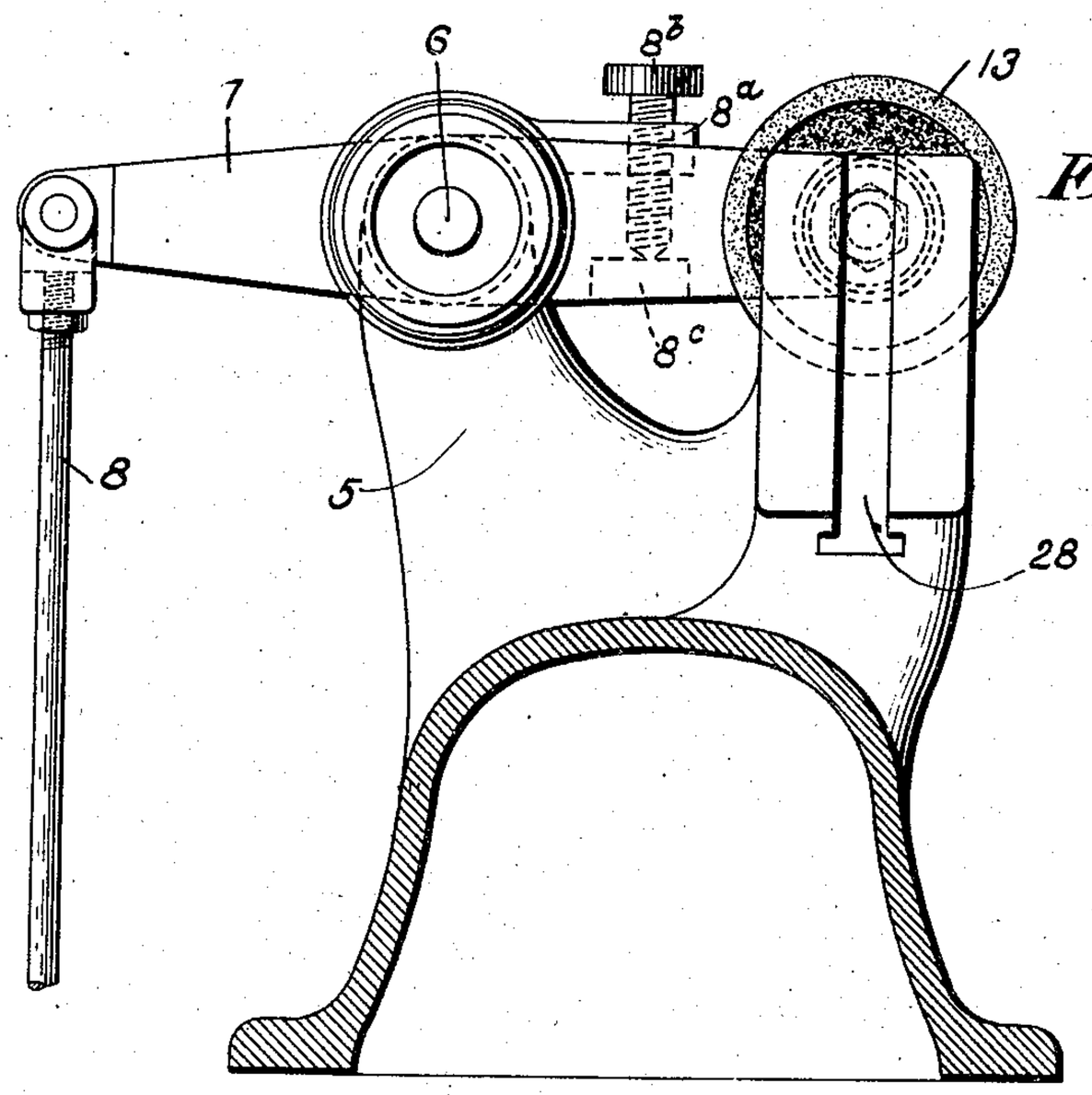



*Fig 5*

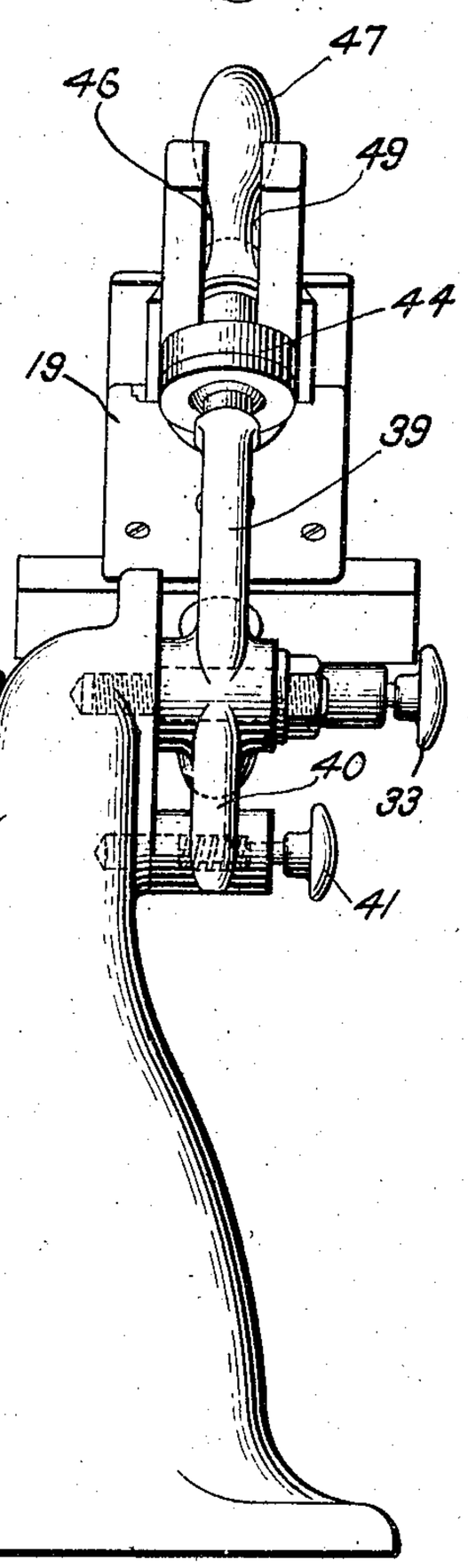
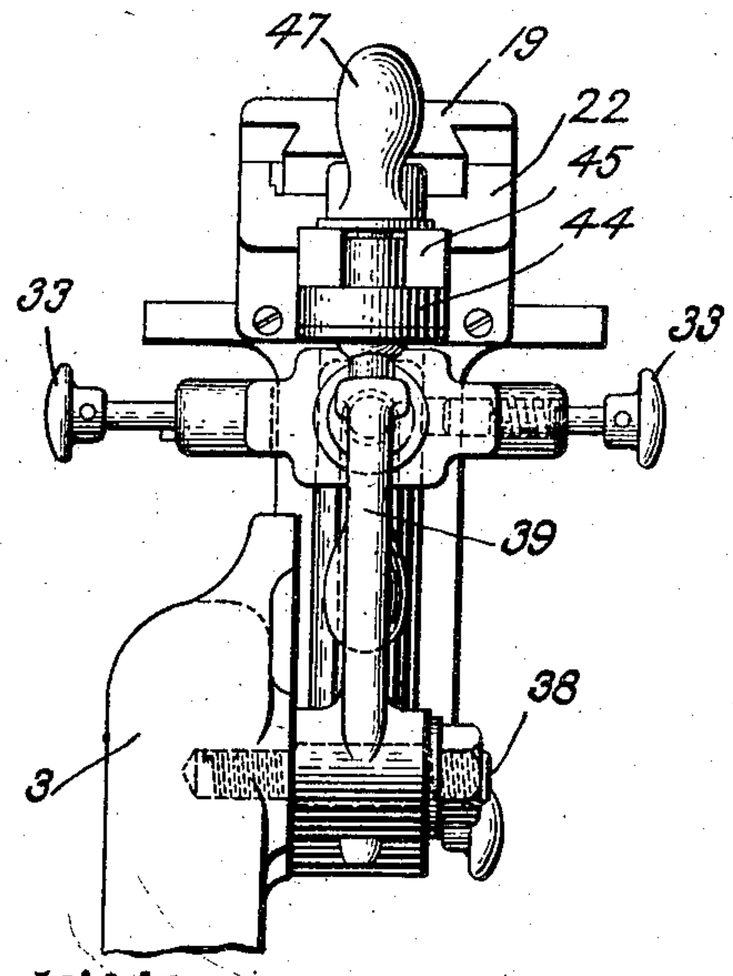



*Fig 6*




Witnesses:

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# UNITED STATES PATENT OFFICE.

JOHN J. HEYS, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS G. PLANT, OF BOSTON, MASSACHUSETTS.

## BREASTER-KNIFE-GRINDING MACHINE.

944,238. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed July 17, 1906. Serial No. 326,537.

*To all whom it may concern:*

Be it known that I, JOHN J. HEYS, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented an Improvement in Breaster-Knife-Grinding Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to means for grinding blades or knives, particularly adapted for use in breasting machines designed to operate upon the heel breasts of boots and shoes. In certain aspects of the invention, however, it may be used in grinding blades or knives intended for other purposes as, for example, chisels and other tools.

The heel, as applied to a boot or shoe, is constructed of a series of superposed layers having rough and uneven or overlapping edges when positioned. In the formation of the shoe, after the body of the heel has been built up, the top lift is secured thereto, it being a layer of leather having the proper contour for the heel. The rounded or outer edge of the heel body is then suitably shaved to conform to the shape of that portion of the top lift. The breast of the heel, together with that of the top lift is then shaped by a blade or knife the face of which conforms to the shape of the heel breast and the edge of which is shaped to conform to the shoe shank. The breast of the heel is commonly concaved, although in certain types of shoes it is made straight. The shoe shank, to the form of which the edge of the knife should conform, is generally convex. Thus, the blade or knife commonly employed in cutting or shaping the heel breast has a convex face and a concave edge. So far as I am aware, no means have previously been devised to accurately or reliably and effectively grind a blade or knife so that the face thereof shall have the curvature of the heel breast or so that the edge shall conform to the curvature of the shoe shank. In the practice of my invention I am enabled to secure both of these results together with various other advantages and features which will be best understood from a description of one embodiment or type of machine thereof, illustrating my invention, the same being shown in the accompanying drawings, wherein:

Figure 1 is a side elevation (the grinding wheel being shown in section) of a machine constructed in accordance with my invention and adapted to grind the face and edge of a knife into suitable form for use in a heel breasting machine; the driving pulleys being omitted for the sake of clearness; Fig. 2 is a detail in plan view showing the manner of supporting and driving the grinding wheel; Fig. 3 is a detail showing in vertical section the means for altering or adjusting the pivot of the spindle of the blade carrier to vary the curvature of the arc of traverse of the blade carrier; Fig. 4 is a side elevation (the machine frame being shown partly in section) of the means for supporting the grinding wheel, the knife carrier being removed; Fig. 5 is a front elevation of a portion of the frame of the machine looking to the right in Fig. 1, and showing a portion of the means for varying the projection of the blade carrier during its traversing movement; and Fig. 6 is an elevation of the machine and a portion of the frame thereof, looking somewhat downward and to the right in Fig. 1.

In the particular embodiment of my invention selected for illustration here and shown in the drawings, the frame of the machine (Fig. 1) is indicated at 1, the same having a suitable base 2 and front, intermediate and rear uprights, 3, 4, and 5, respectively, projecting therefrom. In the rear upright (Figs. 2 and 4) a short shaft 6, is journaled upon which is loosely mounted a lever 7 in the front arm 9 (see Fig. 2) of which is mounted for rotation a spindle 11, carrying at one end thereof a pulley 12, and at the opposite end thereof a grinding wheel 13 of any desired type but preferably a frusto-conical emery wheel. Mounted loosely on the shaft 6 is a loose pulley 14, also a fast pulley 15, adapted to be connected by belting with any suitable source of power. Upon the opposite end of the shaft 6 is secured a pulley 16, adapted to be suitably connected by a band with the pulley 12 upon the spindle 11 of the grinding wheel, whereby the latter may be rotated at any desired speed, while at the same time permitting said wheel to be oscillated ver-

tically about the axis of the pulley shaft 6. To the rear end of the lever 7 (see Fig. 4) is suitably connected a link 8, connected at its other or lower end to any suitable treadle or equivalent mechanism for raising and lowering the grinding wheel at will.

Upon the upright 5 and preferably adjacent the lever 7, (see Fig. 2 and dotted lines Fig. 4) is a horizontal arm $8^a$ having thereon a set screw $8^b$ adapted to engage a lug or projection $8^c$ upon the forward end of the said lever 7, and to act as an adjustable stop to limit the upward movement of the emery wheel, so that even though too great pressure be brought to bear upon the treadle, no injurious action results and the temper of the blade is not affected. By providing an adjustable stop any desired degree of contact of the sharpening means and the blade can be secured.

The emery wheel may be secured upon the shaft 11 in any desired manner and preferably (see Fig. 1) by a nut and washer 17, so that the said wheel may be readily removed if desired.

The blade or knife to be ground (see Fig. 1) is represented at 18, the same being secured to its support 19 in any desired manner, as by means of a threaded bolt 20 passing through the usual slot or opening in the blade or its permanent holder and into the said support 19. Upon the outer end of the threaded bolt is secured a handled nut 21, whereby the blade may be securely clamped in position upon its support. The support 19 for the blade to be ground is preferably mounted to slide longitudinally to and from the grinder in suitable guide ways in a carrier 22, for a purpose to be more fully described hereinafter. The carrier 22 (see Fig. 1) is preferably mounted to slide transversely on a dovetailed head 23 of a spindle 24, the latter resting at its lower end when not in operation upon a suitable step or base 25 projecting upward from or secured upon the frame 1 of the machine. This sliding capacity is availed of only when grinding flat blades, at all other times it is prevented by a spring pin or lock $23^a$ entering said support.

The grinding wheel or element and the blade support are adapted to have a relative bodily traverse imparted thereto, and preferably this traverse is in a curved path or arc. In that embodiment of my invention herein shown I have chosen to traverse the blade support with respect to the grinding element. I preferably also provide means to alter or change the curvature of the said arc of traverse, to suit the curvature of the heel breast, in different types of boots and shoes as has been previously referred to. As one embodiment of means to provide capacity for such arc of traverse of the blade support, the spindle 24 is adapted to receive a rocking movement upon a horizontal axis or pivotal point adapted to be shifted longitudinally of the spindle to vary the curvature of the arc of oscillation. To this end, there is provided (see Figs. 1 and 3) in the intermediate frame projection 4 referred to, a suitable oblique guide way 28 wherein is adapted to be positioned at the desired point the head 29 of a stud 30, whereon is mounted (see Fig. 3) a flanged sleeve 31 passing transversely through the depending carrier spindle 24 and constituting a pivot upon which said spindle and its carrier and blade clamped thereto may have a rocking motion. The said sleeve 31 has pivotally mounted thereon (see Figs. 1 and 3) a yoke 32 that surrounds the said depending spindle 24 and has mounted in its opposite faces (Figs. 1 and 6) spring pressed pins 33 adapted to enter positioning sockets in said spindle. In Fig. 1 the series of sockets 35 extending throughout the greater portion of the length of one face of the spindle are shown in full here while in the opposite face of the said spindle 24 is provided a second series of sockets 36, which are shown as intermediate the sockets 35 so that the desired fineness of adjustment may be secured without spacing the said sockets too closely and without making them unnecessarily small. In order to properly position the pivotal point of the spindle, 24, the handled nut 37 (see Figs. 1 and 3) upon the outer screw threaded end of the spindle 30 is loosened and the head 29 of the spindle is shifted in the guide 28 to the desired position, carrying therewith the yoke 32, one of the pins 33 being projected by its spring into that socket 35 or 36 with which the pin has been brought into alinement, thereby securing the pivotal support for the spindle at the desired position.

As has been previously stated, the blade 18 is designed to cut a heel breast which is ordinarily concaved and to that end the blade is provided with two faces respectively concaved and convexed. In Fig. 1 the blade is represented as positioned with its concave face in contact with the grinding wheel. When it is desired to grind a blade whose faces shall have a curvature of the desired arc of a curved heel breast, the blade having been secured in position, is in this embodiment of my invention rocked back and forth about the pivot stud 30 as a center, past the face of the grinding wheel by any convenient and suitable means preferably by the operative who grasps any convenient portion of the rocking part. It is apparent that the curvature of the arc represented by the inner or concave face of the blade is dependent upon the length of the radius pertaining to such arc. If, therefore, the spindle 24 or other equivalent support for the blade were rocked upon a permanent or

unvarying pivotal point it is apparent that the curvature of the face of the blade would necessarily be invariable. By altering the radius referred to, the curvature of travel of the blade may be made to correspond with that of the concave face of the blade. It is obvious that the said radius may be altered or changed in many different ways. Merely as one manner of so varying the same, I have shown the described means for adjusting the spindle 30 in the upright 4. The described means may be widely varied within the scope of my invention inasmuch as any mechanism for varying the radius of the arc represented by the blade of the knife falls within the scope of the invention. In practice the sockets upon the sides of the depending spindle will be marked or identified by characters indicating the different radii of oscillations in inches so as to facilitate quick adjustment to any blade presented. Thus for example the yoke will be adjusted to the socket marked 6 for a blade of 6″ radius.

If it be desired to grind a blade having a flat face to operate upon a straight heel breast, it is clear that such blade should be traversed past the grinder in a straight line instead of a curved line as described. To this end and to engage the lower end of the depending spindle 24 I have preferably pivoted in suitable ears 26 projecting from the machine frame a catch 27, an edge of which in the position shown in full lines in Fig. 1 is adapted to engage a corresponding slot or groove in said spindle 24 to hold the same against oscillation and at the same time the spring latch 23ª at the head of the spindle is released to free the dovetailed slide 22 and permit it to slide freely on the now stationary dovetailed head 23. My machine is therefore conveniently adapted to grind either curved or flat faced blades.

As has been previously stated the edge of a blade adapted to cut down through a heel breast upon the sole beneath should be shaped to conform to the shoe shank in order that the knife should not cut through said shank. Inasmuch as the latter is ordinarily convex, it is usually necessary to provide a knife with a concave edge. I have devised means for forming such an edge whether having curved or flat face and preferably do so while grinding the face thereof, although it is obvious that the two operations may be entirely distinct and carried on in different machines or at different times.

The embodiment of means here represented includes devices acting during the relative movement or traverse of the grinding mechanism and the blade to modify the traversing movement by altering during such movement the amount of projection of the blade support to conform to the grinding element, or, in other words, to position the edge of the blade with respect to the grinding wheel, and also means to adjust or vary the action of such traversing movement modifying means. That is to say, and viewing the mechanism shown in Fig. 1, by projecting the blade 18 forwardly toward the grinding wheel to a minimum extent at the beginning of the rocking movement of the spindle 24 and increasing such projection to a maximum extent at the middle of the rocking movement, and then correspondingly reducing the same to a minimum again it is apparent that a concaved edge will be imparted to the said blade. Although I have stated that the blade may be projected to a minimum and then to a maximum extent toward the active face of the grinding wheel, such expression is used in a broad sense and contemplates the relative projection of the blade toward the grinding wheel. That is to say, it is within the scope of the invention to project the grinding wheel in the described manner toward the blade.

In that embodiment of my invention wherein the blade is projected toward the grinding wheel, I prefer to connect an end of the blade support by means of a radius arm, with a fixed though adjustable point of support, so that during the rocking of the spindle 24 upon its pivot the said support shall receive the forward and back sliding movement to produce the curve of the cutting edge. As one form of mechanism to suitably connect the blade support in the described manner, upon the upright 3 of the frame of the machine is a stud 38 upon which is mounted (see Fig. 1) a bell crank lever 39, the lower arm 40 of which has mounted therein a pin 41, preferably spring pressed (see Fig. 5) the said pin being adapted to engage the proper one of the series of sockets 42 suitably formed in the framework of the machine. The upper arm of the lever 39 has preferably formed thereon a rounded head 43 so as to form a ball and socket joint with the socket 44, that is adjustably secured to the radius arm 45 by means of a threaded bolt 46 passing through (see Fig. 5) a slot 46′ in said arm, and having mounted upon the upper end thereof a handled nut 47 whereby the socket 44 may be clamped in any desired position of longitudinal adjustment upon the radius arm 45 to thereby vary as desired the curvature or convexity of the edge of the blade. In order to couple the radius arm with the blade support I have preferably formed upon the inner end of the radius arm a rounded head 48 adapted to engage a suitable socket near the end of the blade support. It is obvious that the effective length of the radius arm may be altered by providing instead an adjustable connection between the same and the blade carrier. By the described mechanism it is apparent that in the reciprocation,

or in the rocking or oscillation of the spindle 24 upon its pivot the blade 18 is relatively projected to a controlled degree toward the grinding wheel to thereby modify the traverse of said blade and thereby to concave the edge of the blade. The radius of this movement and consequently the concavity of the knife edge may be varied at will by adjustment of the arm 40 of the bell crank. I may omit or disconnect the described mechanism to vary the amount of projection of the blade support relative to the emery wheel, that is to say, the radius arm 45 or its equivalent and the parts connected therewith, to modify the traverse of the blade support in the manner previously described, and yet secure the proper grinding of the concave face and the concave edge of the blade simultaneously, by imparting a relative traverse to the carrier of the blade support and the grinding means upon an arc the radius whereof is less than that of the arc represented by the concave face of the blade. In other words, if for example the blade be what is known as a six inch blade, or one the radius of whose arc is six inches, I may rock the blade carrier thereof in an arc of a somewhat less radius, and thereby correctly grind both the concave face and concave edge of the blade. In such relative traverse of the blade support and the emery wheel, a blade representing a certain arc is rocked upon a shorter than the true radius, with the result that the emery wheel is brought into such deep relation with the blade as to enter into and grind the concaved edge thereof while grinding the concaved face.

Although in setting forth this embodiment of the invention the same is specifically described, I wish it to be clearly understood that descriptive terms are used in their general sense and not in their specific nature, and, that the scope of the invention is set forth in the following claims:—

1. A blade sharpening mechanism comprising sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, and means acting continuously during the traversing movement to vary the relative position of projection of the blade support and sharpening means.

2. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said blade support having capacity for traversing movement with respect to said sharpening means, and traverse modifying means including a member having a fixed point of support and connected to the blade support to impart to the blade varying positions of projection toward the sharpening means during the traversing movement.

3. A blade sharpening mechanism comprising sharpening means, a blade support, said blade support having capacity for traversing movement with respect to said sharpening means, and automatic traverse modifying means to project the blade support in the plane thereof toward the sharpening means in a curved path during said traversing movement.

4. A blade sharpening mechanism comprising sharpening means, a blade support, said blade support and sharpening means having capacity for relative traverse, traverse modifying means acting continuously during the traversing movement to alter the amount of projection of the blade support relatively to the sharpening means and action varying means to vary the action of said traverse modifying means.

5. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said blade support having capacity for traversing movement with respect to said sharpening means, and traverse modifying means including a member having a fixed point of support and operatively connected to said blade support, and means to alter the effective length of said member.

6. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, a pivotal base for said support whereon the same may be bodily traversed in an arc relatively to said sharpening means, and means to adjust the said pivotal base, thereby to alter the curvature of said arc.

7. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, and arc controlled traversing means to impart relative bodily traverse to said blade support and sharpening means in a curved path.

8. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, arc controlled traversing means to impart relative bodily traverse to said blade support and sharpening means in a curved path, and traverse modifying means to alter the amount of projection of the blade support relative to said sharpening means during said traverse.

9. A blade sharpening mechanism comprising sharpening means, a blade support, arc controlled traversing means to impart

bodily traverse to said blade support in a curved path with respect to said sharpening means, and traverse modifying means to project said blade support toward the sharpening means in a curved path during said traverse.

10. A blade sharpening mechanism comprising sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, and means, acting continuously during said traversing movement, to relatively project said blade support and sharpening means toward each other in a direction at an angle to that of the traversing movement.

11. A blade sharpening mechanism comprising sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, and traverse modifying means acting during the traversing movement to modify such traverse in a plurality of directions.

12. A blade sharpening mechanism comprising sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, traverse modifying means acting during the traversing movement to modify such traverse in a plurality of directions, and means to vary the action of said traverse modifying means.

13. A blade sharpening mechanism comprising a sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, and connected means permitting said traverse to be effected in a curved path or a right line at will.

14. A blade sharpening mechanism comprising a curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said sharpening means and blade support having capacity for relative traverse movement, traverse modifying movement means acting during said traverse to alter the amount of projection of the blade support and sharpening means, means to manually control one of said movements, and means to automatically control the other of said movements.

15. A blade sharpening mechanism comprising sharpening means, a blade support, said sharpening means and blade support having capacity for relative traverse, and means to move relatively the sharpening means and blade support to bring the sharpening means into sharpening relation independently of said relative traverse.

16. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said sharpening means and blade support having capacity for relative traverse, and automatic means acting during said traversing movement to alter the relative position of said sharpening means and blade support.

17. A blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said sharpening means and blade support having capacity for relative traverse and automatic means acting during said traversing movement to alter the path thereof.

18. A grinding mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means, said sharpening means and blade support having capacity for relative traverse movement, and automatic means to vary during the said traverse movement the line of relative travel of the edge of the blade mounted in the support.

19. A grinding machine comprising sharpening means, a blade support, means for moving the said sharpening means toward the blade support, and devices for controlling the extent of such movement that any desired contact with the member to be sharpened can be effected with a view of retaining the temper of the blade being ground or sharpened.

20. A concave blade sharpening mechanism comprising curved sharpening means, a blade support constructed and arranged to support the blade with its cutting edge extending in the direction of curvature of said sharpening means and means for imparting a relative bodily traverse to said sharpening means and said blade support in a curved path the radius whereof is other than that represented by the concave face of the blade.

21. In a breaster knife grinding machine, the combination of a grinder having a curved edge, means for operating the grinder, a knife holder for supporting a knife having a concaved cutting edge extending in the direction of curvature of the grinder and partially enveloping the same, and means for changing the relative position of the knife and grinder to enable the latter to simultaneously grind the curved edge and concaved face of the knife.

22. In a breaster knife grinding machine, a grinder having a curved surface, a swinging knife holder arranged to support the knife with its edge extending in the direction of curvature of said grinder, and with its concaved face enveloping said curvature and means to alter the effective radius on which said holder swings.

23. A breaster knife grinding machine comprising a grinder, a knife support mounted for movement about the grinder to grind the concaved face of the knife, and means controlling said movement adapted to permit the concavely curved edge of the knife to be simultaneously ground.

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

JOHN J. HEYS.

Witnesses:
SIDNEY F. SMITH,
ROBERT H. KAMMLER.