

No. 882,009.

PATENTED MAR. 17, 1908.

B. F. MAYO.
SOLE ROUNDING MACHINE.
APPLICATION FILED NOV. 7, 1902.

4 SHEETS—SHEET 1.

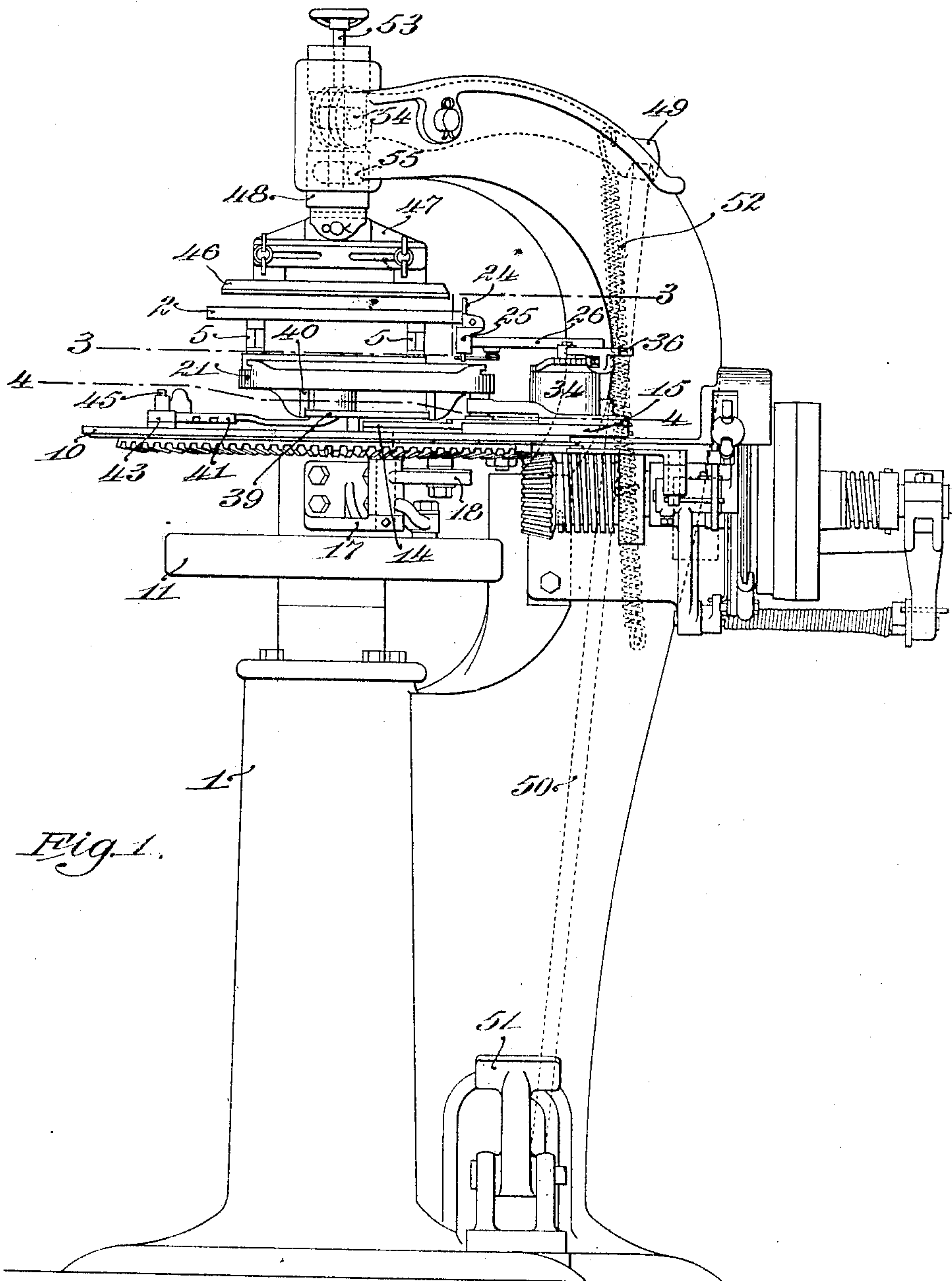


Fig. 1.

Witnesses

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4 SHEETS—SHEET 2.

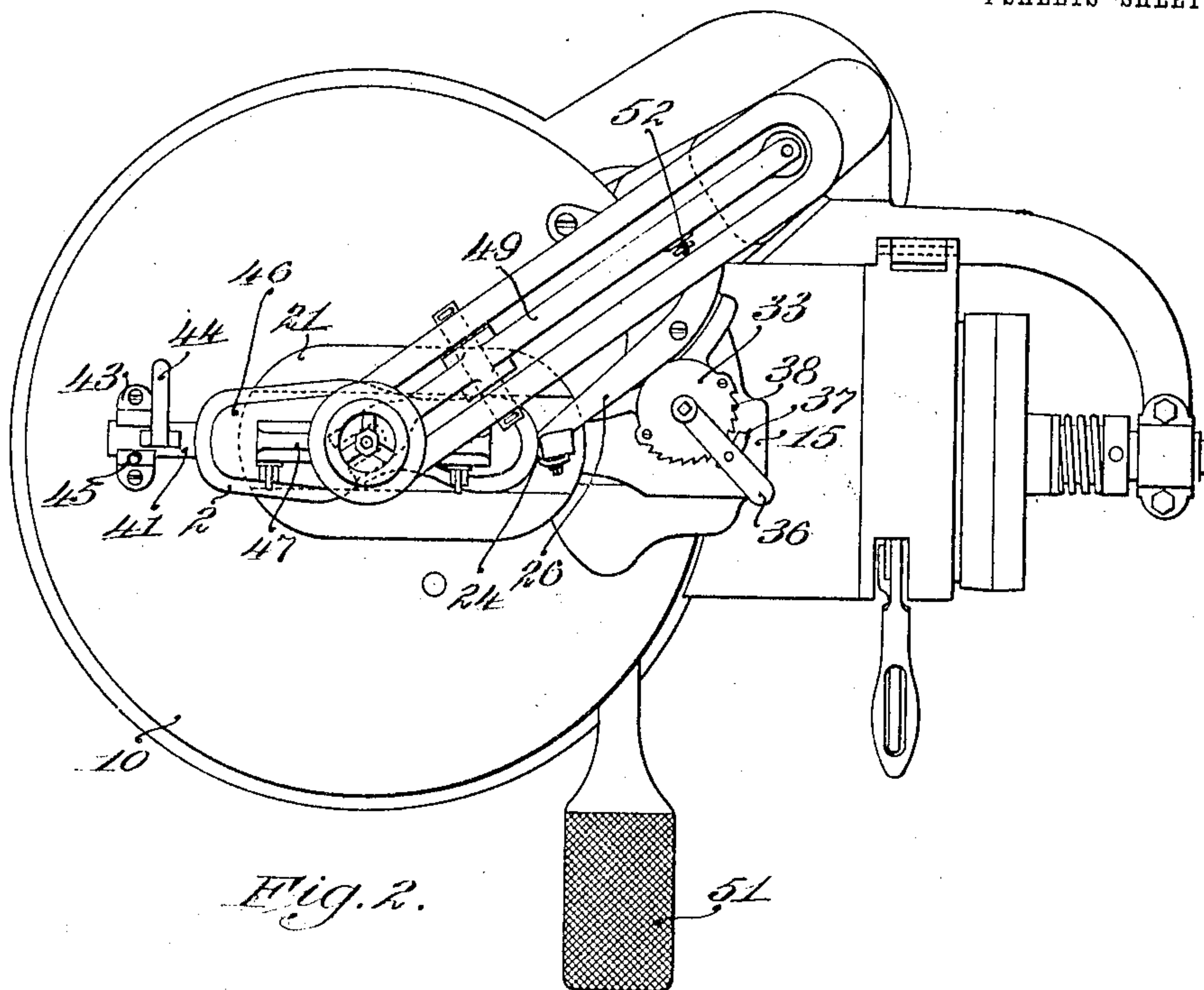


Fig. 2.

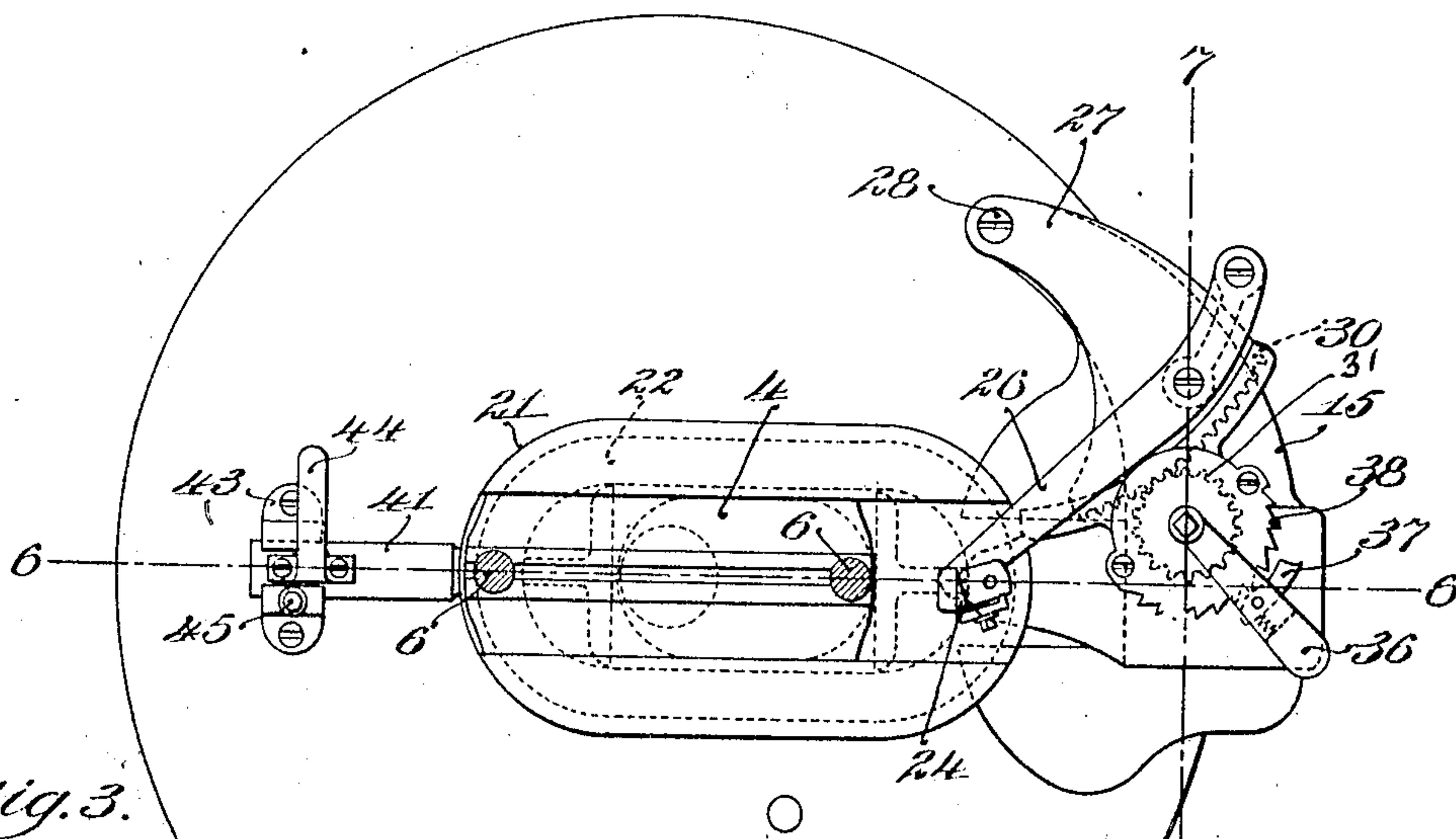


Fig. 3.

Witnesses

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4 SHEETS—SHEET 3.

Fig. 4.

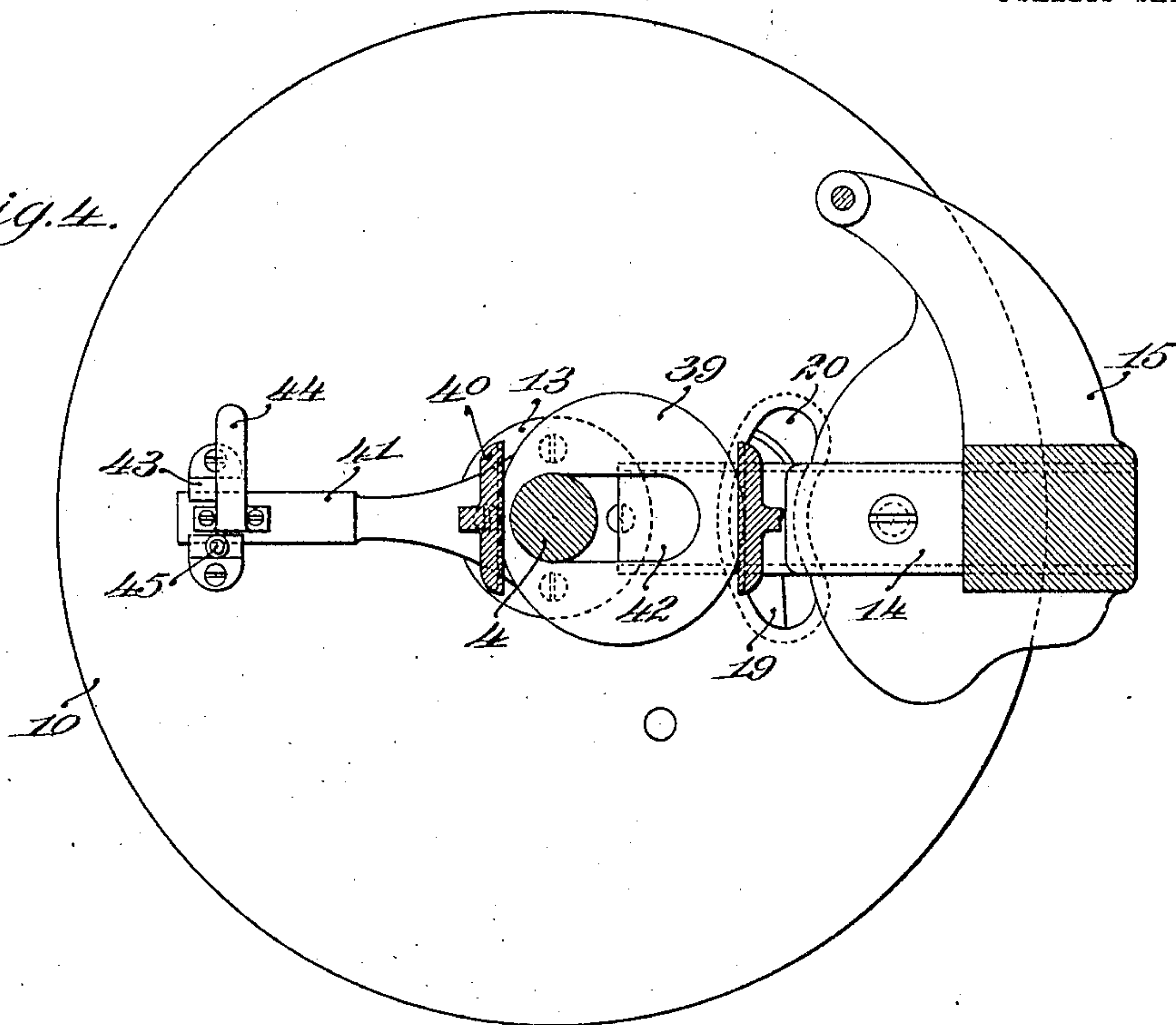
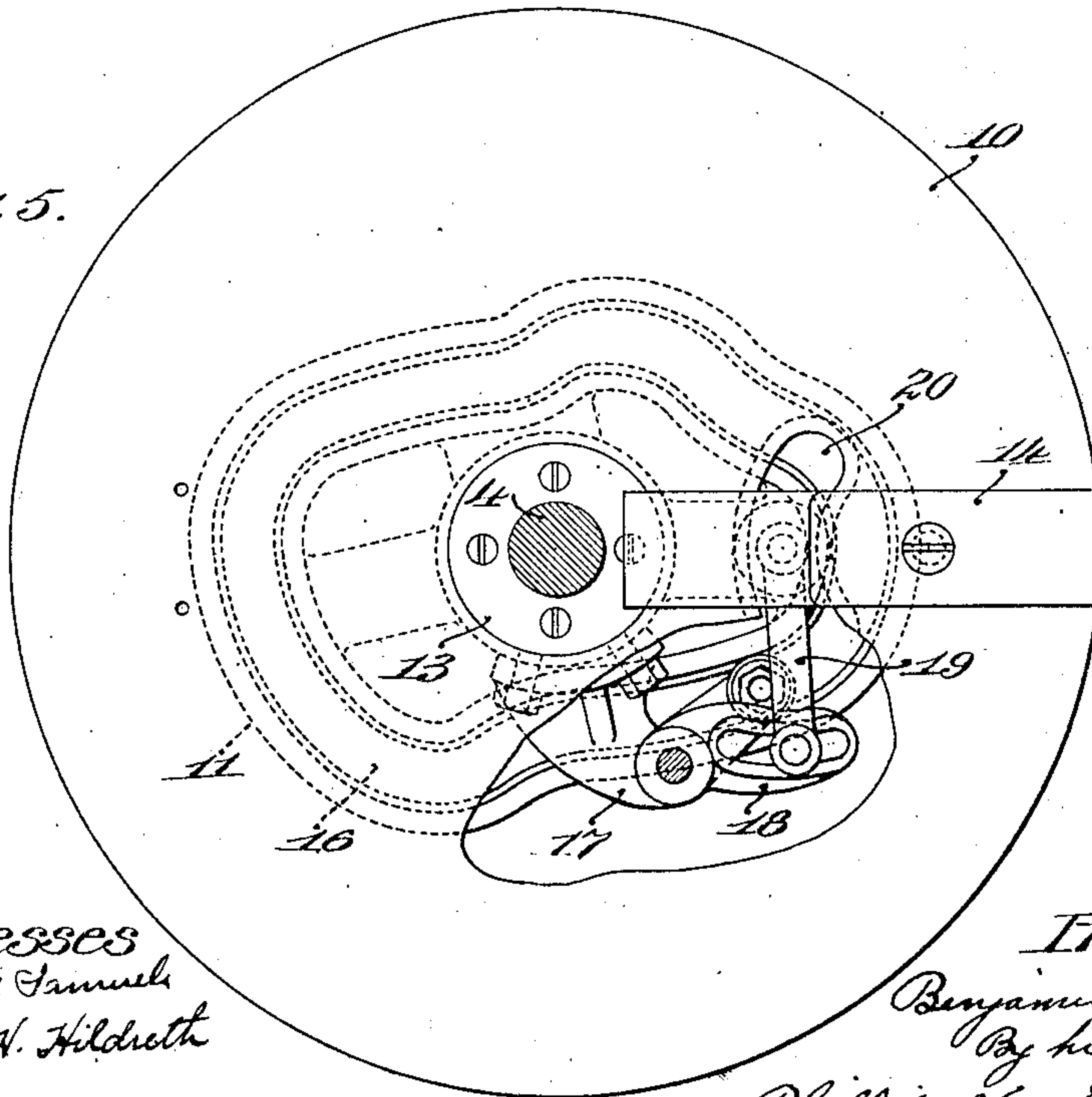


Fig. 5.



Witnesses

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4 SHEETS—SHEET 4.

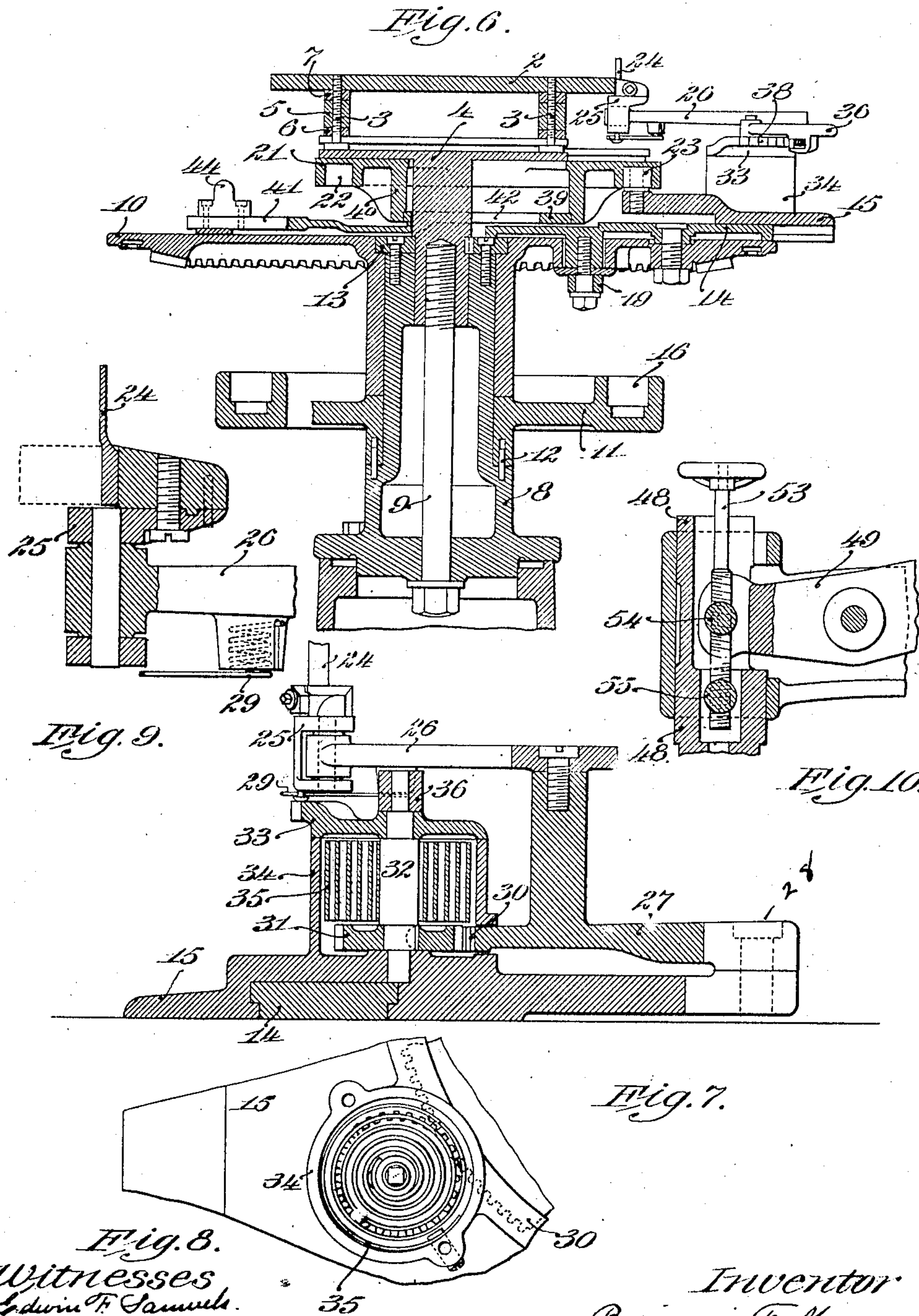


Fig. 8.
Witnesses
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Fig. 7.
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UNITED STATES PATENT OFFICE.

BENJAMIN F. MAYO, OF SALEM, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOLE-ROUNDING MACHINE.

No. 882,009.

Specification of Letters Patent.

Patented March 17, 1908.

Application filed November 7, 1903. Serial No. 130,384.

To all whom it may concern:

Be it known that I, BENJAMIN F. MAYO, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Sole-Rounding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to sole rounding machines of that class which comprise a pattern of the shape of the sole to be produced, a rounding knife and means for relatively actuating the pattern and knife to cause the knife to travel around the pattern.

More particularly the present invention relates to sole rounding machines of the class referred to in which the rounding knife is mounted upon a carrier movably mounted upon a support and in which the relative movement of the knife and pattern is produced by rotating either the pattern or the support upon which the carrier is mounted.

In the drawings accompanying this application I have illustrated my invention as embodied in a machine in which the pattern is stationary and the support is rotated to carry the knife around the pattern. It is to be understood, however, that while my invention is particularly applicable to such a machine and is embodied in its preferred form therein, certain features of my invention are equally capable of embodiment in a machine in which the pattern is rotated to produce the relative movement of the knife and pattern. As to these features therefore my invention is not limited to the arrangement illustrated for producing the relative movement of the knife and pattern. In this connection I also desire to state that except as specifically recited in the claims the various features of my invention are not limited to any particular construction or arrangement of parts.

Among the objects of my invention is to provide a sole rounding machine of the class referred to with an improved mechanism for actuating the knife carrier constructed and arranged to so actuate the knife carrier that the knife or guide in contact with the pattern which controls the path of the knife, follows the pattern without tending to move

out of contact therewith and without exerting sufficient pressure thereon to offer an appreciable resistance to the operation of the machine or to cause wear of the contacting parts.

Another object of my invention is to provide a sole rounding machine of the class referred to in which patterns widely varying in shape and size can be used without detracting from its ease and certainty of operation or the speed at which it can be successfully operated.

Other objects of my invention are to simplify and improve the construction, arrangement and mode of operation of the various parts of sole rounding machines of the class referred to with a view to rendering the actuating mechanism of such machines easier of operation and capable of being operated at a high rate of speed and to rendering the rounding knife more certain and reliable in operation.

With these objects in view my invention consists in the constructions, combinations, and arrangements of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following description.

The sole rounding machine embodying my invention hereinafter specifically described comprises a pattern for determining the path of movement of the rounding knife and a rounding knife mounted upon a carrier pivotally mounted upon a support. It also comprises means for oscillating the carrier to bring it into such a position with relation to the edge of the pattern that the pull or thrust on the knife always is substantially tangential to the curve of the pattern. By so oscillating the carrier the pull or thrust on the knife does not tend to move the knife away from the pattern when passing into the curves of the shank portion or when passing around the heel and toe, and also the knife or the guide in contact with the pattern is allowed to move easily inwardly or outwardly and follows the pattern without exerting an objectionable pressure thereon. The means for oscillating the carrier which I have provided comprises a cam and connections between the cam and carrier, and these connections are so arranged that substantially the entire force exerted by the cam is transmitted to the carrier in a direction substantially at right angles to a line connecting

the point about which the carrier oscillates and the point at which the force is applied. By the use of a cam the carrier can be oscillated to cause it to assume the desired positions during the sole rounding operation and by arranging the connections between the cam and the carrier as above stated the power used in running the machine is applied to the best advantage and the machine runs easily and smoothly.

It is desirable in sole rounding machines to provide means independent of the pattern for causing the knife to travel in a path corresponding approximately to that of the pattern, as thereby the inward and outward movements of the knife or of the guide in contact with the pattern due to the varying curvatures of the pattern are less in extent, the pressure of the knife or guide on the pattern is more uniform and the knife or guide more easily follows the pattern. To accomplish this result I have provided a cam for imparting inward and outward movements to the carrier, which cam coöperates with the cam and connections hereinbefore referred to for oscillating the carrier to so actuate the carrier that the knife mounted thereon is moved in a path approximating that of the pattern, and in order to allow the knife or the guide in contact with the pattern to follow the pattern I have movably mounted the knife upon the carrier and have provided means for holding it or its guide against the pattern.

As I have stated, my invention is preferably embodied in a sole rounding machine in which the pattern is stationary and the support upon which the carrier is movably mounted is rotated to move the rounding knife about the pattern, as such a machine can be of simple and compact construction and can be used to cut soles from strips of material as well as from pieces of material containing only enough stock for a single sole. When the mechanism above referred to is embodied in such a machine, the force exerted upon the knife to cause it to travel around the pattern always acts in a direction substantially tangential to the curve of the pattern so that the knife or its guide in contact with the pattern is not forced against the pattern in passing around the heel and toe, so as to produce wear of the contacting parts or offer a resistance to the operation of the machine. Also, the force exerted upon the knife does not tend to pull the knife away from the pattern at any point in the rounding operation and moreover the oscillating movement of the carrier retards the movement of the knife when passing around the heel and toe of the pattern and into the curves of the shank and thereby still further decreases the liability of the knife leaving the pattern.

To adapt the machine for operation with

patterns of different sizes I have provided mechanism for moving the cam, which imparts inward and outward movements to the carrier, during the operation of the machine, and have provided such mechanism with means of adjustment whereby the extent of movement imparted to the cam may be varied to suit the size of the pattern used in the machine. The extent of movement imparted to the cam may be varied considerably without interfering with the ease of operation of the machine, as the cam in combination with the mechanism for oscillating the carrier will actuate the carrier to cause the rounding knife to travel in a path corresponding approximately in shape to that of the pattern. To increase the range of adjustment, however, I preferably provide the mechanism for oscillating the carrier with means of adjustment whereby the extent of the oscillations imparted to the carrier may be varied.

My invention will be clearly understood from the drawings accompanying this application in which

Figure 1 is a view in side elevation of a sole rounding machine embodying a preferred form thereof; Fig. 2 is a plan view of the machine illustrated in Fig. 1; Fig. 3 is a sectional plan view on the line 3-3 of Fig. 1, the frame of the machine, the driving shaft and the mechanism for starting and stopping the same being omitted; Fig. 4 is a view similar to Fig. 3 taken on the line 4-4 of Fig. 1; Fig. 5 is a view similar to Fig. 3 illustrating the mechanism for oscillating the carrier upon which the rounding knife is mounted, a portion of the rotary support being broken away to show underlying parts; Fig. 6 is a detail sectional view taken on the line 6-6 of Fig. 3; Fig. 7 is a detail-sectional view taken on the line 7-7 of Fig. 3 illustrating the means for holding the rounding knife against the pattern; Fig. 8 is a detail plan view illustrating a portion of the mechanism shown in Fig. 7, the top of the casing for the actuating spring being removed; Fig. 9 is a detail sectional view illustrating the construction of the swiveling knife block to which the rounding knife is secured, and Fig. 10 is a detail sectional view illustrating the adjustable connection between the slide which carries the clamp and its actuating lever.

The frame of the machine is indicated at 1 and consists of a base portion and an overhanging portion extending upwardly from one side of the base portion.

2 indicates the stationary pattern which is held in position by the upper ends of bolts 3 extending into holes in the pattern, the heads of the bolts being received in a groove formed in the upper surface of a block 4. The bolts 3 are locked in position by means of locking nuts 5, washers 6 and 7 being interposed be-

between the nuts and the surfaces of the pattern 2 and block 4. The block 4 is rigidly secured to the upper end of a cylindrical standard 8 by means of a bolt 9 passing upwardly through the lower end of the standard and screwing into the block. The standard 8 is provided with a flange which rests upon the upper end of the base portion of the machine and is securely bolted thereto. Rotatably mounted upon the upper end of the standard 8 is a rotary table or support 10, the hub of which rests upon the hub of a stationary cam 11 also mounted upon the standard 8 and secured thereto by means of pins 12. The hub of the rotary support 10 is held in position on the standard 8 by means of the hub of the cam 11 and a perforated disk or washer 13 secured to the upper end of the standard. The perforated disk or washer 13 also serves to support the block 4 on the standard 8 by engaging a shoulder formed on the block. A key connecting the block 4 and the washer serves as a means for preventing any rotary movement of the block. A guide 14 is pivotally mounted upon the support 10 and upon the guide 14 is mounted a knife carrier 15 so as to slide inwardly and outwardly thereon. The rounding knife is movably mounted upon the carrier 15 as will be hereinafter described, and the arrangement of the rotary support 10 with relation to the pattern is such that the knife is caused to travel around the pattern during the revolution of the support. The pivotal connection of the guide 14 with the support 10 and the sliding connection of the carrier 15 with the guide 14 allows the carrier to be oscillated and moved inwardly and outwardly during the rotation of the support 10 in causing the knife to travel around the pattern.

Secured to the hub of the rotary support 10 is a bracket 17 on which is pivotally mounted a bent lever 18, one arm of which is provided with a roll engaging a cam groove 16 in the cam 11 and the other arm of which is connected by means of a link 19 to the guide 14, a slot 20 concentric with the pivot of the guide 14 being provided in the support 10 into which a projection from the guide 14 extends to which the link 19 is secured. During the rotation of the support 10 the roll on the lever 18 is caused to travel in the cam groove 16 and thus the lever 18, the guide 14 and the carrier 15 mounted thereon are oscillated. The force exerted by the cam is radially outward through the point of the cam in contact with the roll, and it will be seen that the arrangement of the lever 18 is such that this force acts substantially at right angles to the line joining the pivot of the lever and the point of contact of the roll. It will be seen that the link 19 is arranged substantially at right angles with the line joining the pivot of the guide 14 and

the point of connection of the link 19 with the guide. Substantially the entire force exerted by the cam 16 is, therefore, utilized in moving the lever 18 and this force is transmitted to the carrier in such a manner as to act to the best advantage in oscillating the carrier.

For imparting inward and outward movements to the carrier 15 during the revolution of the support 10 a cam 21 provided with a cam groove 22 is mounted upon the block 4. A roll 23 mounted upon the carrier 15 (see more particularly Fig. 6) engages the cam groove 22 and the shape of the groove is such that the desired inward and outward movements are imparted to the carrier during the revolution of the support 10. The movements imparted to the carrier 15 by the rotation of the support 10 and by the action of the cam grooves 16 and 22 are such that the rounding knife is caused to travel in a path approximating in shape to that of the pattern 2. In order to cause the knife to move in a path exactly corresponding in shape to that of the pattern the rounding knife is movably mounted upon the carrier 15 and is yieldingly pressed against the pattern.

The construction shown in the drawings for movably mounting the rounding knife upon the carrier 15 and the means for yieldingly holding it against the pattern are substantially the same as those which have heretofore been employed in this class of machines. As shown the rounding knife 24 is secured to a holder 25 pivotally mounted in the end of an arm 26 rigidly secured to a segmental shaped plate 27 pivotally mounted at 28 on the carrier 15. The shank of the knife bears against the edge of the pattern and constitutes a guide which by cooperating with the pattern causes the knife to travel in a path corresponding exactly in shape to that of the pattern. A coiled spring 29 seated in a hollow boss projecting downwardly from the arm 26 and having one end connected to the arm and the other end connected to the knife holder 25 tends to rotate the holder in a direction to press the cutting edge of the knife towards the pattern. The plate 27 is provided with a segmental rack 30 which meshes with a pinion 31 secured to a short vertical shaft 32, the lower end of which is journaled in the carrier 15 and the upper end of which is journaled in a cover plate 33 secured to a casing 34 projecting upwardly from the carrier 15. A spiral spring 35 surrounds the shaft 32 and is secured at one end to the shaft and at the other end to the casing 34, the tendency of the spring being to rotate the pinion 31 in a direction to move the rounding knife towards the pattern. To the upper end of the shaft 32 a hand lever 36 is secured by means of which the shaft 32 may be rotated against the tension of the spring 35 to move the rounding

knife away from the pattern. In order to hold the rounding knife in its retracted position a spring-pressed pawl 37 is mounted upon the lever 36 which is arranged to engage a series of ratchet teeth 38 formed upon the cover plate 33.

The operation of the mechanism so far described is as follows:—During the rotation of the support 10 the guide 14 is oscillated so as to stand substantially normal to the curve of the pattern at all times, this result being due to the configuration of the cam groove 16 and the arrangement of the connections between the cam groove and guide. Also the carrier 15 is moved inwardly and outwardly by the cam groove 22 the resultant motion of the carrier due to the oscillating movements of the guide and the inward and outward movements of the carrier being such that the rounding knife is moved in a path corresponding approximately in shape to that of the pattern. The point of connection between the rounding knife and the carrier 15 is at 28 and it will be seen that the oscillating movements imparted to the carrier move the point 28 in such a manner that a line joining this point and the point on the pattern at which the knife is operating is always substantially tangential to the curve of the pattern. The pull on the knife is therefore always in a direction substantially tangential to the curve of the pattern and does not tend to cause the knife to leave the pattern. Consequently the machine can be run at a high rate of speed without danger of pulling the knife away from the pattern in passing into the curves at the shank or in passing around the toe and heel. The oscillating movements of the carrier also retard the movement of the knife when entering and leaving the curves of the shank portion and when passing around the sharp curves at the heel and toe, and this action still further decreases the liability of the knife leaving the pattern at these points. It will also be seen that the oscillating movements imparted to the carrier bring the carrier into such a position that the rounding knife is allowed to move easily inwardly and outwardly on the carrier and thus follow the pattern without exerting an objectionable pressure thereon. Since the knife is moved by the carrier in a path approximating in shape to that of the pattern the inward and outward movements of the knife on the carrier are comparatively slight and thus the pressure of the knife against the pattern is maintained substantially uniform.

The mechanism above described for actuating the carrier is adapted to operate satisfactorily with patterns varying considerably in size and shape. In order to adapt the mechanism for operation with patterns varying widely in size and shape I have provided mechanism having means of adjustment for

moving the cam 21 during the operation of the machine whereby the extent of the inward and outward movements imparted to the carrier 15 may be varied and have also provided the mechanism for oscillating the carrier with means of adjustment whereby the extent of the oscillating movements imparted to the carrier may also be varied. In order to allow the cam 21 to be so moved it is mounted to slide in the direction of the longitudinal axis of the pattern upon guideways formed on the block 4. The cam 21 is moved on its guideways during the rotation of the support 10 by means of a circular cam 39 (see more particularly Fig. 4) which engages projections 40 extending downwardly from the cam and which is secured to or formed integral with a slide 41 mounted upon the support 10, the construction being such that the cam 39 is rotated with the support 10. The cam 39 is provided with a slot 42 through which a cylindrical portion of the block 4 extends. The slot 42 permits the cam 39 to be adjusted with relation to the center of the rotary support 10 to vary the extent of the movements imparted to the cam 21. The slide 41 is arranged to slide through a guide 43 upon the support 10 and is provided with a handle 44 by means of which it may be actuated to change the position of the cam 39. The cam and slide are held in adjusted position by means of a locking pin 45 which engages notches formed in the slide. The cam 39 can be so adjusted as not to move the cam 21 during the revolution of the support 10 or it may be so adjusted as to increase or diminish the extent of the outward movements imparted to the carrier. In order to adjust the extent of the oscillating movements imparted to the carrier the arm of the lever 18 to which the link 19 is connected is provided with a slot in which the end of the link may be adjusted nearer to or farther from the pivot of the lever. This construction is clearly shown in Fig. 5. The mechanism for actuating the knife carrier may be adapted for operation with patterns of different sizes by adjusting either the mechanism for moving the cam 21 or the mechanism for oscillating the carrier. It is preferable, however, to adjust both of these mechanisms when it is desired to use patterns varying widely in size.

The material to be operated upon is held upon the pattern 2 during the rounding operation by means of a clamp 46 carried by a block 47 secured to the lower end of a slide 48 mounted in the overhanging portion of the machine frame. The slide 48 is connected to one arm of a lever 49, the other arm of which is engaged by a rod 50 connected to a foot treadle 51 the construction being such that a depression of the foot treadle actuates the slide 48 to force the clamp towards the pattern. The clamp is raised from the pat-

tern by means of a coiled spring 52 connected at one end to the lever 49 and at the other end to the frame of the machine. To vary the extent of movement imparted to the clamp by its actuating mechanism an adjustable connection is provided between the slide 48 and the lever 49. This adjustable connection is illustrated in detail in Fig. 1 and consists of a rod 53 provided with right and left screw-threads having a screw-threaded engagement with pins or blocks 54 and 55 pivotally mounted on the lever and slide.

The rotary support 10 is actuated from a driving shaft journaled in a bracket secured to the frame of the machine, by means of a bevel gear mounted on the inner end of the driving shaft which meshes with a series of bevel gear teeth formed on the lower surface of the table as is clearly illustrated in Fig. 1. The stop mechanism illustrated in Fig. 1 is not illustrated in detail and described herein as it forms no part of my present invention but constitutes the subject-matter of my application, Serial No. 130,385, filed of even date herewith.

Having thus indicated the nature and scope of my invention and having specifically described a preferred form thereof, I claim as new and desire to secure by Letters Patent:—

1. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly thereon, a rounding knife mounted on the carrier, and means for actuating the carrier to maintain the direction of the inward and outward movements of the carrier substantially normal to the curves of the pattern throughout the entire rounding operation, substantially as described.

2. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier having a pivotal connection therewith located entirely outside of the pattern, a rounding knife mounted on the carrier, a cam for oscillating the carrier about said pivotal connection and connections between the cam and carrier acting to transmit substantially the entire force exerted by the cam to the carrier in a direction substantially at right angles to a line joining the point about which the carrier oscillates and the point at which the force is applied, substantially as described.

3. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier having a pivotal connection therewith located entirely outside of the pattern, a rounding knife mounted on the carrier, a cam for oscillating the carrier about said pivotal connection, a lever pivotally mounted upon the rotary support, and connections between the lever and the cam, and between the lever and the carrier, substantially as described.

4. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier having a pivotal connection therewith located entirely outside of the pattern, a rounding knife mounted on the carrier, a cam for oscillating the carrier about said pivotal connection, and mechanism intermediate the cam and carrier mounted upon the rotary support and acting to transmit substantially the entire force exerted by the cam to the carrier in a direction substantially at right angles to a line joining the point about which the carrier oscillates and the point at which the force is applied, substantially as described.

5. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier having a pivotal connection therewith located entirely outside of the pattern, a rounding knife mounted on the carrier, and means for oscillating the carrier about said pivotal connection comprising a cam and mechanism intermediate the cam and the carrier mounted on the rotary support, substantially as described.

6. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, and means separate from the cam having provision for adjustment for moving the carrier to change its angular position on the rotary support, substantially as described.

7. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam directly engaging the carrier acting to impart inward and outward movements thereto, and means separate from the cam for moving the carrier to change its angular position on the rotary support, substantially as described.

8. A sole rounding machine, having, in combination, a pattern, a rotary support, a guide pivotally mounted upon the rotary support, a carrier mounted to slide on said guide, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam acting to move the carrier on the guide, and means separate from the cam for oscillating the guide, substantially as described.

9. A sole rounding machine, having, in combination, a pattern, a rotary support, a guide pivotally mounted upon the rotary support, a carrier mounted to slide on said

guide, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam acting to move the carrier on the guide, and means for oscillating the guide comprising a lever mounted on the rotary support, a cam engaging the lever and a link connecting the lever and guide, substantially as described.

10. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support, and to oscillate to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, a cam for oscillating the carrier, and connections between said cam and the carrier acting to transmit substantially the entire force exerted by the cam to the carrier in a direction substantially at right angles to a line joining the point about which the carrier oscillates and the point at which the force is applied, substantially as described.

11. A sole rounding machine, having, in combination, a pattern, a rotary support, a guide pivotally mounted upon the rotary support, a carrier mounted to slide on said guide, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam acting to move the carrier on the guide and means for oscillating the guide comprising a cam and connections between the cam and guide, substantially as described.

12. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam directly engaging the carrier acting to impart inward and outward movements thereto, and means for moving the carrier to change its angular position on the rotary support comprising a cam and connections between the cam and carrier, substantially as described.

13. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to oscillate to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, and means for oscillating the carrier comprising a cam and connections between the cam and the carrier mounted upon the rotary support, substantially as described.

14. A sole rounding machine, having, in combination, a pattern, a rotary support, a

carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, mechanism having provision for adjustment acting automatically to shift said cam during the operation of the machine, and means for moving the carrier to change its angular position on the rotary support comprising a cam mounted independently of said first-mentioned cam, and connections between the cam and the carrier, substantially as described.

15. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to oscillate to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, mechanism having provision for adjustment acting automatically to shift said cam during the operation of the machine, and means for oscillating the carrier comprising a cam and mechanism intermediate the cam and the carrier mounted upon the rotary support, substantially as described.

16. A sole rounding machine, having, in combination, a pattern, a rotary support, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, means separate from the cam for moving the carrier to change its angular position on the rotary support and mechanism having provision for adjustment acting automatically to shift the cam during the operation of the machine, substantially as described.

17. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, and means separate from the cam having provision for adjustment for moving the carrier to change its angular position on the rotary support, substantially as described.

18. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a carrier mounted to move inwardly and out-

wardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife toward the pattern, a cam for imparting inward and outward movements to the carrier, means separate from the cam for moving the carrier to change its angular position on the rotary support, and mechanism having provision for adjustment acting automatically to shift the cam during the operation of the machine, substantially as described.

19. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a carrier mounted to move inwardly and outwardly on said support and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam directly engaging the carrier acting to impart inward and outward movements thereto, and means separate from the cam for moving the carrier to change its angular position on the support, substantially as described.

20. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a guide pivotally mounted upon said support, a carrier mounted to slide on said guide, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam acting to move the carrier on the guide, and means separate from the cam for oscillating the guide, substantially as described.

21. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a guide pivotally mounted upon said support, a carrier mounted to slide on said guide, a rounding knife mounted on said carrier, means for pressing the knife towards the pattern, a cam acting to move the carrier on the guide and means for oscillating the guide comprising a lever mounted on said support, a cam engaging the lever and a link connecting the lever and guide, substantially as described.

22. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a carrier mounted to move inwardly and outwardly on said support and to oscillate to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, and means for oscillating the carrier comprising a cam and connections between the cam and the carrier acting to transmit substantially the entire force exerted by the cam to the carrier

in a direction substantially at right angles to a line connecting the point about which the carrier oscillates and the point about which the force is applied, substantially as described.

23. A sole rounding machine, having, in combination, a pattern and a support mounted for relative rotary movement, a carrier mounted to move inwardly and outwardly on said support, and to move to change its angular position thereon, a rounding knife movably mounted on said carrier, means for pressing the knife towards the pattern, a cam for imparting inward and outward movements to the carrier, mechanism having provision for adjustment acting automatically to shift said cam during the operation of the machine, and means for moving the carrier to change its angular position on the support comprising a cam mounted independently of said first-mentioned cam and connections between said cam and the carrier, substantially as described.

24. A sole rounding machine, having, in combination, a knife carrier and a pattern relatively movable to carry the knife carrier around the pattern, and means including two cams for controlling the position of said carrier, one of said cams being movable during said relative movement, substantially as described.

25. A sole rounding machine, having, in combination, a knife carrier, a rotary support therefor, means for controlling the position of said carrier on the rotary support, said means including two cams one of which is movable during the rotation of said support, and means for adjusting the extent of movement of the movable cam, substantially as described.

26. A sole rounding machine, having, in combination, a pattern, a knife carrier movable about the pattern, a cam for imparting inward and outward movements to the carrier, said cam being movable during the normal operation of the machine and being adjustable to vary such movement according to varying sizes of patterns, and a second cam for imparting additional movements to the carrier, substantially as described.

27. A sole rounding machine, having, in combination, a pattern, a clamp, a slide for actuating the same, a lever for actuating the slide, blocks pivotally mounted on the lever and slide and a connecting link provided with right and left threads engaging corresponding screw threaded apertures in said blocks, substantially as described.

28. A sole rounding machine, having, in combination, a knife carrier and a pattern mounted for relative movement, a movable cam for imparting inward and outward movements to the carrier during such relative movement, and means for moving the car-

rier during such relative movement to change its angular position, substantially as described.

29. A sole rounding machine, having, in
5 combination, a pattern, a rotary support, a
knife carrier having a pivotal connection
therewith located entirely outside of the pat-
tern, a cam and mechanism comprising con-
10 nections movable with relation to the car-
rier and actuated by the cam for oscillating

the carrier about said pivotal connection during the rounding operation, substantially as described.

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

BENJAMIN F. MAYO.

Witnesses:

FRED O. FISH,
HORACE VAN EVEREN.