

J. BUSFIELD.  
SOLE GOUGING MACHINE.  
APPLICATION FILED MAR. 19, 1902.

933,820.

Patented Sept. 14, 1909.  
2 SHEETS—SHEET 1.

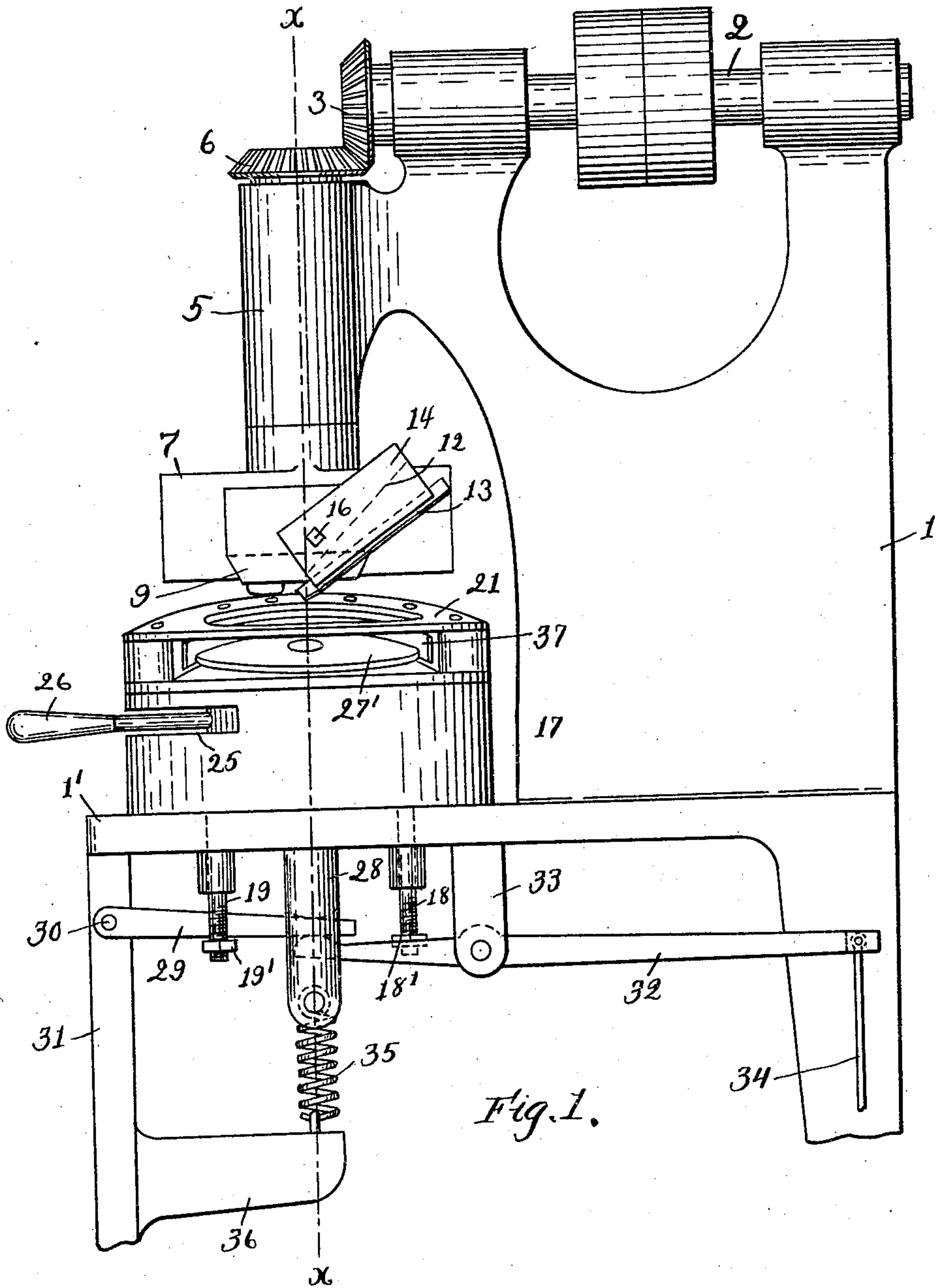


Fig. 1.

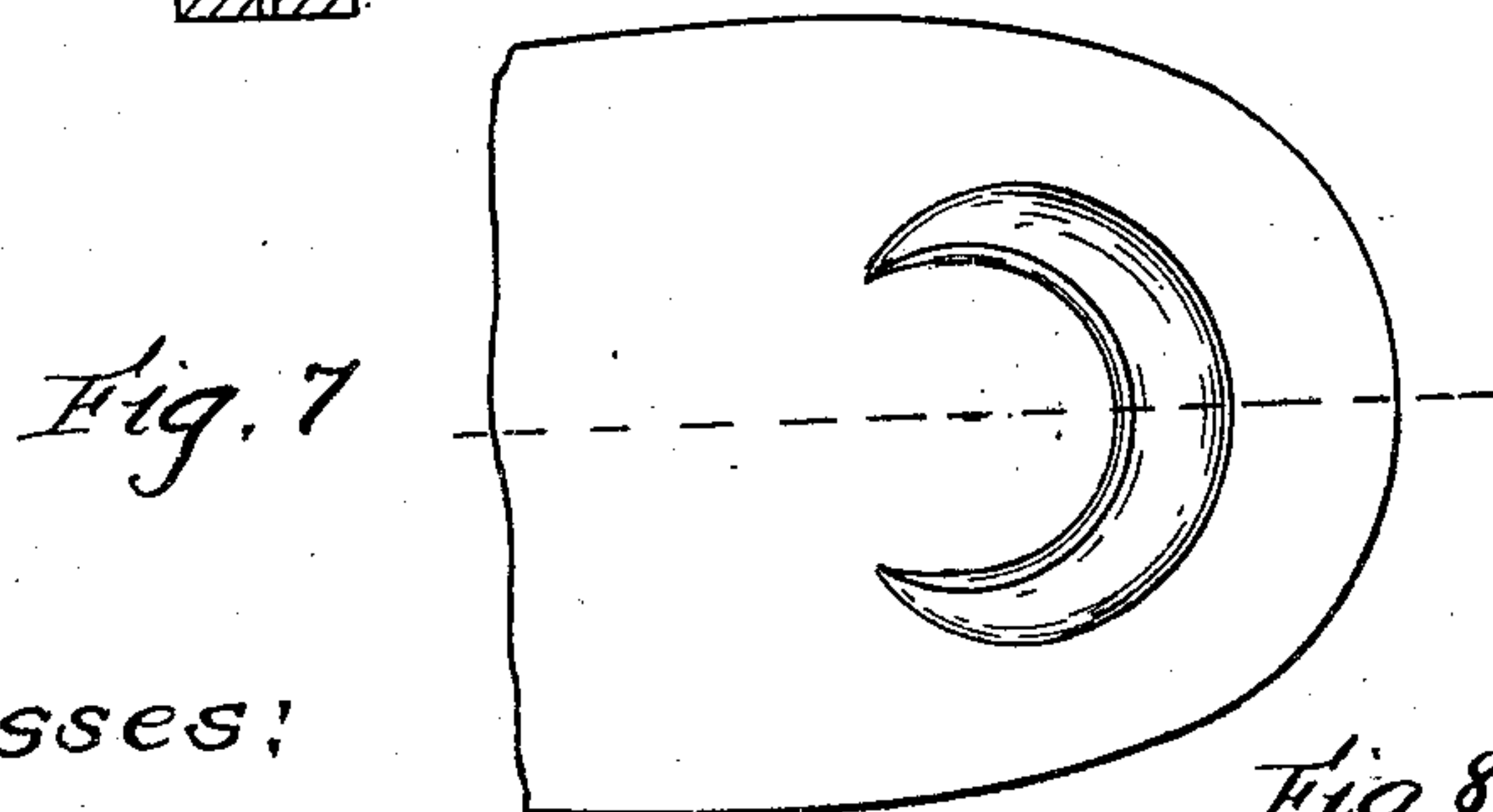
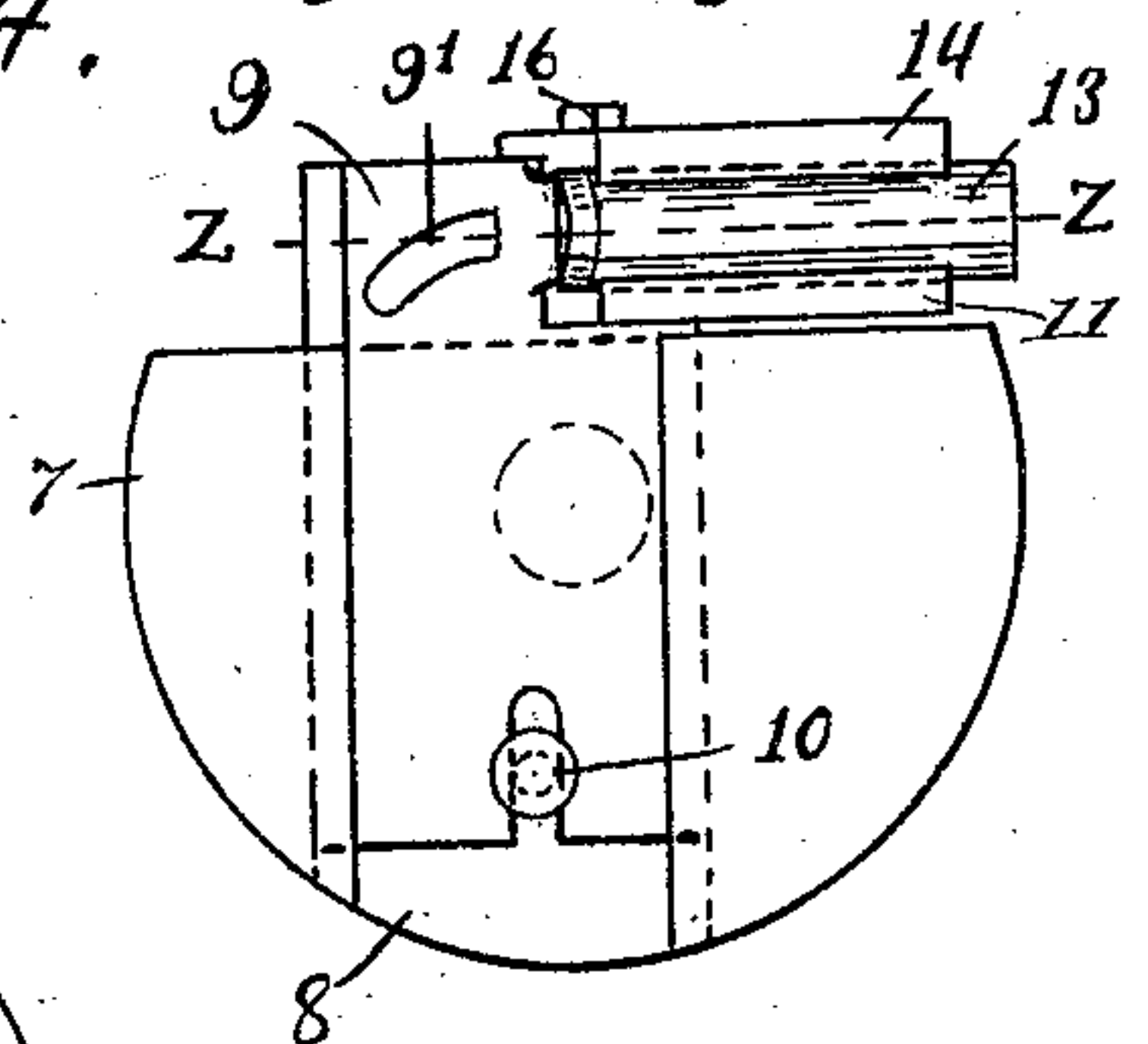
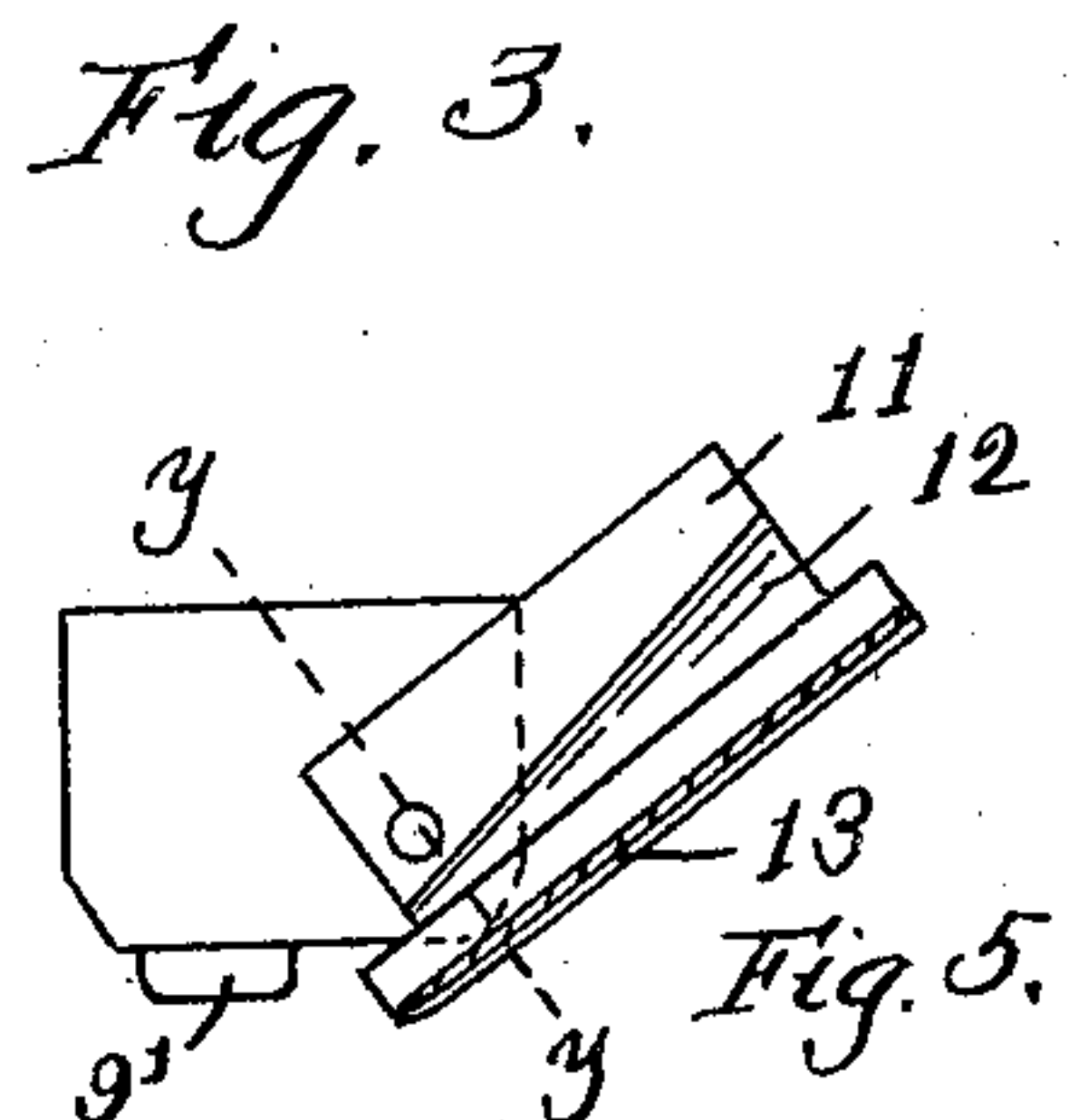
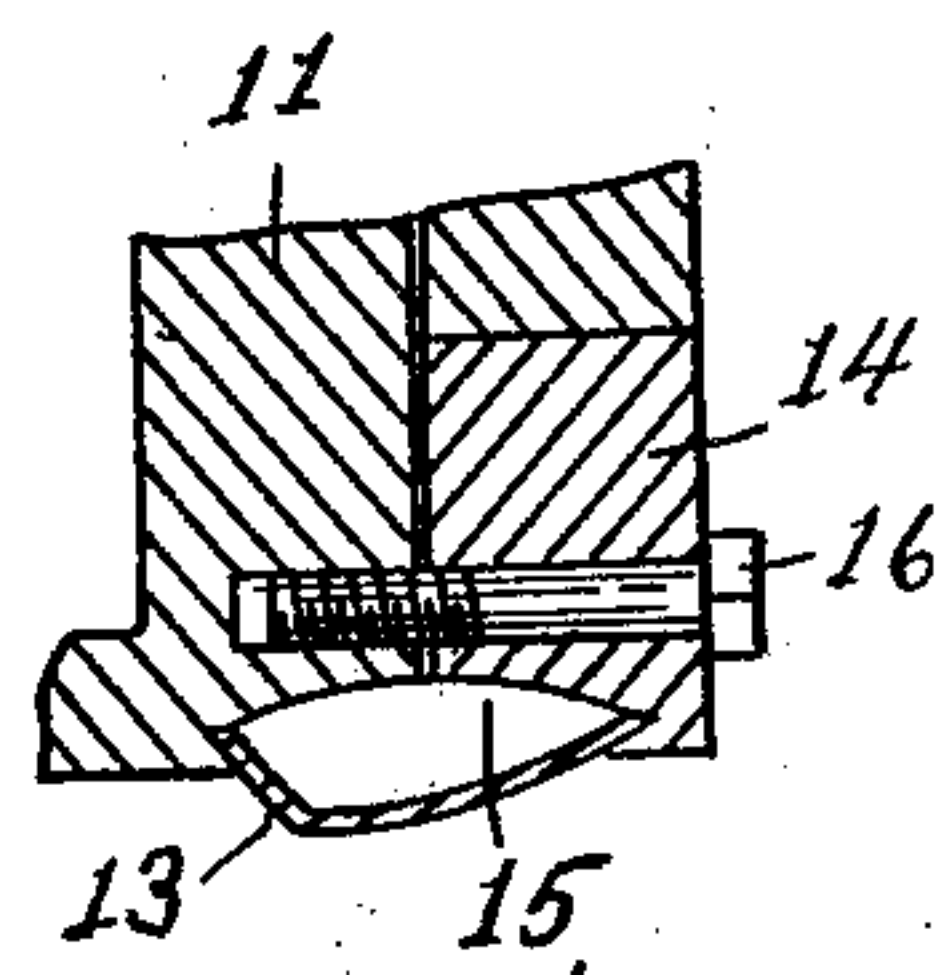
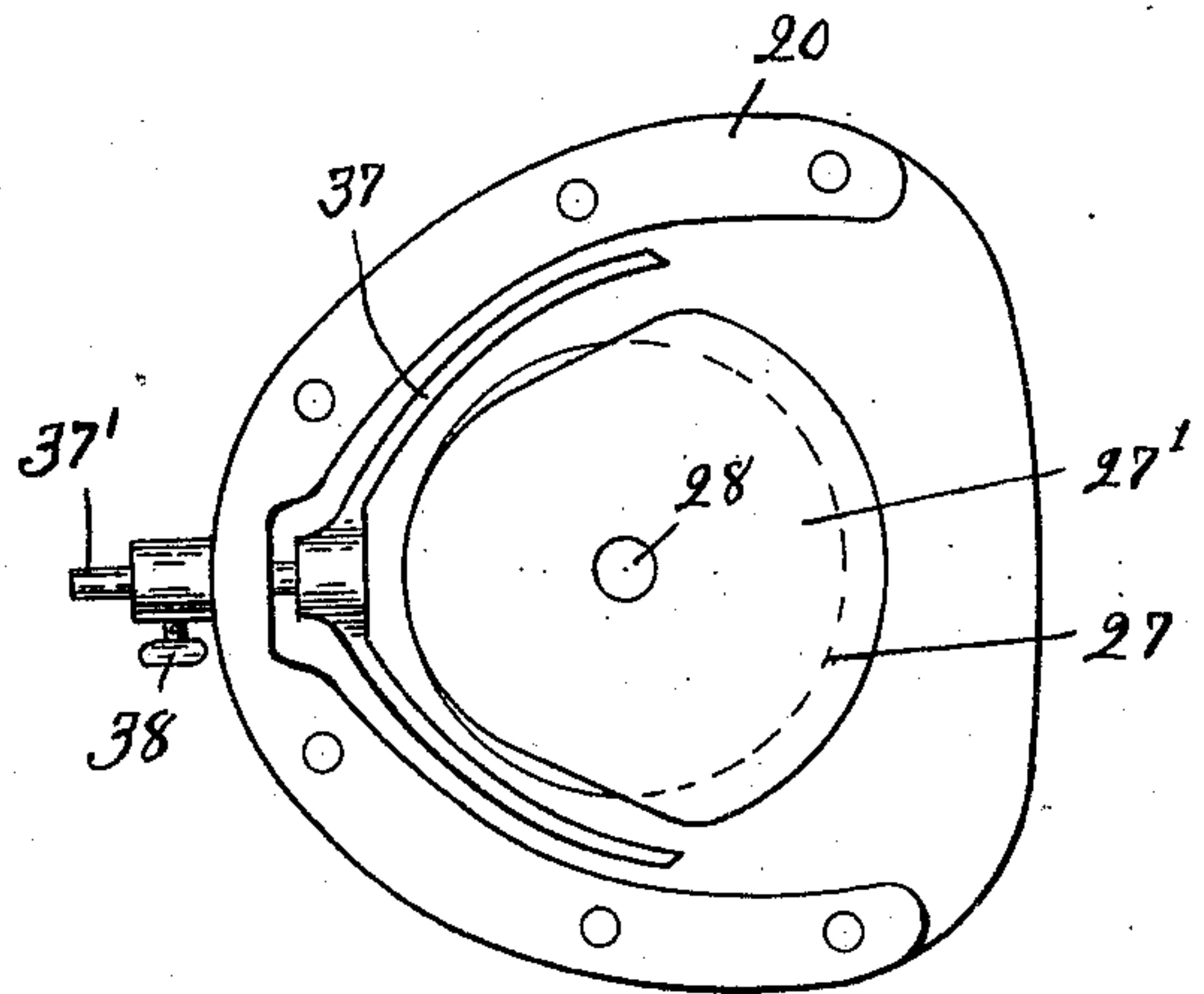
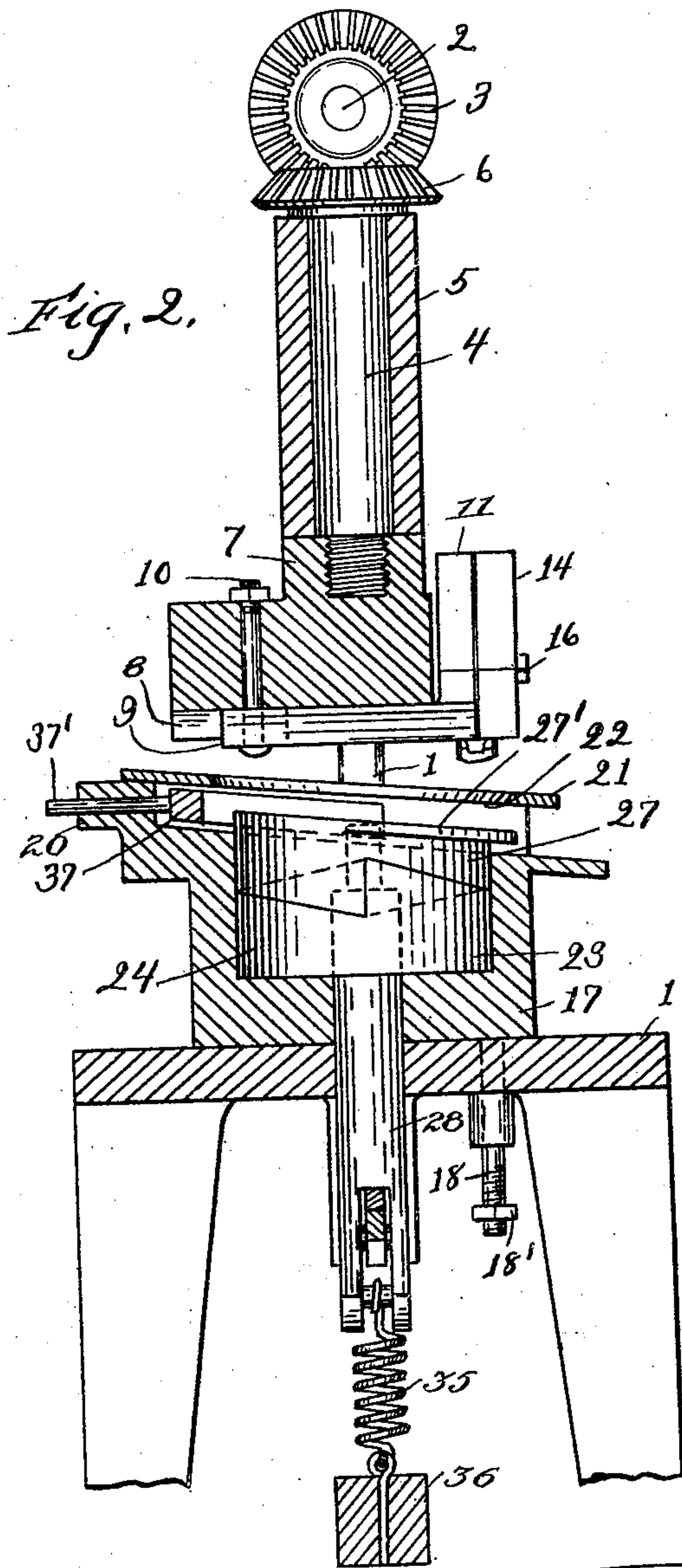
Witnesses:  
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J. L. Hutchinson.

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Attys

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# UNITED STATES PATENT OFFICE.

JAMES BUSFIELD, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOLE-GOUGING MACHINE.

933,820.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed March 19, 1902. Serial No. 98,966.

*To all whom it may concern:*

Be it known that I, JAMES BUSFIELD, of Haverhill, county of Essex, and State of Massachusetts, have invented an Improve-  
5 ment in Sole-Gouging Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

10 This invention relates to machines for grooving or recessing leather and especially for preparing soles for boots and shoes, and has for its particular object the production of a machine for providing either the toe or  
15 heel portion of a sole with a groove or recess to receive the ridge formed between the soles at the end of the shoe by the superposed or plaited layers of upper material folded over in the lasting of the shoe. If no provi-  
20 sion is made for receiving this ridge difficulty is experienced in the operation of securing the outsole to the lasted shoe, since the ridge prevents the sole from resting firmly and squarely upon the lasted shoe at  
25 its ends along the line of fastening. For this reason also, frequently the finished shoe is found to have an open seam, showing the stitches, or other fastening material, plainly between the soles. Even when the outsole  
30 has been drawn down upon the lasted shoe at the line of fastening, either the ridge forms a bunch by forcing the insole upwardly, thus causing discomfort to the wearer, or it causes the outsole to bulge, giving  
35 its tread surface an unsightly appearance and making the sole subject to excessive wear at the bulging point. Reliance has been commonly placed on the leveling or beating-out operation to remove this bunch  
40 or bulge, but it has been found that the desired result cannot be accomplished in this way. To overcome these difficulties it has been proposed to provide the outsole, or it  
45 may be the insole, with a recess or depression to receive the ridge or plaited upper, so that no bunch would be formed either on the outside or the inside of the shoe. As heretofore  
50 practiced, this recess has been formed by digging out a concavity across the curved end of the sole with a hand knife. This is a slow and laborious method and has resulted in the formation of an irregular shaped recess extending across the end of the sole and in the removal of a large amount of stock, so

that the sole was materially weakened and 55 its usefulness lessened. According to the present invention, therefore, I have produced a machine for forming in a sole a groove or recess to receive the ridge formed on a lasted shoe by the plaited or overlapped 60 portions of the upper. I believe I am the first to provide a successful machine for forming a groove or recess in a shoe sole for this purpose.

In the preferred embodiment of the inven- 65 tion, and as herein shown, the machine is provided with a knife movable in a curved path and in a plane inclined to the plane in which the sole is sustained by the work support. By this arrangement the knife is 70 adapted to cut a curved groove or recess of substantially crescent-shape in the sole and to make the groove or recess deepest in its middle portion and of decreasing depth toward its ends. By giving the recess this 75 shape, there is left intact on the sole a portion of material in the middle of the end of the sole which is adapted to fit into the space at the inner concave edge of the ridge or plaited upper and thereby support the insole 80 against substantial depression at this point. I prefer to arrange the knife so that it can be adjusted to move in a path of greater or less curvature. Thus, by properly adjusting the knife, I am enabled to form the 85 groove or recess of such shape as to receive properly the ridge on shoes of varying sizes.

As the so-called "red leather", often used for outsoles, is especially hard and tough, I prefer to use a knife of peculiar form. The 90 cutting edge of my knife presents a lowest point near its inner end and rises abruptly from said lowest point to the inner end. From the lowest point toward its outer end, it presents a gradual upward incline or 95 curve. This shape of the knife or cutter is an important feature of my invention. By this construction of knife I am enabled to produce a groove or recess, in cross-section deepest near its inner edge and of increasing 100 depth toward its outer edge, thus corresponding very accurately to the contour of the ridge which the groove or recess is designed to receive. This knife and its support are preferably so arranged that a pas- 105 sage is provided for the chips or stock cut away by the knife.

In the specific embodiment of my inven-



tion shown, the sole is clamped on an inclined work support, the latter being movable longitudinally to bring the sole into operative relation with the knife.

5 The machine shown is further provided with an adjustable gage for determining the position of the sole upon the work-support with relation to the path of the knife, whereby the groove or recess may be formed  
10 at the desired distance from the edge of the sole.

The present invention comprises other features, not specifically referred to in the above general statement of the nature and  
15 scope of my invention, but which consist in certain devices, arrangements, and combinations of parts, as will be hereinafter fully described and claimed.

For a complete understanding of my invention, reference is made to the accompanying drawings, in which:—

Figure 1 is a front elevation of a machine embodying my invention; Fig. 2 is a cross section on line  $x-x$ , Fig. 1, certain parts being shown in elevation; Fig. 3 is a plan view  
25 of the work support with the upper clamping plate removed; Figs. 4, 5, and 6 are views of the knife and its support, Fig. 4 being a cross section on line  $y-y$  of Fig. 5, Fig. 5 a cross section on line  $z-z$  of Fig. 6,  
30 and Fig. 6 an inverted plan view; Figs. 7 and 8 are respectively a plan and a longitudinal cross section of the toe end of a sole after it has been grooved or gouged by my  
35 machine, the knife being indicated in Fig. 8.

As shown in the drawings, the main frame 1 of the machine is provided with a driving shaft 2 journaled therein and having a beveled gear 3 at one end. A vertical shaft 4  
40 is journaled in a bearing 5 and is provided at its upper end with a beveled gear 6 which meshes with the beveled gear 3. A head, or holder, 7 is removably secured to the lower end of shaft 4 which is threaded to engage  
45 a threaded socket in the upper side of said head. The lower face of the head 7 is provided with a dove-tailed groove 8 in which a sliding knife carrier 9 is adjustably secured by means of a bolt 10, said knife carrier being  
50 provided with a lateral extension 11 which is provided with a tapering groove 12 in its outer face. A knife 13, which is formed concave or scoop shaped in cross section, is clamped to the face of said knife carrier or to said lateral extension by means of  
55 a clamping piece 14, as shown most clearly in Fig. 4, the faces of said knife carrier and said clamping piece being provided with dove-tailed grooves in which the edges of the knife 13 set. The clamping piece is  
60 provided also with a tapering groove 15 in its inner face which corresponds to the groove 12 in the knife carrier. A bolt 16 passes through the clamping piece 14 and is  
65 threaded into the lower portion of the ex-

tension 11 so that the clamping piece may be drawn firmly against the outer side edge of the knife to clamp it firmly between the clamping piece 14 and the extension 11. The dove-tailed grooves in which the  
70 knife is held and the grooves 12 and 15, above described, extend in an oblique direction from the horizontal face of the head 7, as shown in Figs. 1 and 5, thus providing clearance for the knife and a ready  
75 escape for the chips or material removed.

The gouging knife is preferably so shaped in cross-section that its cutting edge, as shown in Fig. 4, drops abruptly from its inner end and then, bending at a sharp angle,  
80 rises in a gradual curve, the lowest point being relatively near the axial line of shaft 4. The walls of the grooves 12 and 15 and the upper surface of the knife form a tapering passage for the portions of leather removed  
85 by the knife, the smaller end of the passage being adjacent the cutting edge of the knife. As shown, a segmental projection 9' is formed integral with the underside of knife carrier 9, the surface of this projection being  
90 slightly above the lowest point in the cutting edge of the knife.

The base of the machine is provided with a horizontal portion 1' on which rests a cup-shaped work support 17 provided with a pair  
95 of guide pins 18 and 19 which extend vertically through the base, said pins having stop nuts 18', 19' threaded on their lower ends. The upper side of the work support is provided with a vertical rib 20 which extends  
100 around three sides of the work support, as shown in Fig. 3, and a clamping plate 21 is screwed, or otherwise firmly secured, to the upper surface of said rib. Said upper surface, and therefore plate 21, are inclined  
105 downwardly, as shown in Fig. 2.

The plate 21, as shown in Fig. 1, is provided with a circular aperture concentric with the axial line of shaft 4, the radius of said aperture being somewhat greater than  
110 the radius of the path in which the knife 13 rotates, so that the knife may travel without obstruction within said aperture. The upper side of the work support 17 is provided with a cylindrical recess 23, arranged con-  
115 centrically with the axis of the shaft 4 and a block or cam 24, having its upper end formed with two cam surfaces or wedges, rests in the bottom of said recess and is capable of rotating therein to a limited extent.  
120 A horizontal slot 25 is formed in the side of said support 17 and a handle 26 passes there-through and is secured in one side of the cam 24. A clamping block 27, having an enlarged head 27' extending beyond the inner  
125 edge of the aperture 22 of plate 21, is arranged in recess 23 directly above the block 24 and is provided with a double cam surface on its lower end which corresponds with, and is adapted to engage, the cam surfaces on  
130



the block 24. A rod 28, having its axis substantially in alinement with the axis of the shaft 4, passes upwardly through the base 1', the work support 17, and cam 24, and its upper end is firmly secured in the block 27. The lower end of rod 28 is slotted and a short lever 29, pivoted at 30 to a downwardly extending part 31 of the frame of the machine, is arranged in the slot. A lever 32 is pivoted to a lug 33 which extends from the under side of the base 1' and one end of said lever engages the free end of lever 29. The opposite end of lever 32 is connected by a rod 34 to a treadle or other suitable foot operated device, not shown. A spring 35 is connected to the lower end of rod 28 and to a bracket 36 which is formed integral with the part 31.

The plane of the upper surface of head 27' is parallel to the inclined plane of the under side of the plate 21, so that when the work is clamped between said parts, as hereinafter described, it will be held in an oblique position with respect to the horizontal and to the plane of the path of the knife 13.

A stop, guide, or gage 37, having approximately the shape of the letter V, is arranged within and adjacent the rib 20, between the plate 21 and the upper side of the work support 17. This gage is provided with a stem 37' which passes through the middle of the rib 20 in the direction of a line which bisects the angle between the sides of the gage and is adjustably secured upon the work support by a set screw 38.

Having now described the general construction of my machine, the operation thereof may be described as follows:—The sliding knife carrier 9 is first adjusted in the head or holder 7 so that the distance from the axial line of the shaft 4 to the cutting edge of the gouging knife 13 is such that a groove of the desired curvature, corresponding to the general shape of the end of the sole to be grooved, will be cut by the knife as it rotates about its axis. The gage 37 is also adjusted according to the shape and size of the sole to determine the position of the end of the sole and therefore the distance of the groove to be formed from the edge of the sole. Whereupon, the driving shaft is started so that the knife 13 travels in a circular path and in a horizontal plane. The end of the sole is then inserted between the plate 21 and the clamping head 27', so that it rests against the angularly arranged stop faces of the gage 37. The cam 24 is then turned upon the shaft 28 and within the recess 23 through handle 26, thus forcing the block 27 upwardly so that the end of the sole will be firmly clamped between the upper face of head 27' and the lower face of plate 21. The operator draws down the end of the lever 32 by means of the rod 34 and the treadle, thus raising the shaft 28 through the base of the machine and moving the entire work sup-

port 17, and with it the sole which is clamped therein, toward the rotating knife, said work support being guided by the shaft 28 and by the pins 18 and 19 and being held against rotation by said pins. The sole is thus elevated so that the knife edge engages it and, as the surface of the sole is held in an oblique position with respect to the plane of the circle in which the cutting edge of the knife 13 travels, the knife will cut or scoop out the leather near the end of the sole, forming a curved recess therein which corresponds approximately to the curvature of the edge of the sole. As the knife is carried above the surface of the leather in the portion of its path farthest from the end of the sole, a substantially crescent shaped groove is formed. The material which is cut from the sole is discharged through the tapered passage above the knife and, as the cross sectional area of this passage gradually increases from the cutting edge of the knife to the discharge end of the passage, all liability of clogging is obviated.

The work support 17 is elevated to such a point that a groove of the desired depth is cut in the sole, the distance which said support may be elevated being limited by the adjustable stop nuts 18' and 19'. Alternatively the depth of cut may be limited by the segmental projection 9' on the face of the carrier 9, the cutting edge of the knife being adjusted to the desired distance below the surface of said projection. This projection is particularly useful in cutting through hard leather as (to use a well known shop term) it prevents the knife from "hogging". When the groove has been cut to a sufficient depth, the lever 32 is released and the work support is returned to its normal position by its weight and the spring 35. It will be obvious that the width and depth of this groove will decrease gradually toward its ends from the intersection of the groove with the central longitudinal plane of the sole, as indicated in Figs. 7 and 8.

The particular form of cutting edge shown for the gouging knife produces a groove in the sole which is deepest close to its inner edge and gradually decreases in depth as it approaches its outer edge, thus providing the proper space required for the ridge formed by the upper materials in lasting, as above described, which ridge is thickest substantially at the edge of the upper, the folds decreasing in thickness as they approach the edge of the shoe.

It will be obvious that various other forms of gouging knives may be substituted for the particular form herein shown and described, but my invention includes any form of knife, or combination of knives, which is adapted to gouge, or scoop out, a curved groove in a sole to receive the folded edge of the upper.



While I have described a particular construction for producing the result above referred to, obviously this construction may be varied in numerous details without departing from the spirit of my invention.

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

1. A machine of the class described comprising a gouging knife movable in a curved path and a work support disposed at a small acute angle to the plane of movement of the knife.

2. A machine of the class described comprising a rotary knife holder, a work support disposed obliquely to the plane of the movement of said holder, and a gouging knife eccentrically mounted on the end face of said holder, whereby a curved groove may be formed in the work.

3. A machine of the class described comprising a rotary knife holder, a gouging knife carried thereby to travel about the axis of said holder, and a work support substantially in alinement with the axis of the holder and disposed obliquely to the plane of movement of the knife.

4. A machine of the class described comprising a rotary disk-shaped knife holder and a gouging knife mounted on one face of the knife holder, in combination with a work support arranged substantially in line with the axis of rotation of the holder so as to present the work in position to be engaged by the knife during a portion only of each rotation of the knife.

5. A machine of the class described comprising a circularly moving knife holder, a gouging knife carried thereby and movable in an arc about the axis of the holder, means for adjusting said knife to move its cutting edge substantially radially with respect to the axis of the holder, and a work support disposed obliquely to the plane of movement of the knife.

6. A machine of the class described comprising a circularly moving head, a gouging knife which is secured thereto having its cutting edge arranged approximately radially with respect to the axis of said head, and a work support disposed obliquely with relation to the plane of movement of the knife.

7. A machine of the class described comprising a knife support, a gouging knife carried thereby, means for moving said support so that said knife travels in a curved path, said support being provided with a tubular passage one end of which is located closely adjacent to the cutting edge of the knife, said passage being adapted to conduct the chips away from the edge of the knife, a work support, and means for causing the knife to engage the work.

8. A machine of the class described comprising a knife support, a gouging knife

carried thereby, means for moving said support so that said knife travels in a curved path, said support being provided with a tapering tubular passage the smaller end of which is located closely adjacent the cutting edge of the knife, said passage being adapted to conduct the chips away from the edge of the knife, a work support, and means for causing the knife to engage the work.

9. A machine of the class described comprising a gouging knife movable so as to cut a curved groove in the work and a work support bodily movable relatively to the knife and comprising a clamp having a fixed member and a movable member, said fixed member being disposed between said movable member and the knife.

10. A machine of the class described comprising a gouging knife movable in a curved path, a work support comprising a clamp having a fixed and a movable member, said fixed member being disposed between said movable member and the knife, means for moving said support toward said knife and means for limiting said movement.

11. A machine of the class described comprising a gouging knife movable in a curved path, a work support comprising a clamp having a fixed and a movable member, said fixed member being disposed between said movable member and the knife, means for moving said support toward said knife, means for limiting said movement, and means for holding said support against rotation.

12. A machine of the class described comprising a gouging knife movable in a curved path, a work support comprising a clamp having a fixed and a movable member, said fixed member being disposed between said movable member and the knife and the clamping faces of said members being obliquely disposed with respect to the plane of movement of said knife.

13. A machine of the class described comprising a rotary knife holder, a knife carried thereby and movable in a circular path about the axis of said holder, a work support comprising a clamp having a fixed and a movable member, said fixed member being disposed between said movable member and the knife and having a circular opening which is substantially concentric with, but of greater diameter than, the path of the knife, and means for causing the knife to pass through said circular opening and engage the work.

14. A machine of the class described comprising a knife which moves in a circular path, a work support arranged to support the work in a plane oblique to the plane in which the knife travels and having a clamp comprising a fixed member which is adapted and arranged to engage the sole outside of, but adjacent to, the path of the knife for the en-



tire circumference of said member, a movable member which is adapted to press the sole against the fixed member, and means for removing said support toward the knife.

15. A machine of the class described comprising a rotary gouging knife movable in a circular path and constructed and arranged to produce a recess of varying depth in the end of a sole, a work support extending across the axis of the path of the knife but fixed against lateral movement and an adjustable stop or gage, comprising two angularly arranged stop faces and mounted on the work support beyond the circle of said path, for positioning the work.

16. A machine of the class described comprising a knife or cutter movable about an axis, a work support fixed against movement transversely of said axis, said knife and support being mounted to have relative movement in the direction of said axis to bring the knife into operative relation with the work, and a V-shaped stop or gage arranged to position the end portion of a sole with relation to the knife, said stop being mounted on the work support so as to be capable of adjustment toward and from the axis of the knife.

17. A machine of the class described comprising a knife movable about an axis, a work support fixed against movement transversely of said axis and provided with means to clamp the work thereto, said knife and work support being mounted to have relative movement in the direction of said axis to bring the knife into operative relation to the work, and a stop or gage mounted on the work support and arranged to engage and thereby to position the end portion of a sole in predetermined relation to said axis for the formation in the sole of a recess wholly within its perimeter.

18. A machine of the class described comprising a gouging knife movable in a curved path, a work support, an adjustable V-shaped stop or gage for the sole on said support, a clamp adapted to engage the sole when in working position, and means for causing said knife and sole to be brought into engagement.

19. A machine of the class described comprising a gouging knife movable in a circular path, a work support, a V-shaped stop or gage for the sole on said support having

a stem extending in the general direction of a line which bisects the angle between the sides of the gage, an adjustable connection between said stem and said work support, a clamp adapted to engage the sole when in working position, and means for causing said knife and sole to be brought into engagement.

20. A machine of the class described comprising a gouging knife movable in a curved path, a work support disposed obliquely to the plane of movement of the knife and extending across the path of the knife, and a stop or gage located without said path and arranged to position the work on the support.

21. A machine of the class described comprising a gouging knife rotatable in substantially a horizontal plane, a work support, a stop or gage located at the rear of the axis of rotation of the knife, said work support being inclined forwardly and downwardly from the stop or gage, whereby the work is supported obliquely with relation to the plane of movement of the knife.

22. A machine of the class described comprising a knife support, rotatable in a horizontal plane, a knife mounted therein eccentrically to the axis of rotation, means for adjusting the path of said knife transversely to the axis of rotation, a work support, and means to cause relative movement of the knife and work support toward each other.

23. A machine of the character described comprising a gouging knife movable in a curved path about a central axis, and a work support, the cutting edge of said knife being radially arranged with respect to said axis and so shaped that it will enter the work to the greatest depth at a point closely adjacent the side of the cut nearest said axis, the portion of said edge next the axis rising abruptly with respect to the surface of the work from said point and the opposite portion of said edge rising gradually therefrom.

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

JAMES BUSFIELD.

Witnesses:

LOUIS H. HARRIMAN,  
J. L. HUTCHINSON.