March 6, 1951 R. H. PETTENGILL 2,544,470

MACHINE FOR BREASTING LOUIS HEELS

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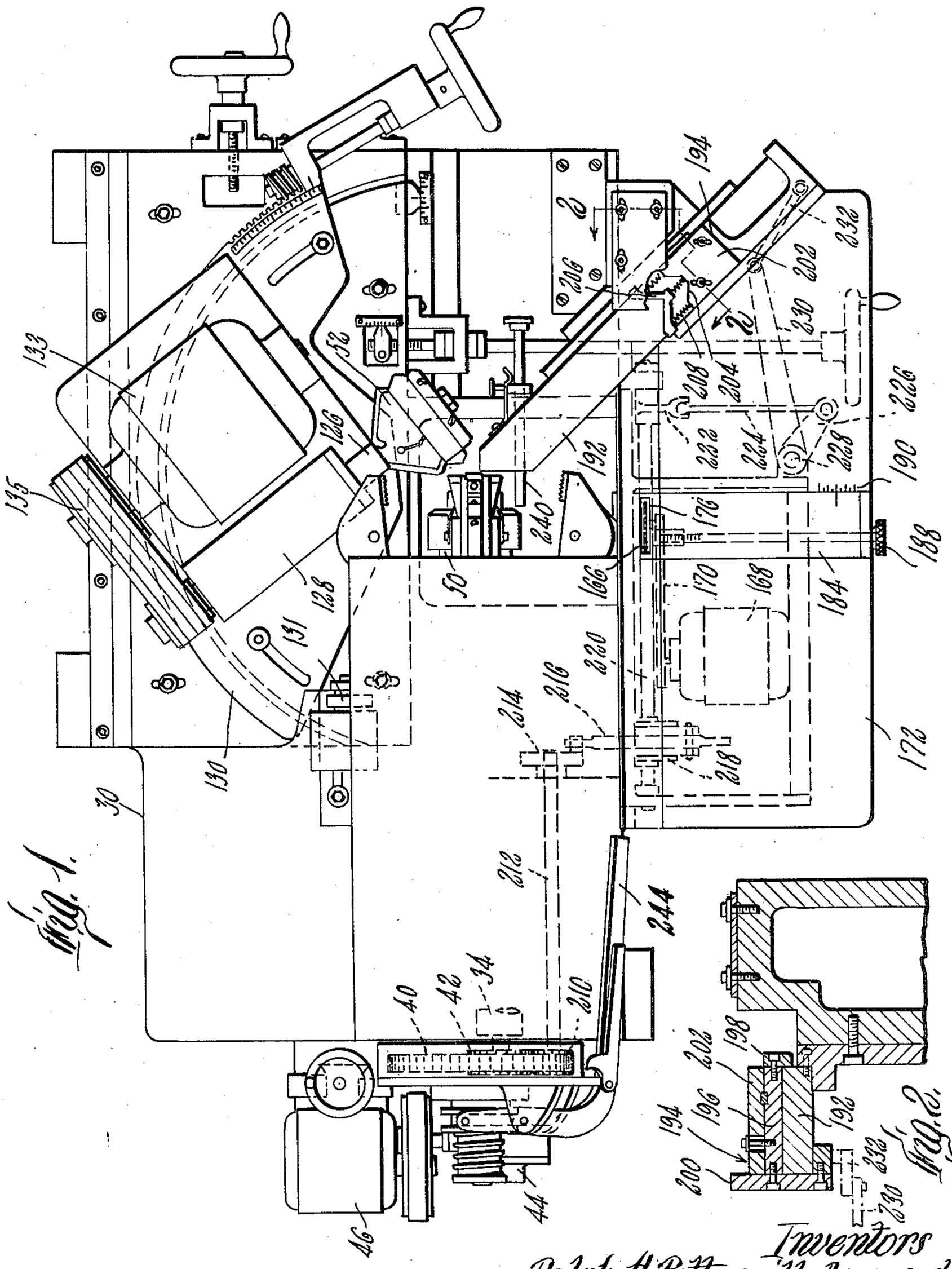

Fig. 1.

Fig. 2.

Inventors
Ralph H. Pettengill, Deceased
by Rita M. Pettengill, Executrix
John W. Sjostrom
by Wright, Brown, Quinby & May
Attys.

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MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 2

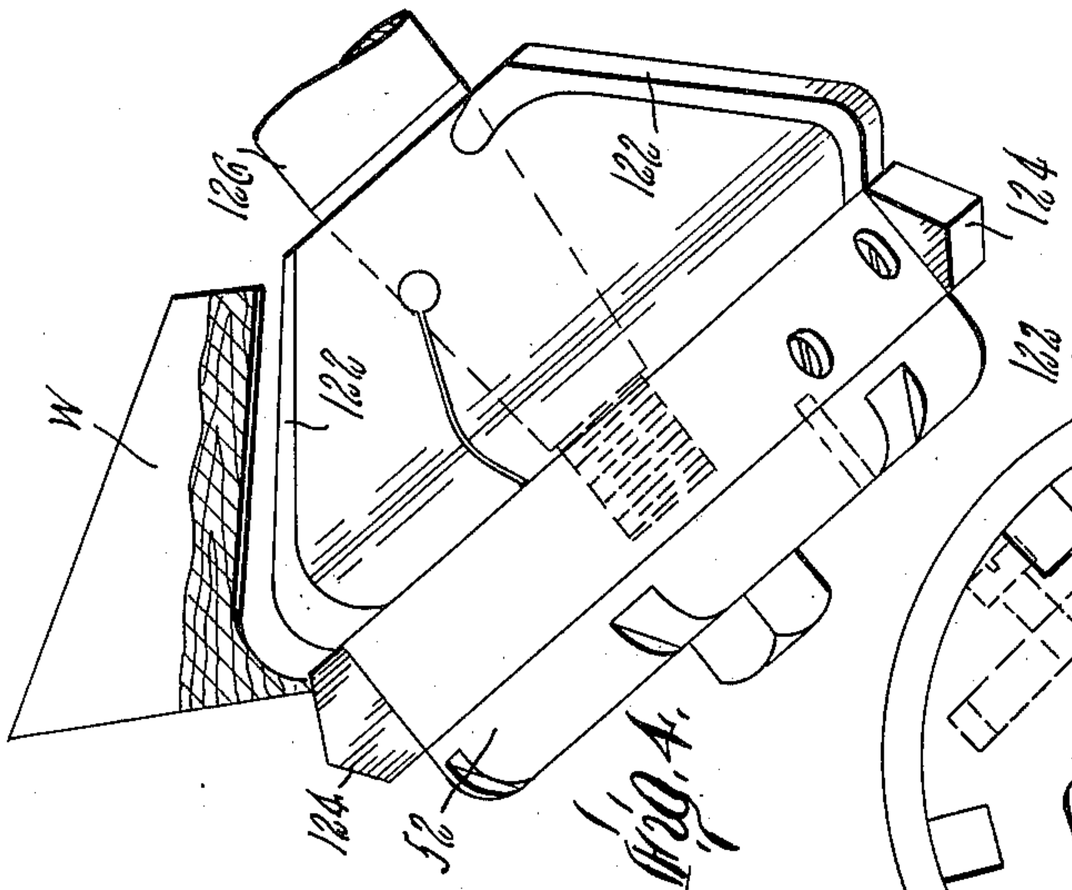

Fig. 4.

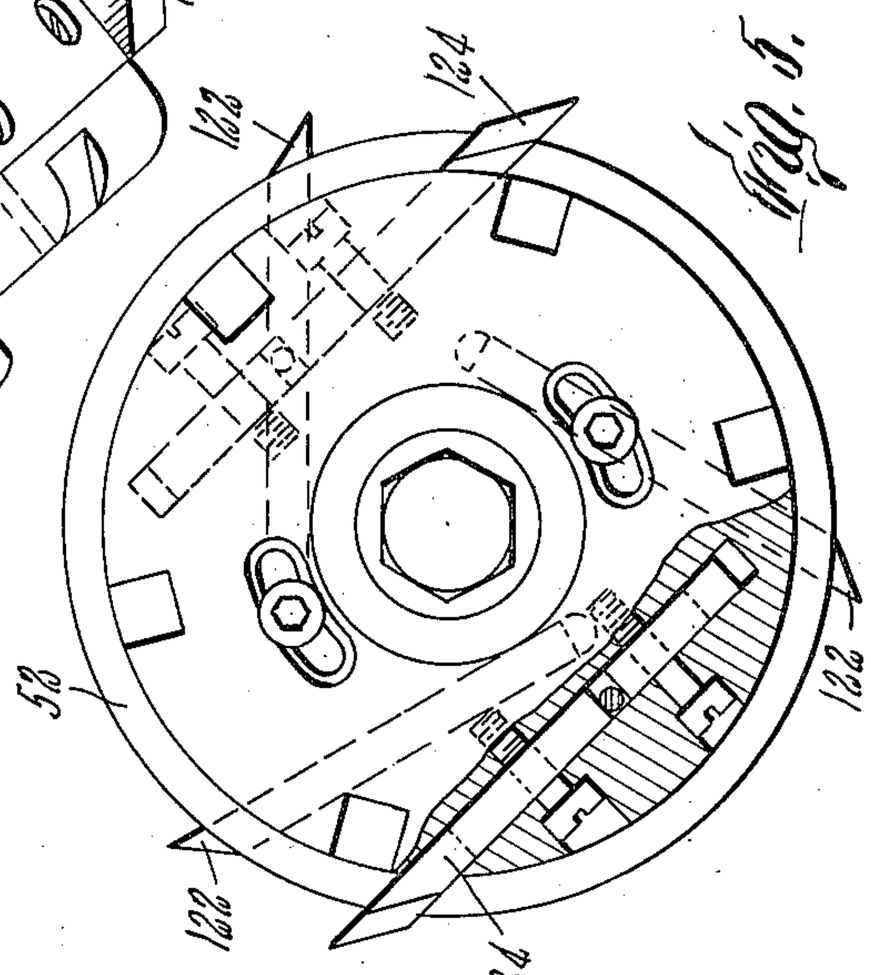

Fig. 5.

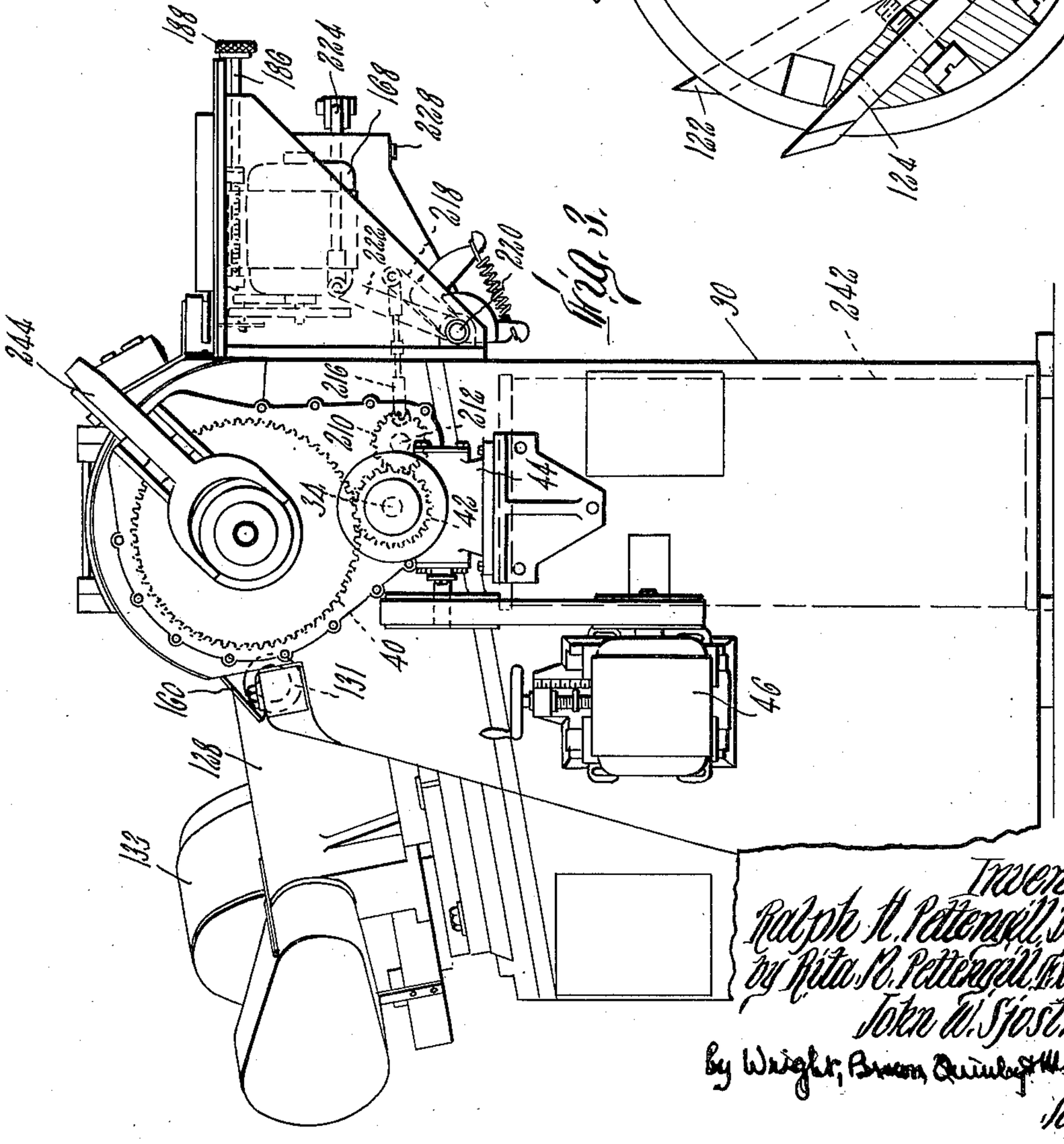

Fig. 3.

Inventors
Ralph H. Pettengill Deceased
by Rita B. Pettengill Executrix
John W. Sjostrom
By Wright, Brown, Quinby & Mills
Attys.

March 6, 1951 R. H. PETTENGILL 2,544,470

MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 3

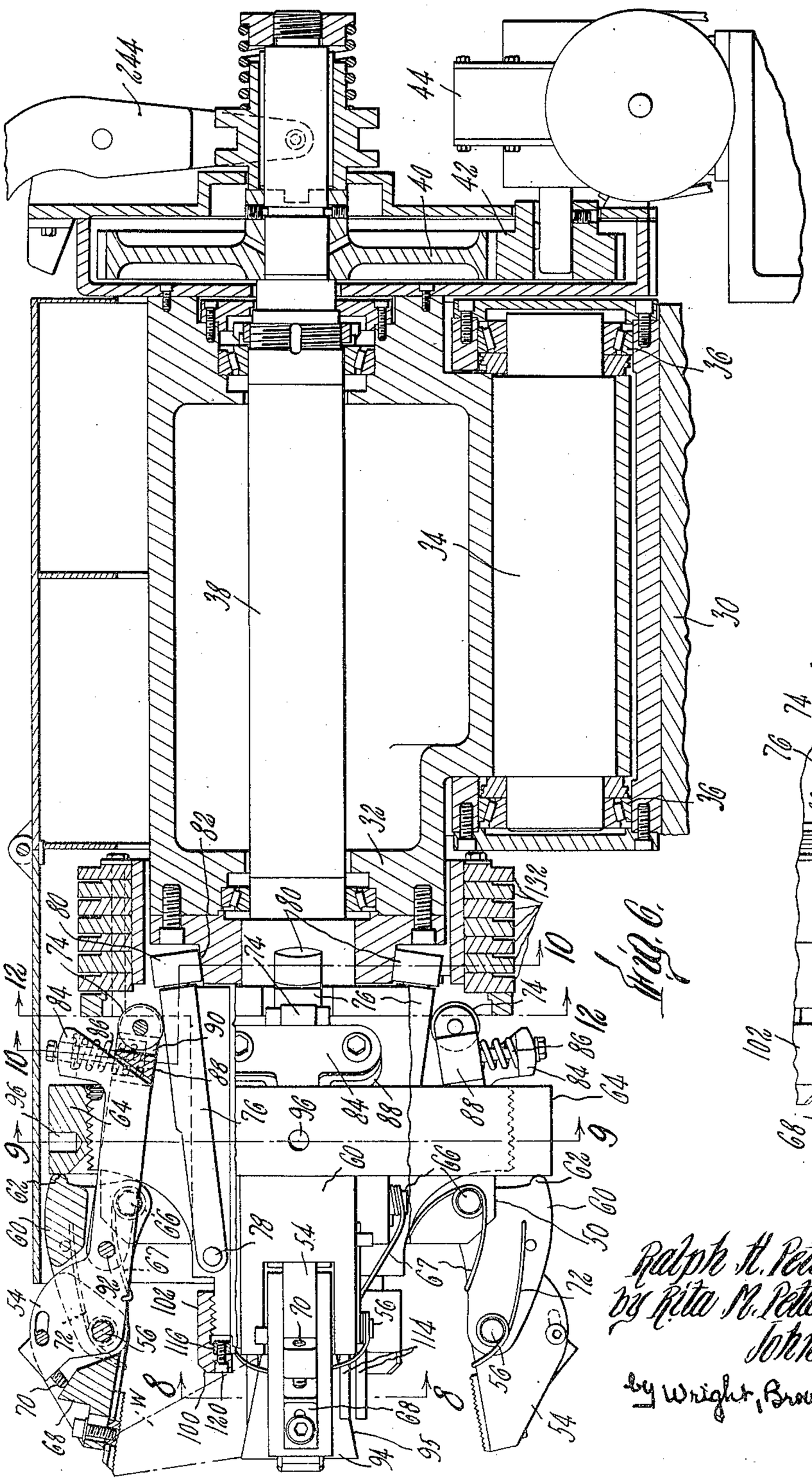

Fig. 6.

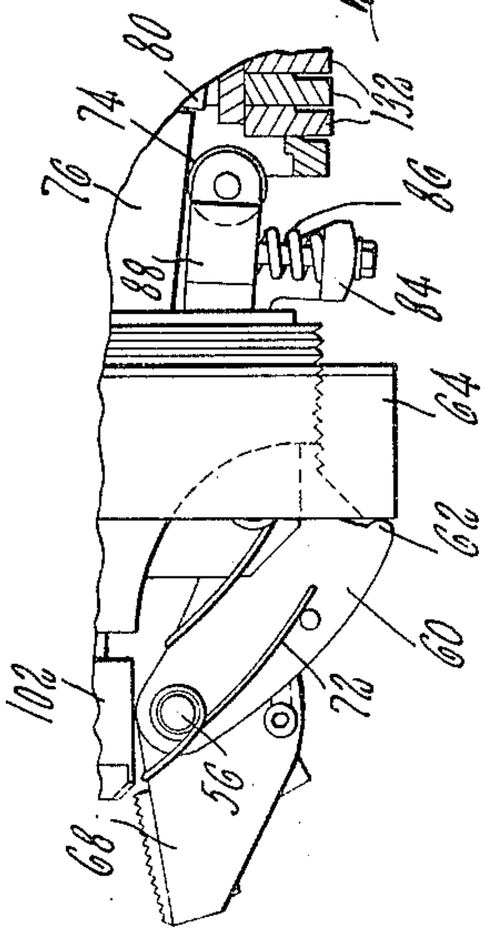

Fig. 7.

Inventors
Ralph H. Pettengill, Deceased,
by Rita M. Pettengill, Executrix
John W. Sjostrom
by Wright, Brown, Quinby & May
Attys.

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MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 4

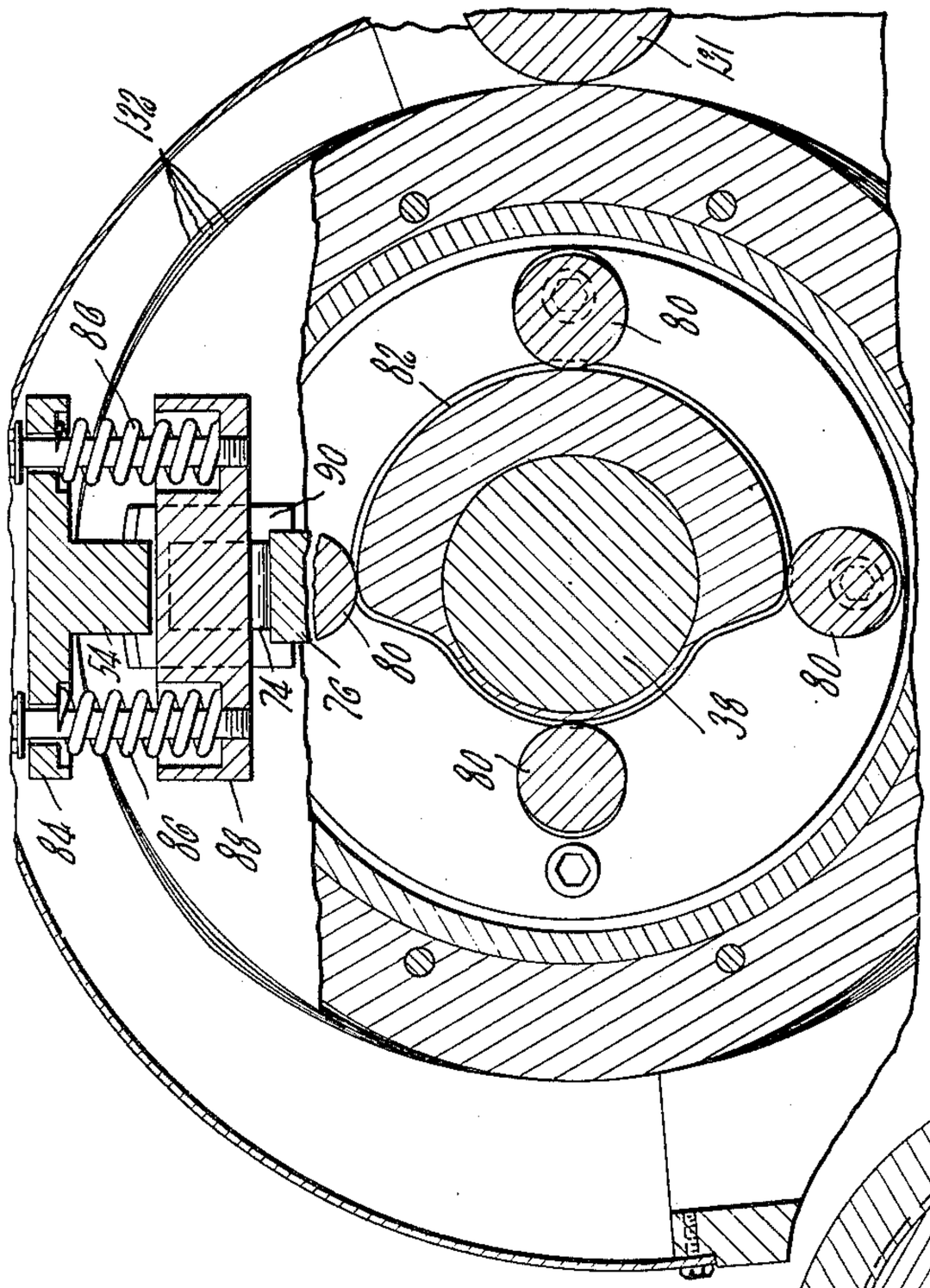

Fig. 10.

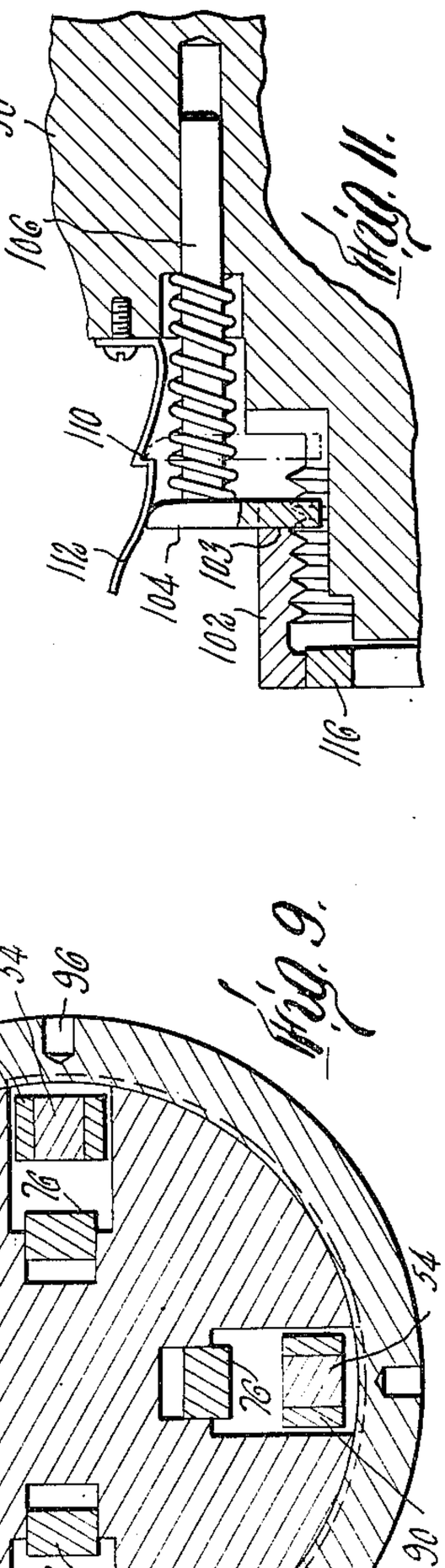

Fig. 11.

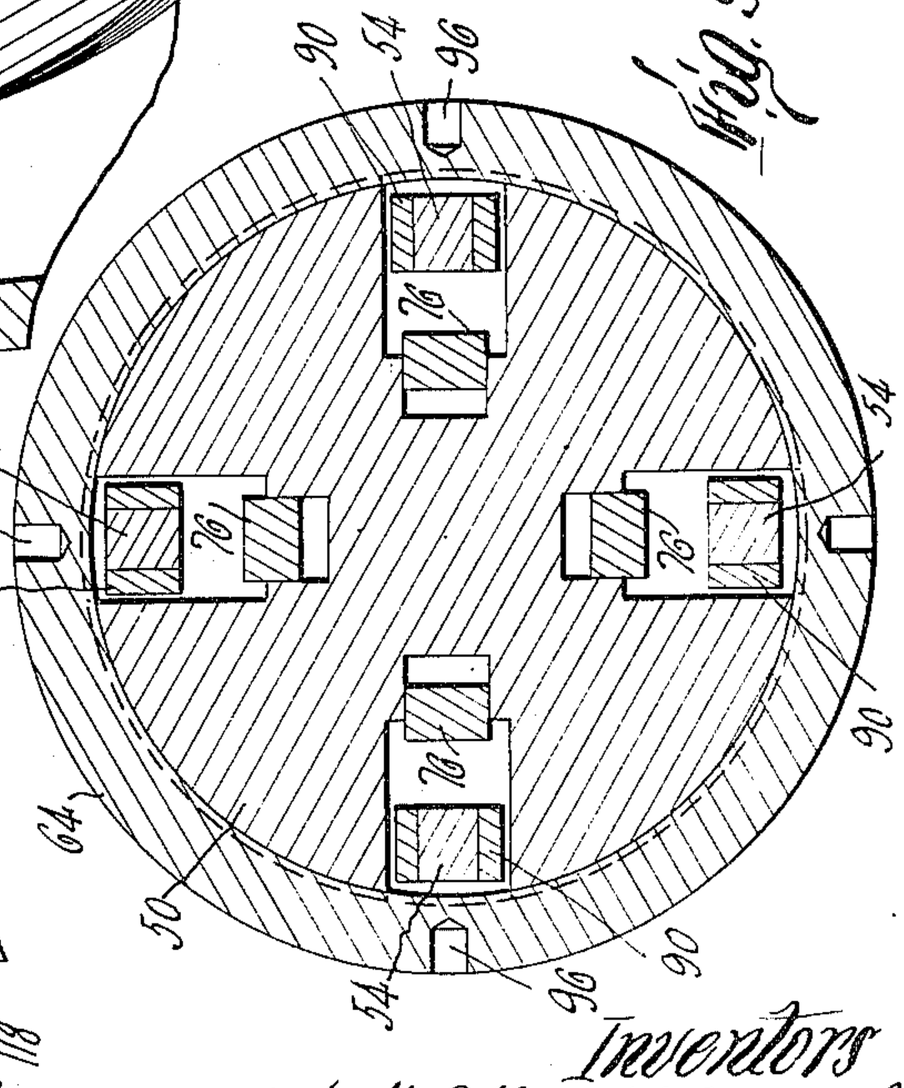

Fig. 9.

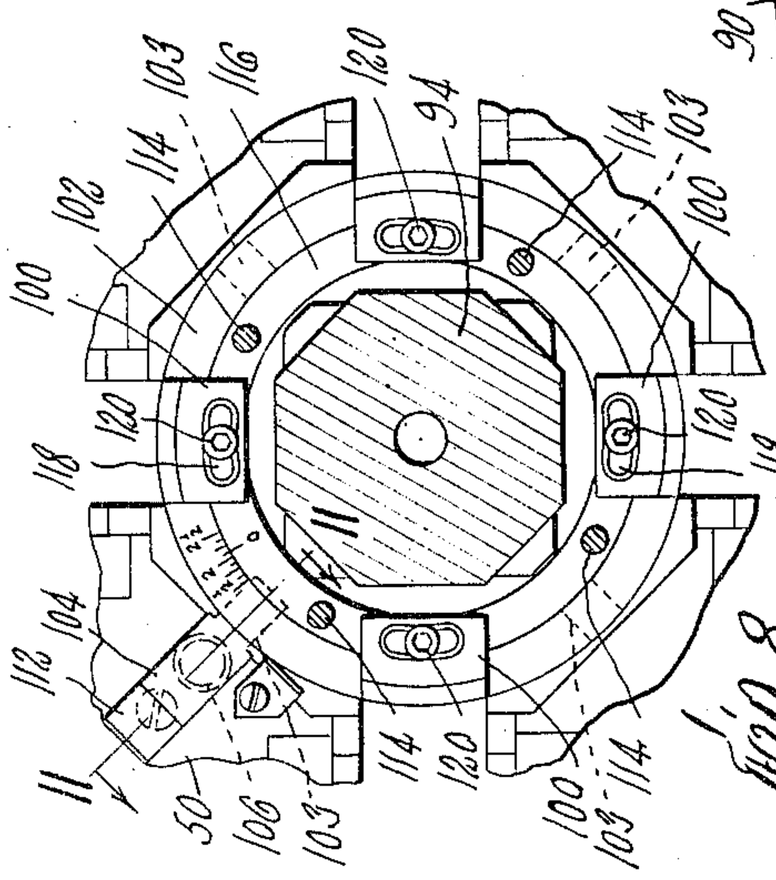

Fig. 8.

Inventors
Ralph H. Pettengill, Deceased,
by Rita M. Pettengill, Executrix
John W. Sjostrom
by Wright, Brown, Quinby & May
Attys.

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MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 5

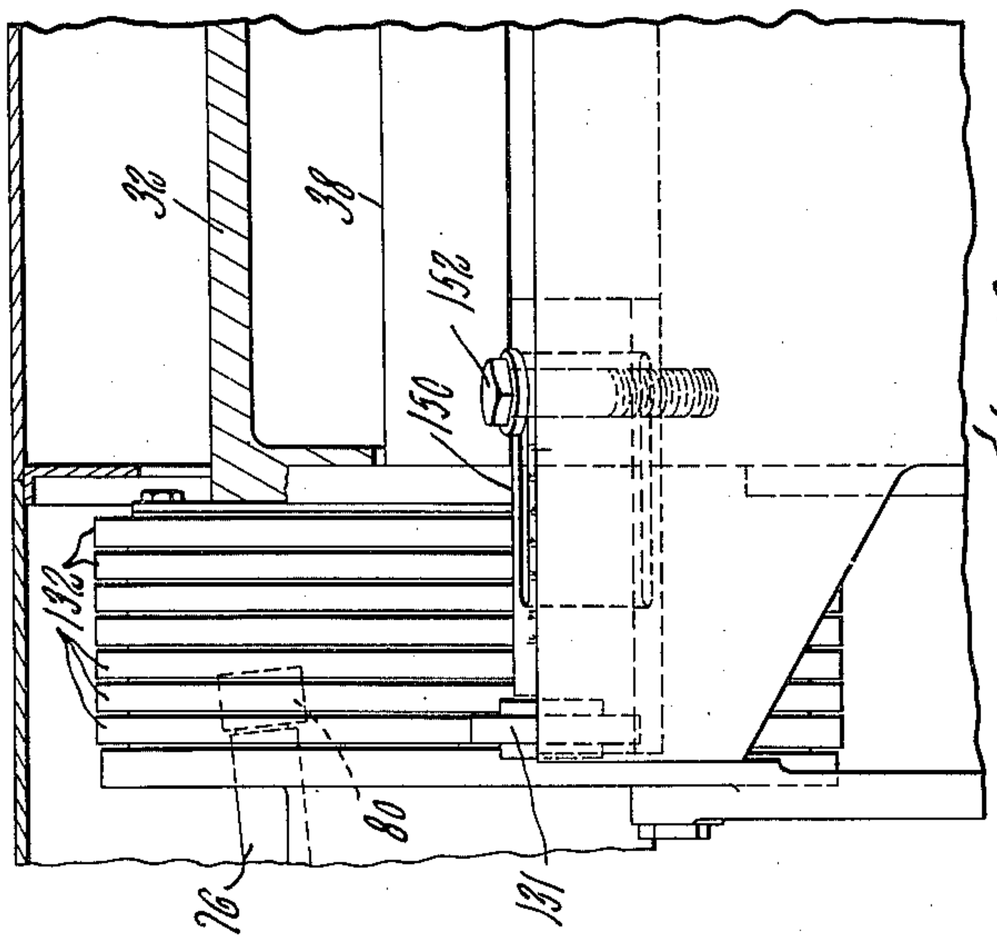

Fig. 13.

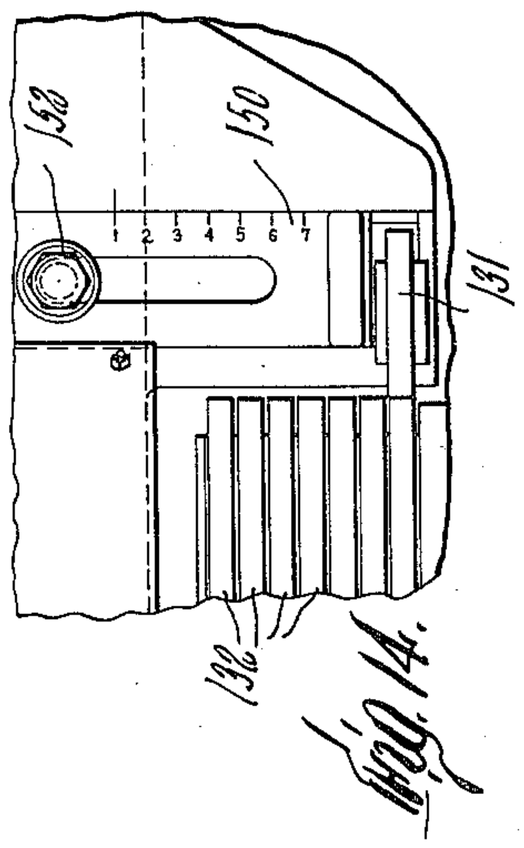

Fig. 14.

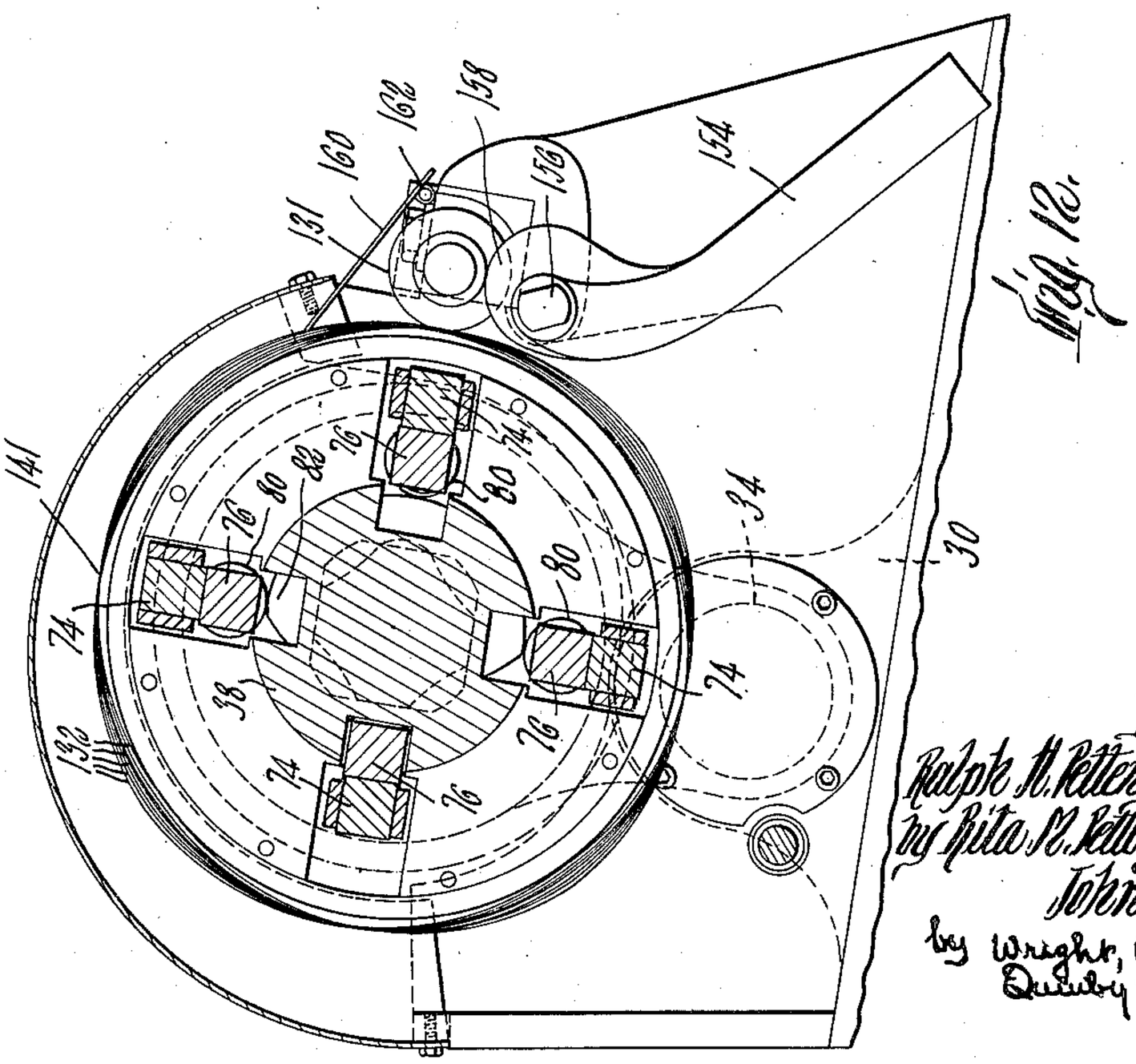

Fig. 12.

Inventors
Ralph H. Pettengill, Deceased
by Rita M. Pettengill Executrix
John W. Ljostrom
by Wright, Brown, Quinby & May
Attys.

March 6, 1951 R. H. PETTENGILL 2,544,470

MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 6

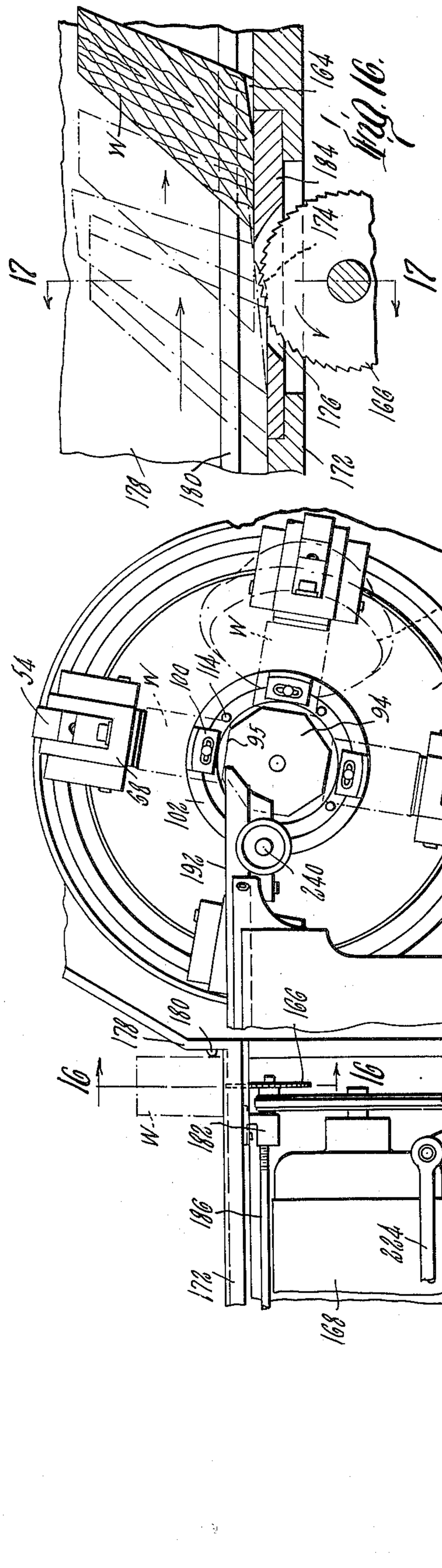

Fig. 16.

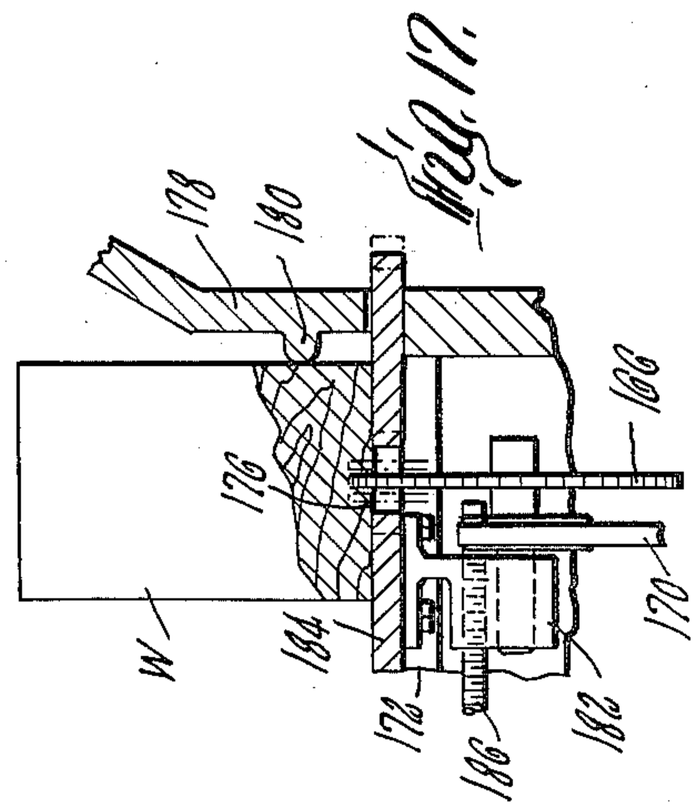

Fig. 17.

Fig. 15.

Inventors
Ralph H. Pettengill, Deceased
by Rita M. Pettengill, Executrix
John W. Sjostrom
by Wright, Brown, Quinby & Woodruff
Attys.

March 6, 1951 R. H. PETTENGILL 2,544,470

MACHINE FOR BREASTING LOUIS HEELS

Filed Jan. 29, 1949 7 Sheets-Sheet 7

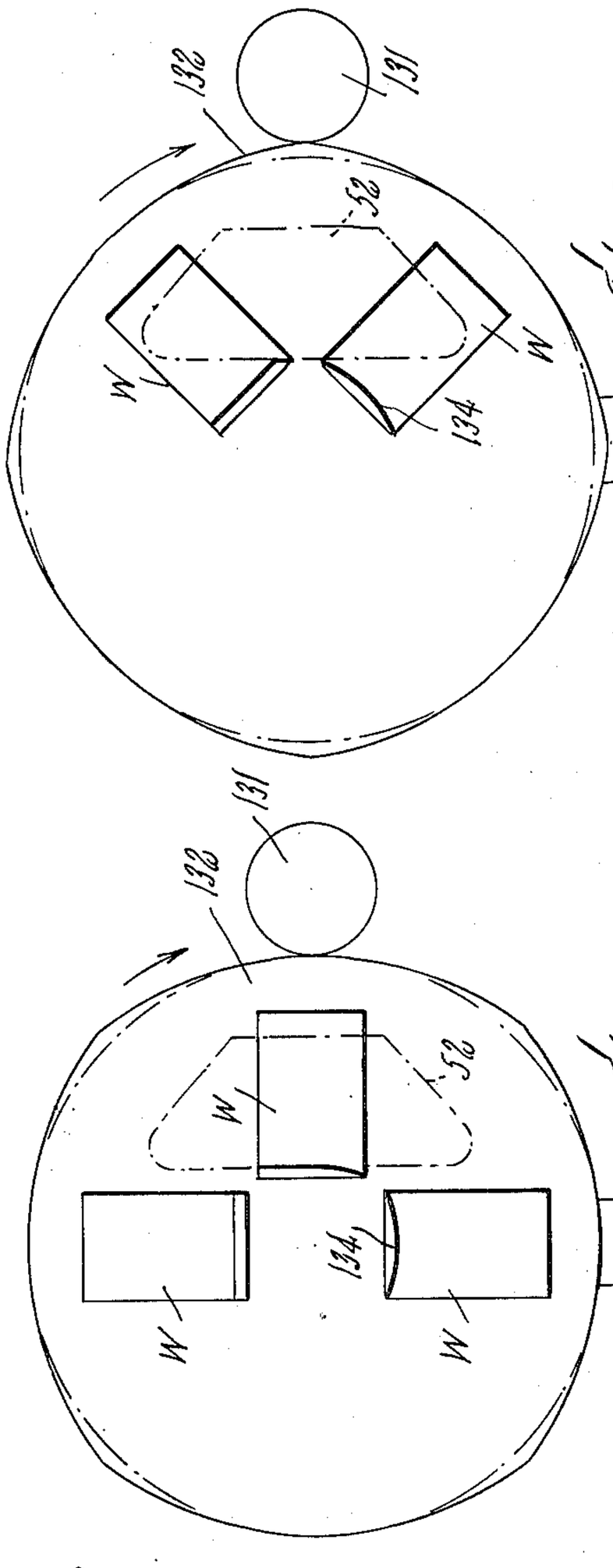

Fig. 21.

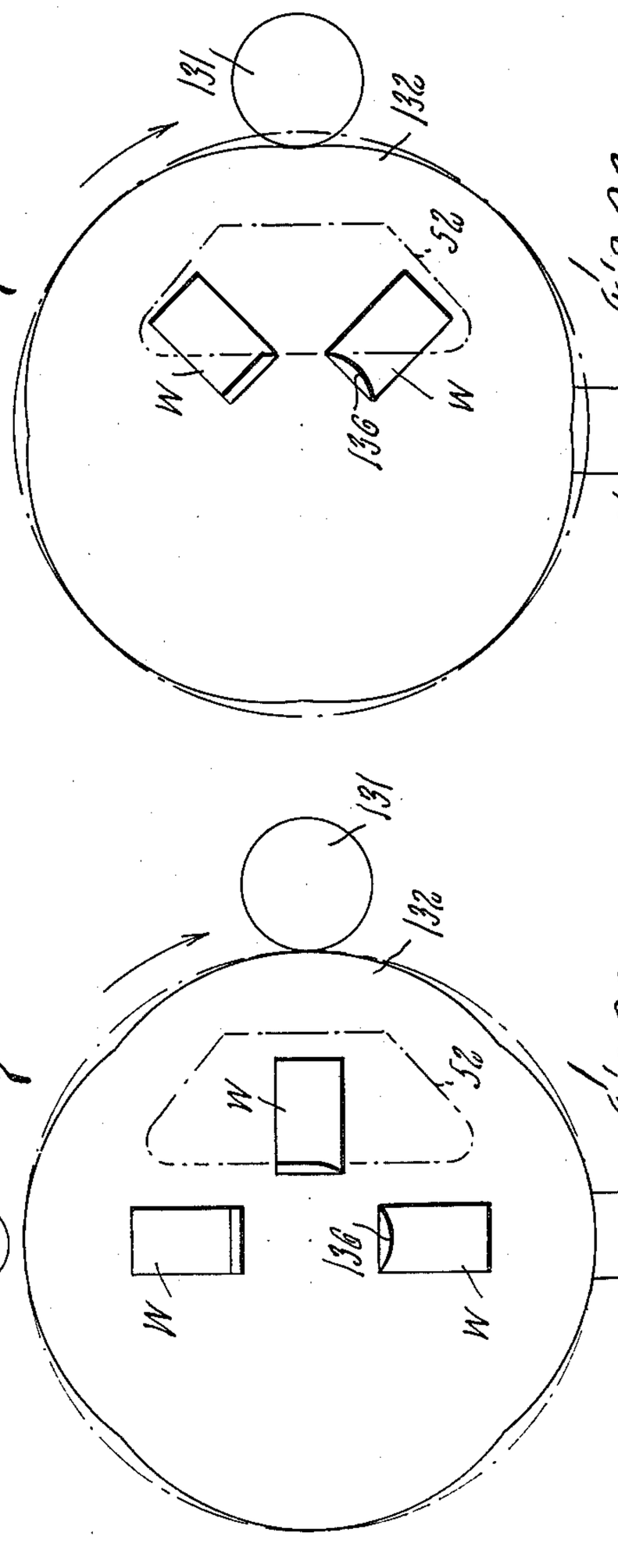

Fig. 23.

Fig. 20.

Fig. 22.

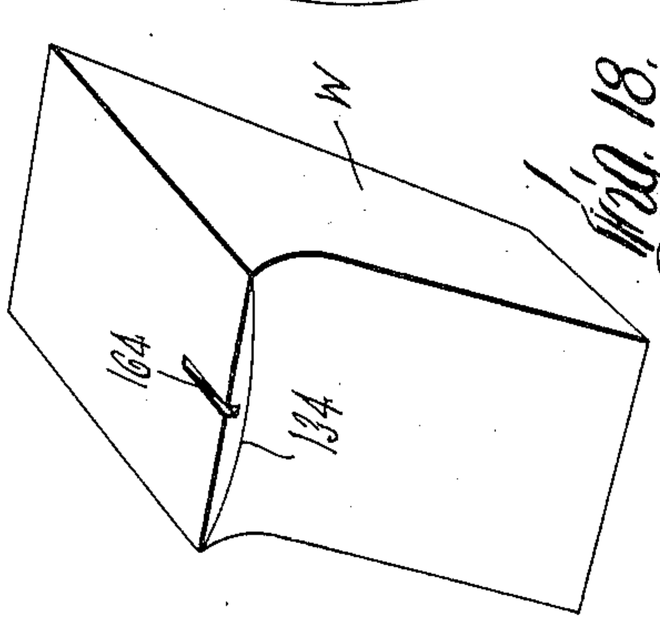

Fig. 18.

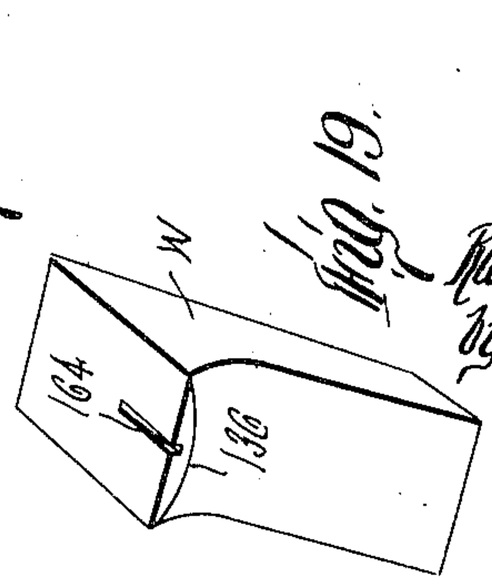

Fig. 19.

Inventors
Ralph H. Pettengill, Deceased
by Rita M. Pettengill, Executrix
John A. Sjostrom
by Wright, Brown, Quinby & May
Attys.

Patented Mar. 6, 1951 2,544,470

UNITED STATES PATENT OFFICE

2,544,470

MACHINE FOR BREASTING LOUIS HEELS

Ralph Howard Pettengill, deceased, late of Georgetown, Mass., by Rita M. Pettengill, executrix, Georgetown, Mass., and John W. Sjostrom, Haverhill, Mass., assignors to Pope Machinery Corporation, Haverhill, Mass., a corporation of Massachusetts

Application January 29, 1949, Serial No. 73,632

8 Claims. (Cl. 12—47.1)

1

This invention relates to machines used in the manufacture of heels for women's shoes and more particularly, to machines for forming the breast and under lip surfaces of Louis wood heel blanks.

These machines consist essentially of a work head, carrying one or more blank holders, by means of which heel blanks are carried in a circular path past a power-driven multi-blade form cutter to form the breast and under lip portion of the heel.

Breast forming machines in common use for this operation may be roughly classified as single blank holder machines, and those having multiple blank holders, or "jacks" as they are commonly called, mounted on a revolving turret.

The single jack machines, which are usually hand operated, employ an oscillating motion by which the blank is pushed past the cutter, and then withdrawn for discharging the breasted blank and reloading. The power operated, multiple jack machines employ a continuous, or sometimes interrupted, rotary motion of the turret. The present invention relates to a power operated, multiple jack breast cutting machine employing continuous rotary movement of the turret, on which the jacks are mounted.

It is a requirement of Louis heel breast cutting machines that a wide range of styles, sizes and heights of blanks can be properly clamped to withstand the cutting stresses, and also that a wide variation in the radii of the arcuate shape of the grooved under lip surface of the heel can be had. The required lip curvature radius varies from about 1¼" to about 2¾".

It has been the common practice to carry the heel blank in a circular path having a fixed axis past the breast cutter with the heel seat surface of the blank in a plane parallel to the axis of work head revolution. The work head has usually been power driven at a fixed uniform R. P. M. and interchangeable turret blocks, varying in size, have been selectively employed for positioning the seat surfaces of the blanks at a radius such as would provide the required lip curvature. It is obvious that when set on the 2¾" radius, the blank is carried past the cutter at more than twice the speed at which it would be carried when on the 1¼" radius. This is objectionable because, as is well understood, the proper relative speed of cutter and work piece is important for best results.

It is an object of this invention to provide means by which any required lip curvature can be had in a multiple jack, constant rotation,

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turret type breast cutting machine without varying the radius of the circular path in which the blanks are carried, relative to the axis of turret rotation. Thus, a uniform relative blank and cutter speed is maintained regardless of the radius of lip curvature. Furthermore, loading the blanks into the machine, either by hand or by power loader, is made much easier because the jacks are always to be found at the same radial position and moving at the same speed when the blanks are presented at uniform intervals for loading, whereas in the prior art machines, both the position and the speed of the jacks at the loading station varied widely, according to the radius being used.

These objects are secured, in the present invention, by mounting the work head on a pivoted member in such manner that it is urged toward the cutter by gravity, as shown, or by spring, if desired, and controlled in its pivotal movement toward the cutter by a cam, the shape of which determines the curvature of the lip of the heel. Another advantage of the cam controlled cut is that the lip curvature is not limited to an arc, but may be of any desired shape.

High production continuous motion, turret type breast cutting machines usually have four jacks, all alike, spaced 90° apart around the work head. These machines are relatively expensive and to be a profitable investment must be capable of high production. Excessive set-over time can discount or even cancel out the higher production which is the purpose of these machines. In prior art machines, the minimum adjustments for each jack for a change of style, lip curvature, height and size of heel blank include side stop, back stop and clamp height adjustments. It has been the practice to adjust each of these three elements on each of the four jacks separately thereby requiring a possible twelve separate adjustments for a set-over. Also a turret block must be taken off and another block of the required size installed. Most of these adjustments required the removal of screws, change of parts and re-entering and tightening of screws. Also, a kick-out pin is required to insure the discharge of the blanks from the jacks after the breasts have been shaped. On variable radius machines, this pin requires re-setting to match radius changes, whereas, in the machine embodying this invention, the pin requires no adjustment.

It is an object of this invention to provide means for saving a major portion of the time required to set over individual jacks as above de-

scribed. In our invention, one adjustment of a unitary control ring sets all four of the side stops, another single adjustment sets all four of the back stops, and a third sets all four of the clamping lever pivot pins for the height of heel blank to be breasted. For quick adjustment to cut a different lip curve, a built in series of cams is provided, having a range of shapes sufficient to cover the range of lip curvatures required on the heels. A slidably mounted cam follower can be quickly set to operate on the cam required for the lip curvature wanted, the proper cam being selected by referring to a suitably marked scale.

Another object is to increase production, and reduce danger of injury to the operator by providing a mechanical loader arranged to transfer heel blanks from a point remote from the jacks and to present them, one at a time, to the respective jacks as they arrive at the loading station.

It has been the practice to load the blanks directly into the jacks by hand. The jacks are necessarily powerful clamping mechanisms, capable of injuring an operator's fingers in case of a misplaced blank. Also, the operator's hand must come close to the cutter as he puts the blanks into the jacks. Much skill was required to secure a moderate rate of production.

In this invention, we have provided a light transfer mechanism, or loader, with guiding means so arranged that an operator can load more blanks with less effort and skill and with greater safety, as compared to the direct jack loading method.

The blanks which are operated upon by the machine embodying the present invention are destined to be turned in a turning machine, the function of which is to shape the side and back surfaces of the heel. In the turning machine the blank is presented to a form cutter which operates first from one side edge of the breast surface around to the center of the back, then from the other side edge of the breast surface and around to the center of the back. It is evident that the movement of the form cutter relative to the blank must be symmetrical with respect to the already formed breast and lip surfaces; otherwise, one of the lip points, as viewed from the side, will be thicker than the other, which means a defective product which must be discarded.

In order to provide a convenient and accurate index for the mid point of the lip without requiring any separate operation or handling of the blanks, a small circular saw is provided in the loading table arranged to make a small slot in the front portion of the heel seat face of the blank, as the operator moves the blank along the table toward the loader. This slot can conveniently be used in cooperation with a centrally located male key in the turning machine jack as a transverse centering means when the blank is subsequently placed in a turning machine. The slot, however, is cut wholly in that portion of the blank which is subsequently removed when the heel seat face is concaved or cupped to fit the convex heel seat of the shoe.

The loading table has a rear wall against which the operator will align each blank, preparatory to moving it into the loader with its seat surface resting on the table top, and its front end toward the loader. As the operator slides the blank toward and into the loader, the slotting occurs without any noticeable extra effort or expenditure of time on the part of the operator.

For a more complete understanding of the invention, reference may be had to the following description of an embodiment thereof, and to the drawing, of which

Figure 1 is a plan view of a machine embodying the invention;

Figure 2 is a fragmentary section on the line 2—2 of Figure 1;

Figure 3 is an end elevation of the machine shown in Figure 1;

Figure 4 is a plan view of the form cutter and a heel blank which has been operated on thereby;

Figure 5 is an end elevation of the cutter, a portion being broken away to show a section;

Figure 6 is a side elevation of the work head, a considerable portion thereof being broken away to show a section;

Figure 7 is a fragmentary portion of Figure 6 showing the jaw mechanism of a jack adjusted to grip a blank of different height;

Figure 8 is a section on the line 8—8 of Figure 6;

Figure 9 is a section on the line 9—9 of Figure 6;

Figure 10 is a section on the line 10—10 of Figure 6;

Figure 11 is a section on the line 11—11 of Figure 8;

Figure 12 is a section on the line 12—12 of Figure 6;

Figure 13 is a fragmentary side elevation of the mechanism shown in Figure 12;

Figure 14 is a fragmentary plan view of the same;

Figure 15 is a front elevation of the work head and a portion of the slot cutting mechanism;

Figure 16 is a section on the line 16—16 of Figure 15;

Figure 17 is a section on the line 17—17 of Figure 16;

Figure 18 is a perspective view of a heel blank the breast of which has been formed with an under lip surface on an arc with a relatively large radius curvature;

Figure 19 is a perspective view of a heel blank the breast of which has been formed with an under lip surface on an arc having a relatively small radius of curvature;

Figure 20 is a diagrammatic end view of a cam shaped to produce a lip with a relatively large radius of curvature; the fixed cam follower, heel blanks in three positions and the form cutter being indicated;

Figure 21 is a diagrammatic view of the same cam in a different angular position;

Figure 22 is a similar diagrammatic view showing a cam shaped to produce a lip with a relatively small radius of curvature; and

Figure 23 is a diagrammatic view showing the cam of Figure 22 in a different angular position.

In the machine illustrated in the drawings, the work head portion is hinged on a suitable base 30 so as to rock about a horizontal axis extending in a direction lengthwise of the machine. This work head portion, as shown in Figure 6, includes a bearing member 32 and is pivoted on a horizontal shaft 34 mounted in suitable bearings 36 carried by the base 30. A horizontal shaft 38 is journaled in the bearing member 32, this shaft being driven through a gear wheel 40 mounted thereon near the rear end of the machine, this gear wheel meshing with a pinion 42 which is driven through a reduction gear 44 by a suitable electric motor 46. At the forward end of the shaft 38 is mounted a turret head 50 which

carries a series of four jacks or clamping devices for heel blanks symmetrically arranged about the axis of the shaft. These jacks travel in a circular path since they are radially spaced from the axis shaft **38**. Thus the heel blanks which are gripped thereby pass successively in a circular path past a form cutter **52**, which operates on the forward or breast surface of the heel blank.

The clamping mechanism by which the heel blanks are gripped is illustrated in Figures 6 and 7 and comprises a lever or clamp bar **54** which is rockably mounted on a pin **56** extending between the arms of a yoke member **60** which has a nose **62** bearing against an adjustable stop ring nut **64**, as shown in Figure 6. The yoke **60** is located in a longitudinal channel in the turret head, and is rockably supported by short shafts **66** extending from each side thereof into the turret head. A spring **67** is employed to hold the nose **62** of the yoke against the ring nut **64** so that it rocks only when the ring nut is adjustably shifted to accommodate heel blanks of a different height. When the ring nut is moved forward, for example, the yoke rocks like a bell-crank on its shafts **66**, the forward movement of the nose **62** resulting in a radially inward movement of the pin **56**. As this pin is the rocking axis of the clamp bar **54**, the jack is thus adjusted to grip heel blanks of lesser height. At the forward end of the clamp lever **54** is mounted a clamp dog **68** which is pivoted to the lever **54** by the pin **56**. This clamp dog bears against an adjusting screw **70** and is held against such screw by a suitable spring **72**. The clamp lever **54** is rocked by a roller **74** which is at its rear end and which bears on a lever **76** the latter being pivoted to the turret head as at **78** and being actuated by a cam follower **80** thereon engaging on a cam surface **82** which is secured to the front face of the frame member **32**.

In order to provide for a yielding on the part of the clamping dog in case a heel blank of extra height is encountered, the roller **74** is not mounted directly on the lever **54**, but on the rear end of an auxiliary lever **90** which is pivoted at its forward end to the lever **54** by a pin **92**. At the rear end of the lever **54** is a cross-piece **84** under which a pair of springs **86** are compressed, the lower ends of the springs pressing against a cross-piece **88** near the rear end of the auxiliary lever **90**. Any thrust on the roller **74** of the lever **90** resulting from an outward swing of the lever **76** acts through the compression springs **86**. These springs preferably are strong enough so that the levers **90** and **54** rock as a unit unless excessive resistance is encountered by the clamp dog at the forward end, in which case the springs **86** can yield to avoid damage to the jack.

As shown in Figure 10, the stationary cam **82** has two portions which are circular concentric arcs of different radii joined by suitable ramps. The high portion of the cam extends a little more than 180° about the axis of rotation of the shaft **38**, the low portion being a little less than 180°. It is evident from Figure 10 that as the turret head revolves in a clockwise direction, the successive cam followers **80** will engage the low portion of the cam when ascending on the left-hand side of the axis, but that shortly before each cam follower reaches a position directly over the axis, it will have been moved outwardly away from the axis to the high portion on which it remains during its travel around the right-hand side of the cam until it has passed the lowermost position directly below the axis. Figure 6 shows the position of the uppermost cam follower **80** on the high portion of the cam, this resulting in the clamp dog **68** being in its gripping position. The clamp dog **68** bears against the small end of the heel blank, this being the end which is ultimately the ground engaging portion of the heel. The opposite or heel seat end of the heel blank bears on the surface of a central block **94** which is mounted on the forward end of the turret head coaxially with the shaft **38**. The block **94** has four faces or platforms **95** to be engaged by the heel seat surfaces of blanks gripped in the turret head, each of these platforms being rearwardly inclined toward the axis, as indicated in Figure 6.

Adjustments are required to accommodate heels of different heights and other dimensions. The adjustment for height is made by rotating the ring nut **64**. This ring nut is in threaded engagement with a portion of the turret head so that relative rotation thereof advances the nut axially in one direction or the other. A series of holes **96** may be provided in the periphery of the ring nut to receive a tool by which the nut can be rotated. Since the noses **62** of all four yoke members **60** engage the forward surface of the ring nut **64**, it is evident that adjustment of the ring nut **64** results in equal simultaneous adjustments of all of the clamping jacks, the rocking axes **56** of the clamp levers being shifted toward or from the axis of the turret head. Figure 7 shows the ring nut **64** shifted forward so that the axes **56** are moved inward and the jacks can grip blanks of lesser height. Scale marks on the rim of the nut may be provided, if desired, to indicate the proper position of adjustment of the nut to take care of any specified height of heel. In order to keep the clamping faces of the individual clamp dogs **68** substantially parallel to the corresponding clamping platforms **95** on the block **94**, individual adjustments may be made by turning the set screws **70**.

In order to facilitate the proper positioning of heel blanks W on the platforms **95**, positioning guides are employed, one such acting as a back stop to be engaged by the rear face of the heel blank, another being a side stop to be engaged by one of the side faces of the blank. These guides or stops must be readjusted when the machine is set over to accommodate heel blanks having different dimensions from those of the heel blanks previously operated on. It is desirable, according to the invention, that the back stops be capable of simultaneous adjustment and that the side stops likewise be capable of simultaneous adjustment so that the time required for setting over the machine will be reduced to a minimum. The back stops may each consist of a forward extension **100** (Figure 6) of a ring nut **102** which is screw threaded on a reduced portion of the turret head. By rotating the nut **102** in one direction or the other, it can be made to advance either forward or rearward and thus to adjust simultaneously all of the back stops **100**. Since each back stop must coperate with one of the platforms **95**, it is evident that adjustive rotation of the nut **102** must be by steps of 90°.

The nut **102** is provided with four notches **103** in its rear face spaced from each other by angles of 90° as seen in Figure 8. These notches are adapted to be engaged by a locking dog **104** which is mounted on a plunger **106**, slidably projecting from a front face of the turret head **50**. The plunger is provided with a compressed spring **108** which pushes the dog **104** forward against the rear end of the nut **102** so that when one of the notches **103** in the nut is in line with the dog **104**,

it is entered thereby so as to lock the ring against rotation. This keeps the back stops 100 in any position of adjustment until the dog 104 is pushed back out of the slot in the ring nut 102. When it is desired to adjust the back stops, the upper end of the dog 104 will catch in a notch 110 of a spring 112 so that the dog 104 will be held in its retracted position while the ring nut 102 is being turned.

The side stops for the jacks consist of four pins 114 (Figures 6 and 8) spaced from each other by 90°, which project forward from a ring 116 mounted within the forward end of the ring nut 102. In order to hold the ring 116 assembled with the nut 102, the ring bears against the rear surfaces of the projections 100 of the ring nut, each projection 100 being provided with an arcuate slot 118 through which a locking screw 120 extends into the ring 116. When the screws 120 are loosened, the ring 116 can be adjustably rotated so as to vary the position of the side stops 114 relative to the corresponding back stops 100. The desired amount of rotative adjustment of the ring 116 can be readily determined by suitable scale marks on a portion of the front face of the nut 102 which cooperate with an index mark on the ring 116. Rotation of the latter obviously results in simultaneous adjustments of all four side stops 114. When the ring 116 has been suitably adjusted, the set screws 120 are set up to secure it in its adjusted position. Back stop adjustments can be made at will without affecting the side stop adjustment, or vice versa.

As illustrated in Figure 6, blanks for high Louis heels have a breast face at such a steep angle to the heel seat surface that the top face of the blank is considerably offset in its own plane from the heel seat face. When strong clamping pressure is applied to the top face in a direction perpendicular to the planes of the two faces, there is danger that the rear end of the seat face will be lifted out of proper position, or that the blank will be distorted by unbalanced pressure, or both, resulting in a defective product. To avoid these hazards, the seat face engaging platform 95 has been slanted downward toward the axis of turret rotation, the back stop 100 is positioned to contact the back surface of the blank at a point spaced up from the bottom edge thereof, and the top jaw 68 is pivoted on its pin 56 in such manner as to cause the clamping pressure to center, well within the seat surface area and to tend to push the wedge shaped rear end of the blank into the recess formed by the platform 95 and the back stop 100.

The form cutter 52 is illustrated in Figures 4 and 5 and may comprise the usual body in which are clamped suitable blades 122. These blades cut and shape the face of the breast and under lip surfaces of the blank as the blank is moved past the stationary, rapidly rotating form cutter. It is desirable that the forward edge of the blank be trimmed so as to secure a lip edge uniformly positioned relative to the breast surface. To this end, trimming blades 124 are also mounted on the body, these blades being arranged to trim off the narrow segmental front face of the blank between the heel seat surface and the arcuate lip edge. The cutter 52 is mounted as usual on the end of a suitable shaft 126 which is mounted in bearings 128 on a platform 130, as indicated in Figure 1. The cutter may be driven by any suitable means such as, for example, a motor 133 mounted on the platform 130 and connected to the shaft 126 by suitable belts 135 running over pulleys. The platform 130 is preferably inclined, as indicated in Figure 3, so as to present the form cutter to the heel blanks at a point favorable to the discharge of shavings as the blanks successively move past the cutter in an arcuate path. The usual adjustments for the table 130 are provided so that the cutter can be moved adjustably forward, rearward or laterally with respect to the machine, or can be swung about an axis to position the cutter as required.

The entire work head, including the bearing member 32 and the turret head 50, is rockable about the axis of the shaft 34, but is held with its center of gravity offset from the axis of the shaft both vertically and horizontally so that gravity constantly impresses a turning moment on the work head urging it toward the cutter. In the embodiment of the invention illustrated on the drawings, the center of gravity of the work head is above the axis of the shaft 34 and is horizontally offset toward the cutter, but it is obvious that the same effect would be had if the center of gravity were below and offset away from the cutter. The turning moment which urges the head toward the cutter may be augmented, if desired, by the use of a suitable spring or springs, but no spring is required or shown in the particular machine illustrated on the drawings.

The work head is held in position by a fixed wheel 131, against which it leans. The wheel 131 is actually a cam follower resting against a selected cam disk 132, seven of which are illustrated in Figures 13 and 14, these disks all being nearly circular and being mounted coaxially with the shaft 38 to rotate therewith. The cam disks 132, although nearly circular, are not accurately circular except for one of them. In the machine, as shown, the middle cam is a true circle; the others have four arcuate lobes spaced 90° apart, one for each jack on the turret head, those on one side of the circular cam having lobes with radii greater, and those on the other side lesser, than the radius of the circular cam. The effect of this series of cams is to duplicate an equal number of under lip shapes such as have heretofore been produced by the use of interchangeable turret blocks of differing dimensions selectively mounted, according to prior practice, on a turret revolving on a fixed axis. Furthermore, by the use of cams, the under lip shape is not restricted to circular arcs, but may be of other shapes. It is evident from Figure 12 that as the shaft 38 rotates with the cam disks 132, the shape of the particular disk bearing against the follower 131 will determine the angular position of the work head as a whole with reference to its rocking axis. The purpose of the disk cams 132 and the resultant rocking movement of the work head with respect to the stationary form cutter is to enable the machine to cut under lip shapes of different curvature on the heel blanks. For example, Figure 18 shows a heel blank which is relatively wide and which has an under lip curvature 134 with a relatively long radius. Figure 19 illustrates a heel blank which is relatively narrow and which has an underlip curvature 136, having a relatively short radius.

It is a feature of the machine herein described that it can be quickly and easily adjusted to cut a lip with a broad curvature like that of the lip 134 or a lip with a sharp curvature like that of 136 without altering the linear rate of travel of the blank past the form cutter. Figures 20 to 23 inclusive illustrate how these different curvatures are achieved by the use of different selected cam

disks 132. As shown in these figures, the turret head, which is not shown in these figures, but which revolves with the disk cams 132 arranged symmetrically about the same axis, rotates in a clockwise direction. A heel blank W is gripped by a jack when the jack is in its uppermost position over the axis of rotation. The blank is then carried down toward the right to the lowermost position below the axis of rotation. As the turret head carrying the blank rotates to move the blank past the form cutter 52 in a circular path, the shape of the disk 132 which bears against the fixed cam follower 131 determines the curvature of the lip edge. If, for example, the cam disk 132 is exactly circular, the radius of curvature of the lip edge will be equal to the distance between the axis of rotation and the lip edge itself. If, however, the contour of the cam disk 132 is modified so that the radius of curvature of any given lobe is greater or less than the radius of the circular cam, the lip curvature will then be controlled by the cam shape independently of the radius of the heel blank path relative to the axis of turret rotation.

The turret in Figure 12 is shown at the mid point of the cut on the blank. At this mid point 141 all of the cam surfaces are at the same radial distance from the turret axis of rotation. A cam lobe includes an arc extending 45° each way from point 141. While all cams meet at point 141, those on one side of the central circular cam have curvatures having radii less than, and those on the other side greater than, that of the circular cam.

By this arrangement an operator, after having secured the proper thickness of lip at the center, can get greater or less curvature as required to produce the proper lip thickness at the sides, without affecting his already arrived at lip center thickness, by moving the cam follower on to a cam of greater or less curvature.

Figures 20 and 21 show a cam having a shape adapted to produce lip curvature of relatively long radius. When the forming of the lip begins, as in Figure 21, the cam follower 131 contacts the cam on a portion more remote from the axis of turret rotation than that contacted at the center of the cut as in Figure 20. Thus, as the cutter cuts from the edge toward the center of the lip, the turret is being rocked toward the cutter until the center is reached, after which the action is reversed, thus broadening the curvature of the lip.

Figures 22 and 23 show a cam having a shape adapted to produce a lip curvature of relatively short radius. When the forming of the lip begins, as in Figure 23, the cam follower 131 contacts a portion of the cam less remote from the axis of turret rotation than that contacted at the center of the cut as in Figure 22. Thus, as the cutter cuts from the edge toward the center of the lip, the turret is being rocked away from the cutter until the center is reached, after which the action is reversed, thus sharpening the curvature of the lip.

The several cam disks 132 are carefully shaped with lobes of increasing or decreasing radius, as illustrated in Figure 12, and in exaggerated form in Figures 20 to 23, these variations being in accordance with the requirements for lip edges of different specified curvatures varying ordinarily from a curvature having a radius of 1¼ inch to a curvature having a radius of about 2¾ inches.

Figures 13 and 14 show convenient means for quickly shifting the cam follower 131 from one

cam disk to another. The cam follower is mounted to rotate on a frame member 150 which is slidable in a direction parallel to the axis of rotation of the work head so as to bring the cam follower 131 selectively into the plane of any one of the cam disks 132. A suitable bolt 152 is provided to clamp the cam follower 131 in any selected position of operation. In order to shift the cam follower, the bolt 152 is loosened, the work head is rocked toward the left sufficiently to take its pressure from the cam follower, then the cam follower is shifted along its axis until its plane is in that of the selected cam disk. The bolt 152 is then set up to secure the cam disk in its adjusted position and the work head is released to lean against the cam follower 131.

In order to rock the heavy work head away from contact with the cam follower, a convenient lever 154 may be pivoted as at 156 and provided with an eccentric surface 158 which bears against a nearby surface of the work head. When the lever 154 (Figure 12) is swung upward, the eccentric surface 158 wedges the work head toward the left, thus removing it from contact with the cam follower. When the latter has been shifted to its desired new position, the lever 154 may be swung down to permit the work head to rock against the cam follower.

Since any irregularity or inaccuracy in the cam disk which bears against the cam follower 131 would result in a corresponding inaccuracy in the cut made on the heel blank, it is desirable that no dirt or other foreign matter be permitted to move into the bite between the cam follower and the disk against which it bears. To this end a doctor or wiper 160 is pivotally mounted as at 162 on the supporting frame for the cam follower 131, so that it always will be immediately above the cam follower and will wipe the edge of the disk 132 as it approaches the cam follower 131.

The machine is provided with means for making a short shallow slot in the heel seat of each heel blank to act as a guiding means for ensuring the correct location of the heel blank when it is subsequently inserted in a jack of a turning machine in which the remaining side and rear surfaces of the blank will be cut to shape. It is important that the heel blank be properly centered in the jack of the turning machine since if it is off center, the cutter of the turning machine will cut more deeply into one side surface of the blank than in the other so that the ends of the lip edge will not be uniform or symmetrical, and the product will be defective. Figures 18 and 19 illustrate heel blanks in which a short slot 164 of this description has been cut. Since the slot thus made is located entirely in material which will be later removed to form the cup of the heel seat, it cannot mar the finished product.

A circular saw 166 for making slots 164 in the blanks is illustrated in Figures 1, 15, 16 and 17. This saw is mounted in a vertical plane and is driven by a suitable motor 168 connected to the saw by a belt 170 so as to rotate the saw at high speed. The saw projects up through a loading table 172, the top of which varies from a lower level to the left of the saw to a higher level to the right of the saw, as shown in Figure 16. These two levels are connected by a curved surface 174 in which is the slot 176 through which the saw projects. The blanks W are moved along the table 172 from left to right over the saw and are guided by a side wall 178 having a horizontal

rib 180 against which a side face of each blank is pressed as it is manually moved past the saw 166. The curved surface 174 of the table is so arranged with respect to the saw that as a blank is pushed over the saw, the cut 164 is made at the center point of the forward edge of the heel seat surface, thus surface being the one which bears on the table 172. As the blank progresses toward the right, the forward edge of the heel seat surface of the blank rides up on the upwardly curving surface 174 so that the depth of the cut 164 decreases until the blank soon clears the saw altogether, this occurring when the forward lower edge of the blank reaches the upper level of the table 162. At that point, the blank is tilting slightly to the rear, as indicated by one of the broken outlines in Figure 16, owing to the fact that its forward end is on the upper level and its rear edge is on the lower level of the table. As the blank is moved farther toward the right, it is restored to its normal position in which the bottom face is flat against the surface of the table. This forward rocking of the blank over the edge between the curved portion 174 and the upper level of the table 172 lifts the rear portion of the blank clear of the saw so that the cutting is confined to the relatively short slot 164 in the forward portion of the heel seat face.

Since the machine must accommodate blanks of different widths, it is necessary that the saw be adjustably movable along its axis toward or from the guiding rib 180. For this purpose, the shaft of the saw is mounted in a bracket 182, this bracket being secured to a slide 184 which is a part of the table 172 and which contains the slot 176, through which the saw projects. The slide 184 is adapted to be shifted in a direction parallel to the axis of rotation of the saw, the saw being carried with it. For this purpose an adjusting screw 186 is threaded through a hole in the bracket 182, the screw 186 having a shaft which extends to the edge of the machine and terminates in a hand wheel 188 (Figure 1). Rotation of this hand wheel shifts the saw 166 and the slide 184 through which is projects toward or from the guiding rib 180 so that the saw can quickly and easily be adjusted to accommodate heel blanks of different widths. As indicated in Figure 1, a series of scale marks 190 may be provided to facilitate setting the slide 184 according to the width of the heel blank.

When a heel blank has been moved past the saw 166, it is then moved along to a feeding means by which it is pushed into engagement with one of the jacks on the turret head. A feeding means of this kind is illustrated in Figures 1 and 2, and comprises an elongated platform 192 which extends diagonally toward the turret head, terminating at a point closely adjacent to the uppermost jack on the turret head. A feeding member 194 is slidable along the platform 192 for the purpose of pushing the blanks one by one into engagement with the successive jacks as the jacks come into the uppermost position during their rotation with the turret head. The pusher 194, as indicated in Figure 2, may comprise a plate 196 slidably supported on top of the platform 192. To the edges of this plate are secured side members 198 and 200, which are guides to keep the pusher on the platform 192. Superimposed on the plate 196, and laterally adjustable relatively thereto is another plate 202 which is recessed at its forward end as at 204. In front of the forward end of the plate 202 is an angle member 206 having two arms presenting faces which are at right angles to each other, as indicated in Figure 1. This angle member is connected to the plate 202 by springs 208, which permit the member 206 to yield under pressure. When the pusher is in its retracted position, as shown in Figure 1, the angle of the member 206 is located in position to receive a blank as it is pushed along the table 172 after passing the saw 166. The front and one side of the blank thus engages the two forward faces of the member 206. The pusher is then moved so as to shove the blank engaged by the member 206 into position to be clamped in the uppermost jack on the turret head, this movement being accurately timed to present the blank to the jack just before the jack is closed by the cam 82 to its gripping position.

Figure 15 shows the work head at a point at which a blank W has just been clamped in the top jack, and the feeder withdrawn to receive the next blank. The blank W is pushed into clamping position just as the plane of the seat platform 95 arrives at the top or becomes parallel with the plane of the surface of platform 192. The blank W begins to pass over this seat platform just before it has reached the top, thus insuring easy entrance to clamping position. The diagonal path of the pusher causes the blank to be pushed snugly, not only against side stop 114, but also against and under back stop 100 as shown in Figure 6. There must be an interval of time between the time the blank arrives at the clamping position and the actual clamping. This interval is extremely short, but however short the blank must be held in true position during such interval. Inasmuch as the work head is in constant rotary motion, it is evident that the means for keeping gentle pressure on the blank to keep it in true position against the side and back stops and in contact with the seat surface jaw during this interval must be yielding in such manner that it can accommodate itself to blank movement in any direction over a small range. In the machine, as shown, this accommodation is provided by mounting the pusher on three coil springs 208, which form its sole support.

Means for operating the feeding mechanism is illustrated in Figures 1, 3 and 15. For this purpose a pinion 210 (Figure 3) is mounted to mesh with the driving pinion 42, the pinion 210 being mounted on a shaft 212 which also carries at its forward end a crank wheel 214. Connected to this crank wheel is a pitman 216 extending to a rocking lever 218 which rocks a shaft 220 (Figure 15). Also fixed on the shaft 220 is a rocking lever 222 having a link 224 connected by two universal joints to a horizontal rocking lever 226. The latter is mounted on a vertical shaft 228 which also carries a lever 230. The end of the lever 230 is connected by a suitable link 232 to the pusher 194. Since the pusher is thus driven directly from the driving pinion 42 which also drives the turret head, the movement of the pusher is thus accurately synchronized with the movement of the jacks.

In order to prevent the heel blanks from sticking to the jacks after the jacks have been opened, a pin kick-out 240 is mounted below the turret head in position to be engaged by any blank which may still cling to a jack after the latter has been opened. The blanks, when released, fall into a suitable receptacle 242 (Figure 3) in the machine housing below the work head.

A dog clutch operated by a lever 244, Figures

1 and 6, provides for disconnecting the work head from its driving mechanism so that the work head can be freely rotated by hand for purposes of inspection or adjustment.

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

1. Apparatus of the class described, comprising a base, a bearing member hinged on said base to rock on a horizontal axis, a horizontal shaft journalled in said bearing member, means for rotating said shaft, a turret head mounted on said shaft, a work holder mounted on said head and spaced from the axis of said shaft whereby to move in a circular path about said axis, a cam disc mounted on said shaft and a fixed cam follower mounted on said base in engagement with said cam, the bearing member being arranged above its hinge axis with its center of gravity horizontally offset toward said cam follower whereby the cam is kept pressed against the follower, and a tool mounted in an adjustably fixed position adjacent to the path of said work holder.

2. Apparatus of the class described, comprising a base, a bearing member hinged on said base to rock on a horizontal axis, a horizontal shaft journalled in said bearing member, means for rotating said shaft, a turret head mounted on said shaft to rotate therewith, a plurality of work holders mounted on said head and equally spaced from the axis of said shaft, a series of differently shaped cam discs mounted side by side on said shaft, a cam follower mounted on said base and adjustably movable parallel to said axes for selective engagement with any one of said cams, said bearing member being arranged above its hinge axis with its center of gravity horizontally offset toward the cam follower whereby said follower is constantly pressed by one of said cams, and a fixed tool mounted adjacent to the path of movement of said work holders.

3. A wood heel breasting machine, comprising a base, a bearing member hinged on said base to rock about a horizontal axis, a horizontal shaft journalled in said bearing member, means for rotating said shaft, a turret head mounted on said shaft to rotate therewith, a plurality of heel blank gripping devices mounted on said turret head and equally spaced from the axis of said shaft, a plurality of differently shaped disc cams mounted on said shaft coaxially therewith, a cam follower mounted on said base and adjustable in a direction parallel to said shaft for selective engagement with any one of said cams, said bearing member being arranged above its hinge axis with its center of gravity offset horizontally toward said cam follower, whereby said bearing member presses against said cam follower the cam in contact therewith, a rotatable cutter mounted in an adjustably fixed position on said base adjacent to the path of travel of said gripping devices, said cams being shaped to rock the bearing member gradually on its hinge axis as the shaft rotates so as to modify the curvature of the path of each gripping device as it passes the cutter, means for automatically closing each said gripping device before it passes said cutter and for opening each said device after it passes the cutter, and means for feeding a heel blank to a gripping device just before the device is closed.

4. In a machine for operating on wood heel blanks, a rotatable turret head, a series of work-clamping devices on said turret head, each said device comprising an outwardly facing platform

and a rocking lever having a jaw movable in a radial direction toward and from said platform to grip and release a work piece, means for simultaneously and equally adjusting the gripping positions of the jaws of all of said devices to accommodate work pieces of different sizes.

5. In a machine for operating on wood heel blanks, a rotatable turret head, a series of work-clamping devices on said head, each said device comprising an outwardly facing platform and a clamping dog movable radially to and from a blank-gripping position with respect to the corresponding platform, a single means for simultaneously adjusting the gripping positions of all said dogs, a side-stop element and a back-stop element mounted on said head adjacent to each said platform, a single means for simultaneously adjusting the positions of all said side-stop elements, and a single means for simultaneously adjusting the positions of all said back-stop elements relative to the respective platforms.

6. In a machine for operating on wood heel blanks, a rotatable turret head, a series of work-clamping devices mounted on said head, each said device comprising an outwardly facing platform, a clamping dog movable radially to and from a clamping position with reference to the corresponding platform, and means for moving said dog, said means including a rocking lever at the forward end of which said dog is mounted, a supporting member pivotally connected to said lever at an intermediate point of the lever, said supporting member being pivotally mounted on said head a point to the rear of the said pivotal connection and having a rearwardly projecting nose located radially outward of said pivotal mounting, a ring nut in threaded engagement with said head and abutting the noses of all said supporting members, spring means resiliently holding said noses against said nut whereby rotation of said nut rocks all said supporting members simultaneously and thereby adjustably moves the pivots of the rock shafts simultaneously inward or outward, and cam means acting on the rear ends of said rocking levers to rock each said lever at predetermined points in its travel around the axis of the head as the head rotates.

7. In a machine for operating on wood heel blanks, a rotatable turret head, a plurality of work-clamping devices mounted on said head, each said device including an outwardly facing platform against which the work piece is pressed, a ring nut in threaded engagement with a portion of said head and coaxial therewith, a forward extension on said nut corresponding to each said clamping device and arranged to serve as a back-stop element therefor, and releasable means on said head for locking said nut against rotation relative to said head.

8. In a machine for operating on wood heel blanks, a bearing member, a horizontal shaft journalled in said member, a turret head mounted at the forward end of said shaft, a series of work-clamping devices on said head movable around the axis of the head as the shaft and head rotate, means automatically closing and opening each said device as it reaches predetermined points in its path of travel about said axis, an elongated loading platform extending toward the forward end of said head in a direction diagonal to said axis, a loading device movable on said platform toward and from said

head, said loading device including a slide and a work-engaging member on said platform resiliently backed by said slide, and means for reciprocating said slide and work-engaging member on said platform in timed relation with the rotation of said head.

RITA M. PETTENGILL,
Executrix for the Estate of Ralph Howard Pettengill, Deceased.

JOHN W. SJOSTROM.

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