

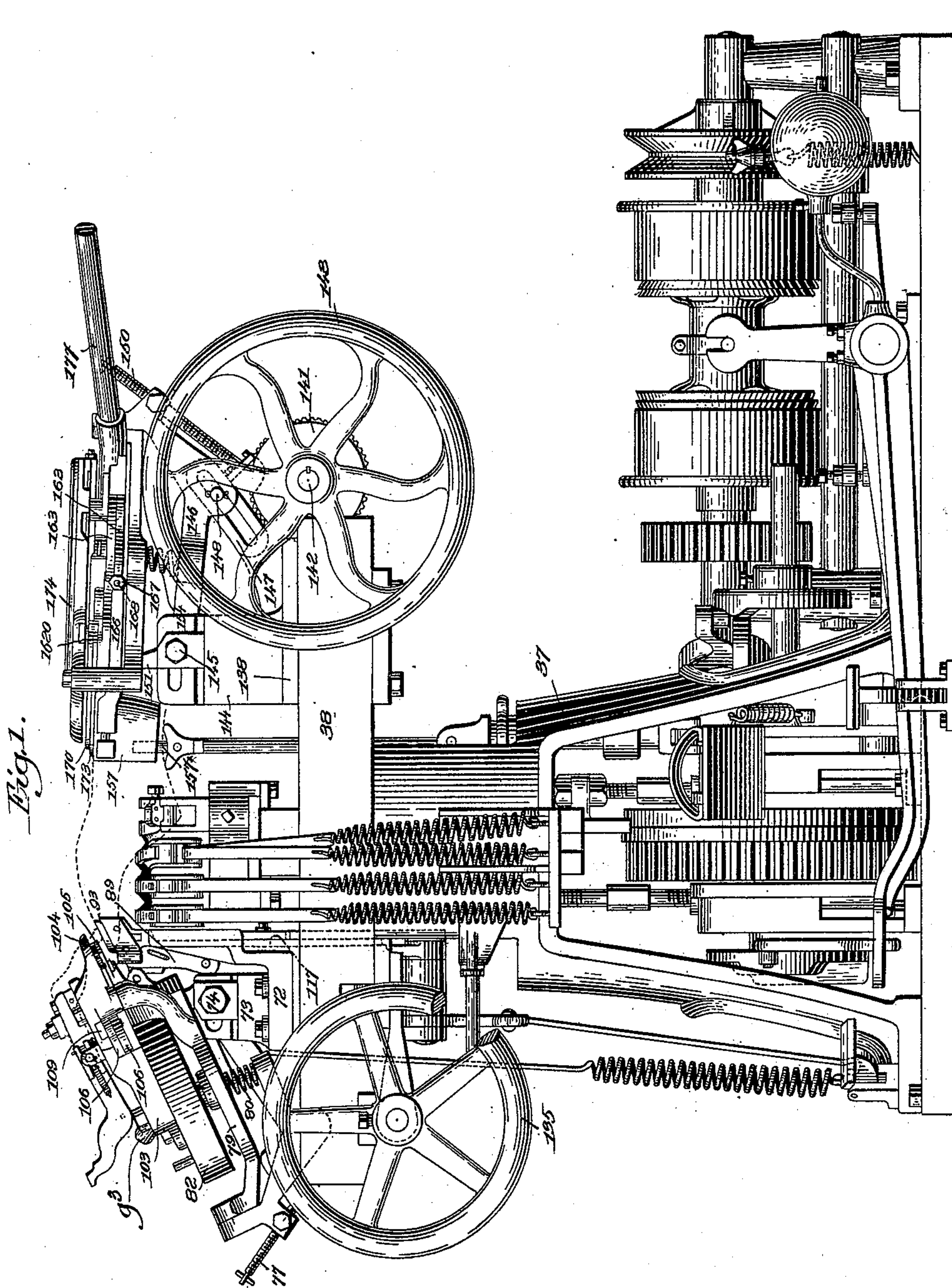
(No Model.)

4 Sheets—Sheet 1.

M. BROCK.
LASTING MACHINE.

No. 601,936.

Patented Apr. 5, 1898.



Witnesses:
Fred L. Gumbel
Thomas J. Drummond

Inventor
Matthias Brock.
by Crosby & Gregory
attys.

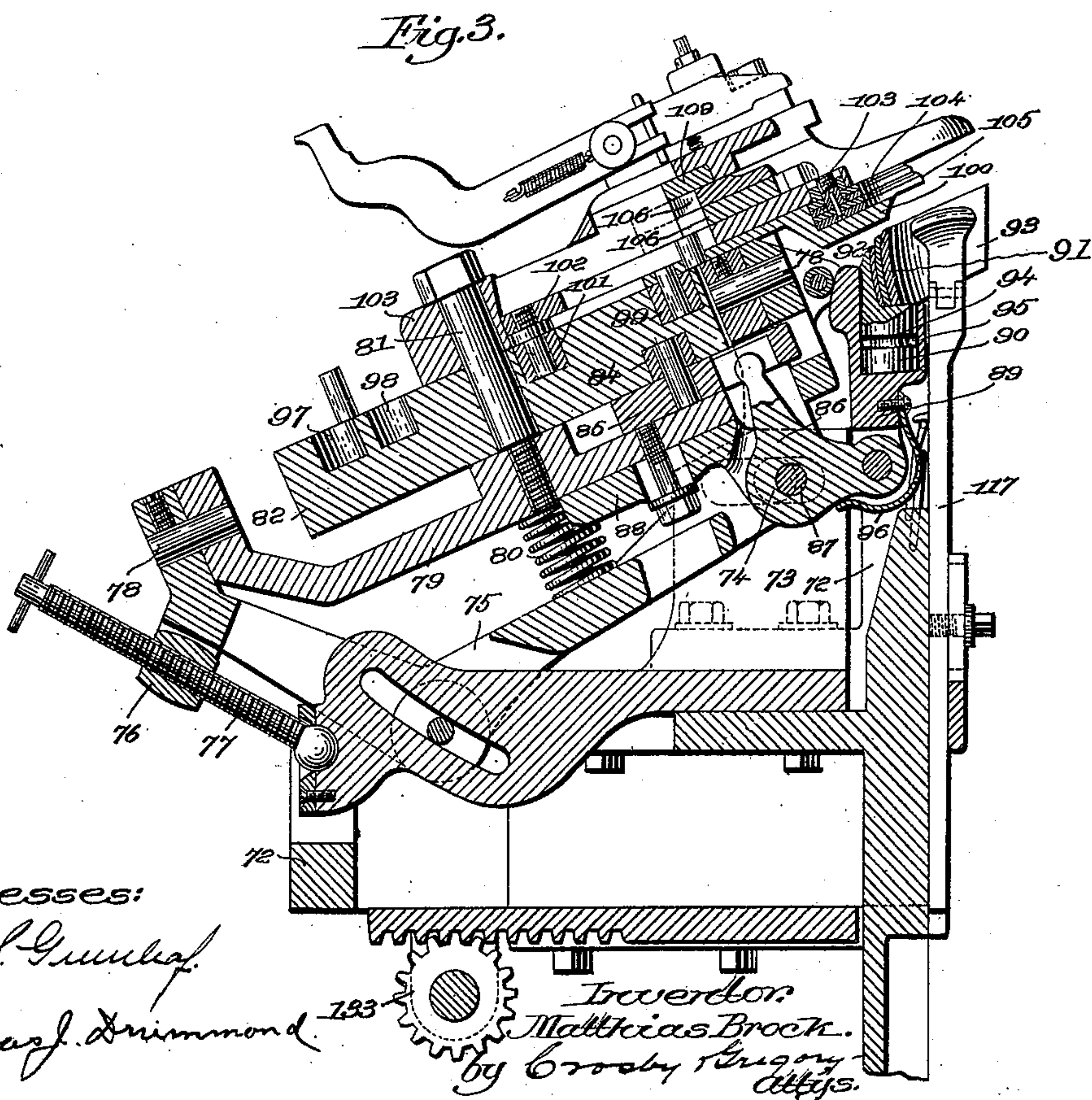
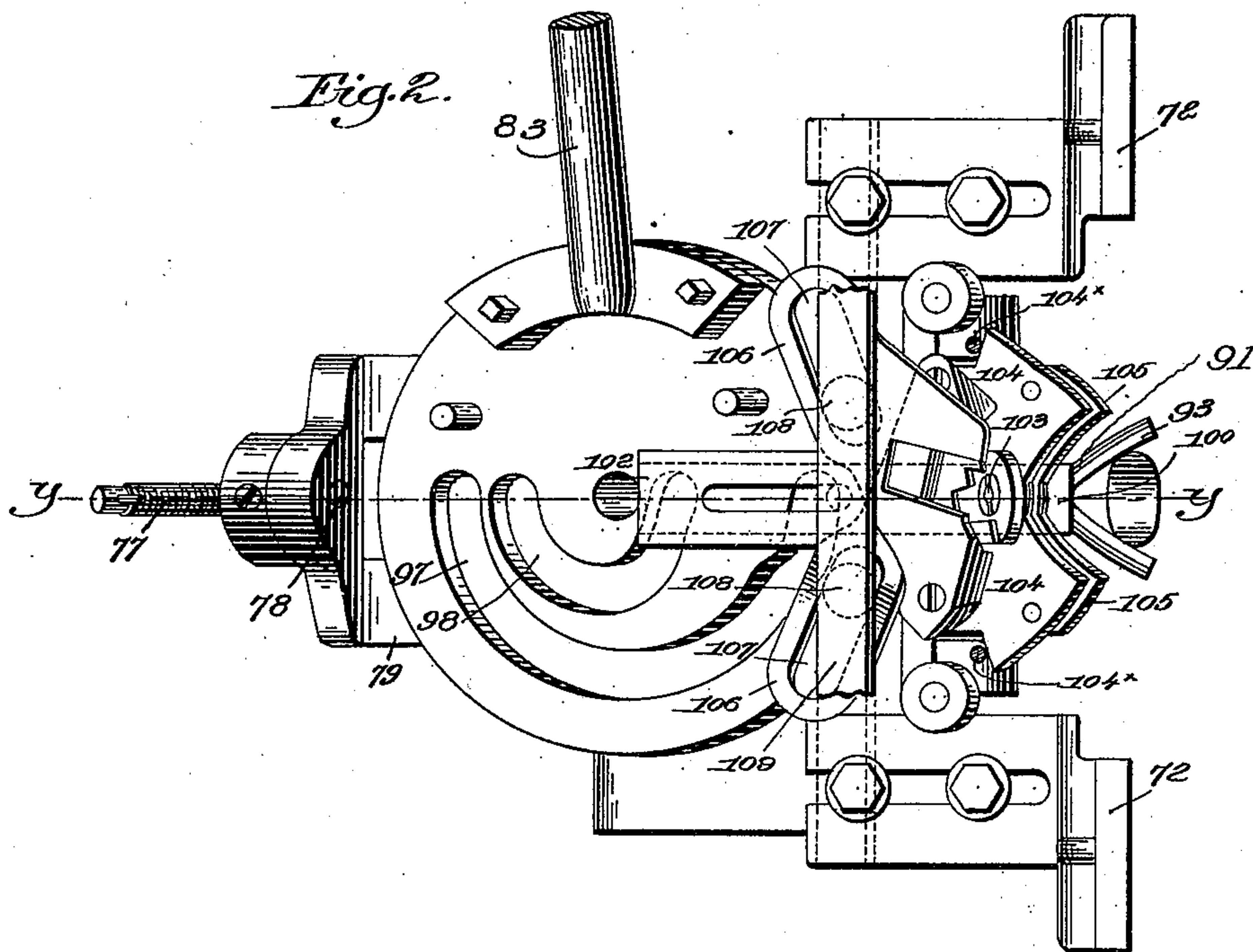
(No Model.)

4 Sheets—Sheet 2.

M. BROCK.
LASTING MACHINE.

No. 601,936.

Patented Apr. 5, 1898.



Witnesses:

Frederick L. Grunwald.

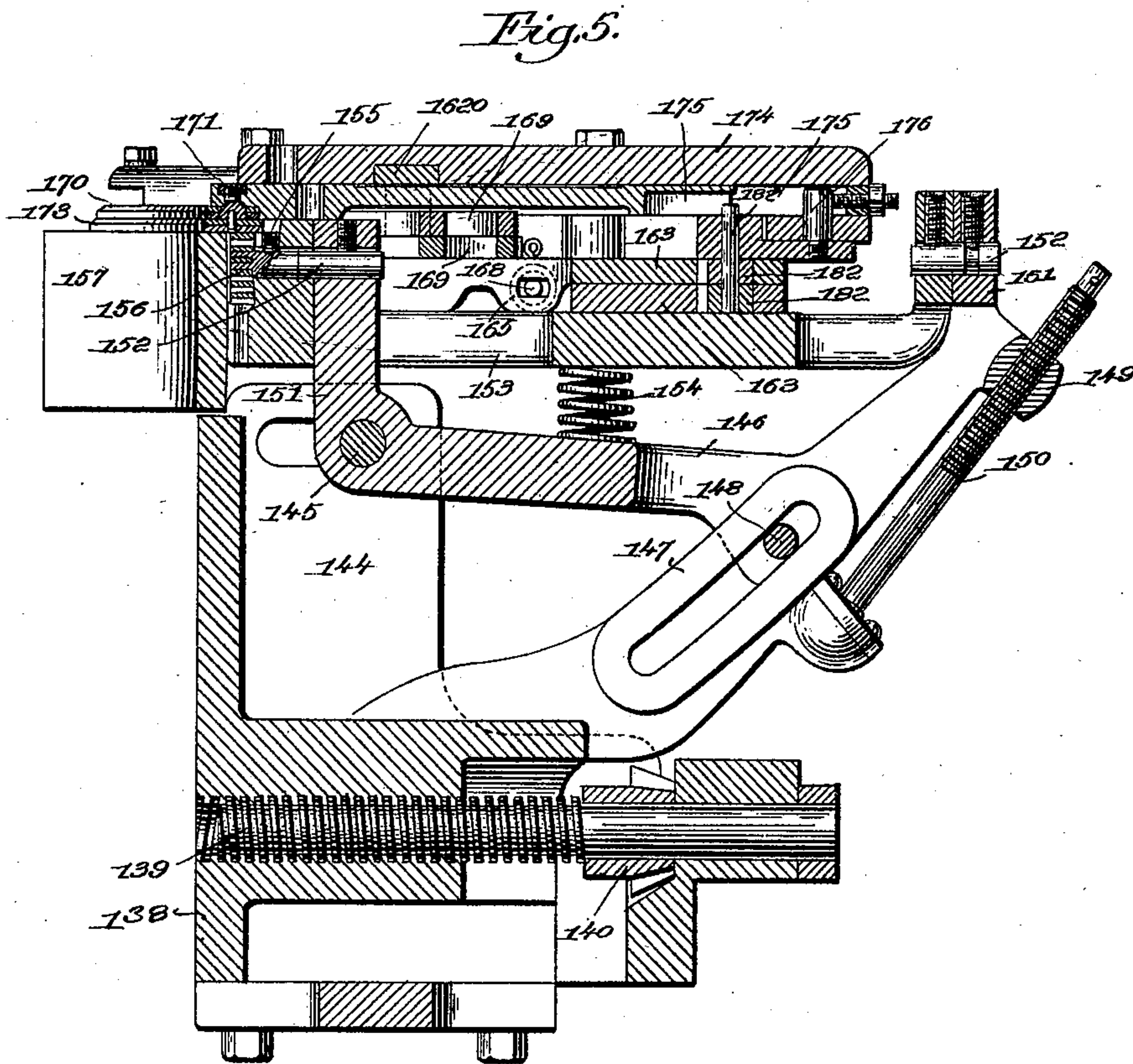
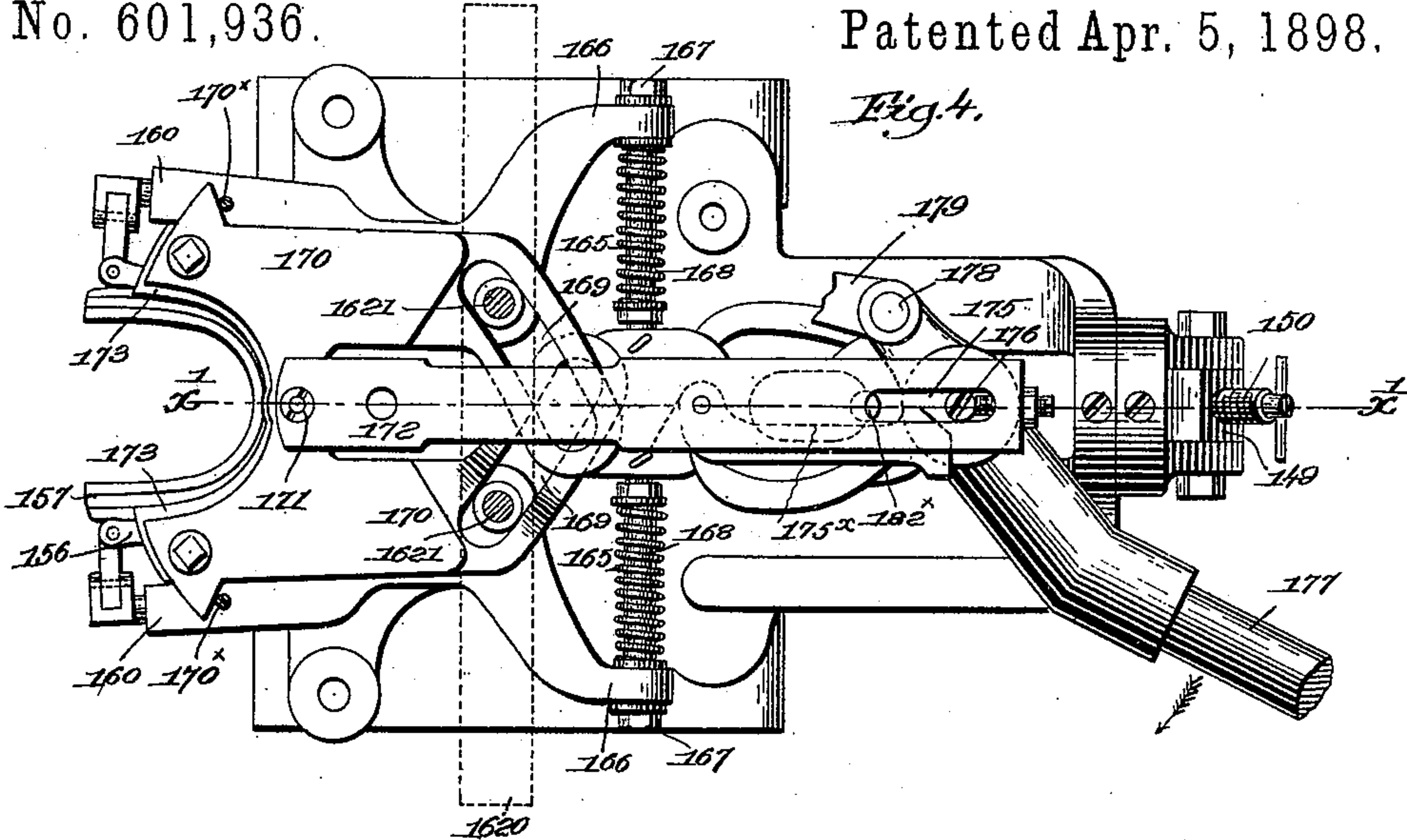
Thomas J. Drummond.

Inventor:
Matthias Brock.
by Crosby Ferguson
Attys.

M. BROCK.
LASTING MACHINE.

No. 601,936.

Patented Apr. 5, 1898.



Witnesses:
Fried. S. Gunkel.
Thomas. Drummond

Inventor
Matthias Brock.
by Crosby & Gregory
attys.

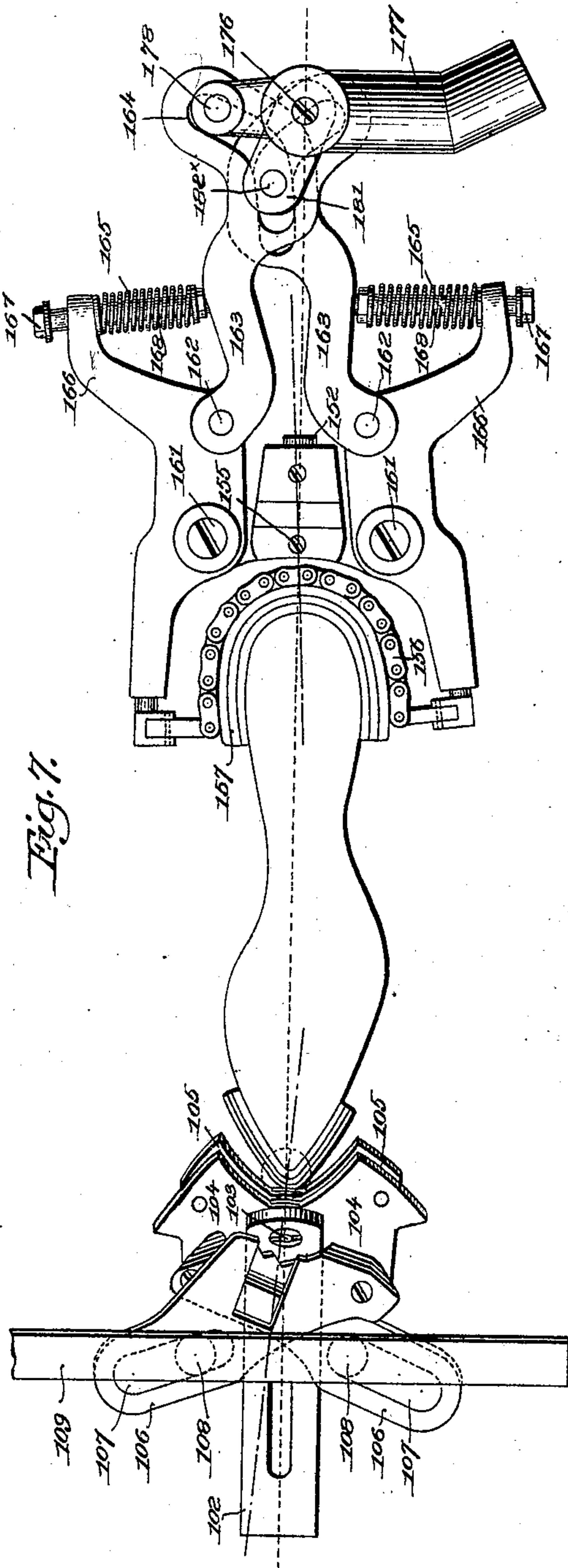
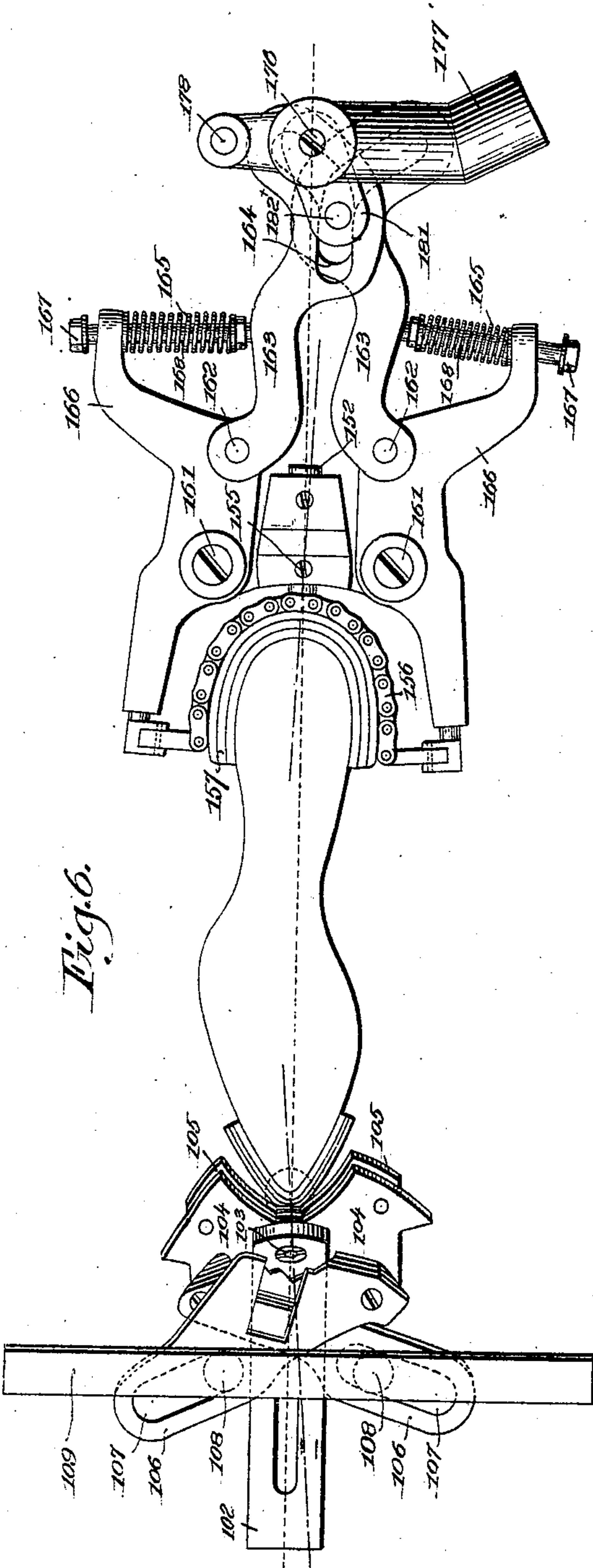
(No Model.)

4 Sheets—Sheet 4.

M. BROCK.
LASTING MACHINE.

No. 601,936.

Patented Apr. 5, 1898.



Witnesses:
Fred S. Grunba
Thomas J. Drummond

Inventor:
Matthias Brock.
by Crosby & Riggs
attys.

UNITED STATES PATENT OFFICE.

MATTHIAS BROCK, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE CONSOLIDATED & MCKAY LASTING MACHINE COMPANY, OF PORTLAND, MAINE.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 601,936, dated April 5, 1898.

Application filed August 14, 1897. Serial No. 648,236. (No model.)

To all whom it may concern:

Be it known that I, MATTHIAS BROCK, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Lasting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like figures on the drawings representing like parts.

This invention has for its object to provide an improved machine for lasting boots and shoes, the invention having special reference to the lasting devices operating in the vicinity of the ends of the lasts.

In lasting Goodyear shoes, wherein is employed an inner sole having an upturned channel flap or lip, such flap or lip being usually located at a uniform distance from the edge of the inner sole, all around the toe end of the inner sole, and usually along the sides thereof, while it is customary for the operator first to advance the lasting devices at the toe sufficiently to override the raised channel-flap and roughly lay the upper down onto the inner sole, yet after said lasting devices have been partially backed off it is desirable that some means be provided by which said lasting devices may again be advanced to lay the material of the upper closely down into the channel and against the raised flap thereof, and for so doing the lasting devices should each advance close up to the channel-flap, but in no case to override such flap. Otherwise the material would not be closely laid in the channel.

Prior to my invention means have been provided for relatively shifting the toe-lasting devices and the toe end of the last to cause the said toe-lasting devices to evenly meet the face of the material upon the last and presumably to move inwardly therefrom through uniform distances. If the material of the upper is of uniform thickness all around the toe of the last and if the toe end of the inner sole is accurately positioned upon the bottom of the last and if the channel-flap is accurately formed upon and at a uniform distance in from the edge of the inner sole, then the end lasting devices could in such cases probably be moved inwardly to the

channel-flap. If, however, the material at one side of the toe happened to be considerably thicker than the material at the opposite side of the toe, the proper positioning of the toe-lasting devices to evenly meet the face of the material of uneven thickness upon the last would cause them to unevenly approach the raised channel-flap of an inner sole evenly positioned upon that last; also, if the inner sole be improperly proportioned or if the channel be inaccurately cut the end lasting devices will unevenly approach said channel-flap at opposite sides of the toe of the last. In any case where the toe-lasting devices unevenly approach the raised channel-flap that lasting device which first meets the flap must of necessity override the same before the other lasting device can be moved up to the flap, for in machines heretofore constructed the end lasting devices when once shifted into position corresponding to the toe end of the shoe upon the last must be uniformly moved from such positions, it being impossible to move one end lasting device for a greater distance than its coöperating lasting device at the same end of the last.

One of the main objects of my present invention is to provide end lasting devices such that if either one meets the raised channel-flap in advance of the other such lasting device will stop in its movement without overriding the flap, while the said other lasting device continues by a further movement until it also meets the raised channel-flap; also, near the ends of the last the material of the shoe-upper is not only laid over and upon the bottom of the last, but is usually folded, crimped, or plaited to a greater or less extent, depending upon the contour of the last and the material to be lasted, and when, as is often the case, the material to be lasted varies in thickness or in stiffness, I have found that the plaiting or crimping takes place more easily at some points than at others, thereby unequally opposing the advance or lasting movement of the lasting devices. For example, if the material acted upon by one of the lasting devices happens to be of excessive thickness or stiffness it will not plait easily or closely, and some-

times it will completely block the advancing movement of the lasting devices, and at such time, with lasting-machines as at present constructed, where the lasting devices at the end of the last have the same or substantially the same movement, it is impossible to cause either of the lasting devices to advance farther than the one which has been stopped by the meeting of the obstacle, making it impossible to last any part of the end of the shoe with the machine. Should this thick and heavy portion of the material be delicate or poor in quality, the operator frequently injures the material and ruins the shoe in his efforts to crowd the lasting devices past the obstruction. Again, if the thick or stiff portion of the material be of good quality the operator in his efforts to crowd the lasting devices past such a thickened or obstructive portion frequently injures the machine or crowds the inner sole to one side or away from the edge of the last, thereby tending to buckle the inner sole and injure the shoe.

My invention aims to provide means whereby if either of the lasting devices at one end of the last encounters any obstruction which another does not then such other lasting device will continue its movement with relation to the first until the resistance opposing the advance of all shall, as far as is possible, be equalized, when they may thereafter advance together, thus avoiding any possible injury arising from excessive pressure applied at one side only. So, also, in any instance where an unvarying and absolutely uniform advance of the end lasting devices would cause injury my invention aims to provide means whereby one end lasting device may be advanced farther than another end lasting device at the same end of the last, as will be clearly understood from the following description in connection with the accompanying drawings, illustrating one embodiment of my invention. In the preferred embodiment of my invention this movement of one end lasting device beyond another at the same end of the last takes place automatically, thereby facilitating the operation of the machine.

In the drawings, Figure 1, in side elevation, represents a sufficient portion of a lasting-machine to enable my invention to be understood. Fig. 2 is a top or plan view of the toe-lasting devices on an enlarged scale; Fig. 3, a vertical section of the same on the dotted line *y y*; Fig. 4, a top or plan view of the heel-lasting devices, also on an enlarged scale; Fig. 5, a vertical section thereof on the dotted line *x' x'*; Figs. 6 and 7, diagrams illustrating the movements of the lasting devices as provided for by my invention.

In the embodiment of my invention selected for disclosure herein and illustrated in the drawings, 37 indicates the supporting-column of the machine, and 38 the table resting thereupon.

The table 38 has suitable guideways, in

which is mounted the longitudinally-sliding carriage 72, actuated by a wheel 135 and pinion 133, meshing in a rack on said carriage, the latter being provided with suitable standards 73, between which is mounted, to rotate upon short longitudinally-adjustable studs 74, (shown in dotted lines, Fig. 3,) the yoke-shaped tipping-plate holder 75, provided at its rear end with a swivel-nut 76, in which is threaded the adjusting-screw 77, acting upon the carriage and furnishing means to vary the tip of said plate-holder about its transverse axis on the studs 74 to accommodate the toe-lasting devices to the variation in spring or longitudinal curvature at the bottoms of the toe portions of the lasts.

Pivotally mounted on studs 78 in the arms of the yoke-like tipping-plate holder is the tipping plate 79, resting at opposite sides of its longitudinal axis upon springs 80, which act to normally hold said tipping plate yieldingly in a central or horizontal position, but permit said plate to be rolled to meet the roll of the toe end of a last.

A stud 81 on the tipping-plate 79 furnishes a suitable axial bearing for the operating-cam 82, shown as disk-like in form and provided with an operating-handle 83, by which the operator can rotate said cam at will in either direction.

At its under side the cam 82 is provided with a suitably-shaped cam-groove for the reception of the roller-stud 84 on the longitudinally-sliding block 85, slotted at its right-hand end, Fig. 3, to receive the vertical arm of a bell-crank lever 86, pivoted at 87 in a longitudinally-adjustable plate 88, secured to the under side of the tipping plate 79. The horizontal arm of said bell-crank lever 86 is jointed to the lower end of and supports the end-wiper holder 89, shown as socketed at its upper end to receive therein the cylindrical shank 90 of the end wiper. This end wiper herein consists of a U-shaped metallic plate or back 92 with a leather or other covering or face 93.

The wiper-shank 90 is shown as circumferentially grooved at 94 to receive the pin 95, which prevents said shank and its wiper rising from the holding-socket therefor without in any way interfering with the free rotation of said wiper and shank in said socket.

A spring 96, secured to the wiping-holder 89, acts upon the horizontal arm of the bell-crank lever 86 and thereby holds the end wiper back in its proper position against its back support on the tipping plate.

The operating-cam 82 at its top side is provided with two cam-grooves 97 98, the groove 97 receiving the roller-stud 99 on the under side of the abutment-slide 100, the outer end of which, at the right, Fig. 3, is shaped and adapted to constitute an abutment against which the toe of the shoe is placed when positioning the said shoe preparatory to lasting. As the operating-cam is rotated for actuating the toe-lasting devices this abutment-slide is

withdrawn by said cam-groove 97, so as not to interfere with the working parts operating about or in the vicinity of the toe.

The inner cam-groove 98 referred to receives the roller-stud 101 on the under side of the wiper-slide 102, arranged in suitable guideways in the under side of the cap 103. To the outer end of this wiper-slide, at the right, Fig. 2, are pivoted at 103 the toe-wiper carriers 104 and toe-wipers 105, adjustably secured to said carriers.

The wiper-carriers 104 referred to have respectively secured to their upper sides the cam-plates 106, crossing each other like a pair of shears and diagonally slotted at 107 to receive the roller-studs 108, (shown in dotted lines, Fig. 2,) depending from the transversely and freely sliding bar 109, also arranged in suitable guideways in the cap referred to.

Rotation of the operating-cam 82 acts through its cam-groove 98 to move the wiper-slide 102 forward, carrying therewith the wipers pivoted thereto. This forward movement carries the wipers over the toe end of the last and at the same time causes their attached cam-plates to be acted upon by the depending roller-studs 108 referred to and moved one laterally toward the other to thereby close the advancing wipers over the end of the last to lay or wipe the material over and upon the bottom of the last.

The operation of the toe mechanism thus described is substantially as follows, viz: Rotation of the operating-cam 82 causes the slide 85 at the under side thereof to be moved back or to the left, Fig. 3, and thereby, through the bell-crank lever 86, raise the end wiper 93 to cause it to wipe the material of the upper smoothly about the sides of the toe end of the last. Rotation of the said cam 82 also acts to first withdraw the abutment 100, which has served to aid in the positioning of the end of the last, and thereafter rotation of the said cam 82 causes the slide 102 to advance and also advance the plates or wipers 105 and close the latter and the material over and upon the bottom of the last, the closing of the wipers being caused by the roller-studs 108 acting in the slots 107 of the shanks of the wiper-carriers. If either one of the lasting devices 105 meets an obstruction or resistance—for example, a raised channel-flap—in advance of the other lasting device, the one first meeting the obstruction will be retarded or prevented from further movement, while the other lasting device will be continued in its movement until it meets a similar or equivalent obstruction or resistance, when the two thereafter may together move forward or close in over the last, or if the said other lasting device fails to meet an obstruction like or equivalent to that met by the first-mentioned lasting device it will finish its movement without starting the first from its position where stopped by the obstruction. This equalizing of the resistance encountered by the lasting devices is per-

mitted by the freely-sliding bar 109, carrying the roller-studs 108, which adjusts itself in the direction of its length or transversely to the head, according to the pressure upon the studs 108 or either of them. If one of the lasting devices meets an obstruction or resistance, it will throw a corresponding pressure upon the stud 108, governing its operation, and thereby throw the said stud and slide-bar with its second stud to one side or in the direction of the length of the bar until the pressure received from the lasting devices upon the two studs is equal or until that lasting device meeting the least resistance has finished its movement. During the action of the toe-lasting devices the toe end of the last is firmly supported upon a suitable toe-support—as, for instance, the padded upper end of the toe-post 117.

Referring now to Figs. 4 and 5, inclusive, the table 38 is provided with suitable guideways for the sliding heel-carriage 138, made longitudinally adjustable in said guideways by a suitable adjusting-screw 139, (see Fig. 5,) held against longitudinal movement at one end, as there shown, and provided with a beveled pinion 140, in mesh with a bevel-wheel 141, Fig. 1, fast on the hand-wheel shaft 142, journaled in bearings carried by the table and provided with a suitable hand-wheel 143, rotation of which causes longitudinal adjustment of the heel-carriage to adapt the heel-lasting devices carried thereby to the side lasting devices described.

The heel-carriage 138 (see Fig. 5) is provided with two vertically-extended arms or stands 144, slotted horizontally at their upper ends to receive a horizontally-adjustable pivot-bolt 145, on which is pivoted the tipping-plate holder 146, shown as bifurcated at its rear end to receive the curved slotted arm 147, rising from the carriage 138, a guide-pin 148 passing through the plate-holder and the slot in said arm.

The tipping-plate holder 146 at its rear end carries a swivel-nut 149, in which is threaded the adjusting-screw 150, connected at its lower end, preferably by a universal joint, with a lug on the slotted arm 147 of the carriage.

Rotation of the adjusting-screw 150 swings the plate-holder and parts carried thereby about the pivot 145 to vary the tip or vertical inclination of the plate-holder to adapt the parts carried thereby to the varying springs of lasts.

The plate-holder 146 at its opposite ends is provided with vertically-extended ears 151, to which is hung on the longitudinal trunnions the tipping plate 153, adapted to swing transversely about the longitudinal axis of the trunnions 152 to adapt its parts to the roll of the heel end of the last, substantially as described with reference to the toe mechanism, springs 154 at the sides of the said plate serving to maintain the latter normally in an intermediate or central position.

To the front of the tipping plate 153 is se-

cured, as by a screw 155, the middle portion of the clasp-chain 156, within which is arranged the flexible clasp 157, adapted to embrace the heel end of the last with the material thereupon.

The positioning devices 160 are fulcrumed at 161, Figs. 6 and 7, on the tipping plate 153 and have jointed to them at 162 one of the ends of the actuating-levers 163, provided, respectively, with the angular slots 164, each of said slots having a longitudinally-extended portion near its end adjacent the joint 162 and a rear angular portion, as shown, the angular portions of the two slots being extended in opposite directions. (See Fig. 7.)

Springs 165 are interposed between the actuating-levers 163 and the tail portions 166 of the positioning devices, said springs being limited in their movements by nuts 167, threaded on the ends of the limiting-bolts 168, carried by the actuating-levers and passing through the tail portions of the positioning devices.

The wiper-carriers 170 are pivotally connected at 171 to the end of the common actuator 172, shown as a slide-bar, said carriers having secured to their under sides the adjustable wipers 173, although said wipers and their carriers may be made integral, if desired.

The sliding actuator-bar 172 is arranged to slide in suitable guideways in the under side of the top plate 174, said bar at its rear end (see Fig. 4) having a longitudinal slot 175, which receives the pin 176 on the hand-lever 177, fulcrumed at 178 to the free end of a swinging lever 179, pivotally connected at a convenient point to the tipping plate or its cap.

Jointed to the under side of a hand-lever 177 is a short link 181, Figs. 5 and 6, carrying at its free end roller-studs 182, which drop into the angular slots 164 in the actuators referred to and are guided by the head of the holding-bolt 182^x, working in the slot 175 in the under side of the actuator-bar 172.

Having placed the last and shoe upon the last-support, as the jack or heel pin, preparatory to lasting, the operator, by means of the hand-wheel 143, moves the heel-carriage to the left (in the drawings) to cause the heel-clasp to tightly embrace the heel end of the last with the material thereupon. The operator, preferably, but not necessarily, after operating the toe-lasting devices now grasps the handle 177 and draws the latter toward him in the direction of the arrow, Fig. 4, causing its pin 176 to travel for a short distance in the slot 175 in the actuator-bar without moving the latter or the wipers. During the time of this lost motion, however, the roller-studs 182 on the short link 181, connected with the hand-lever, move to the left in the opposite angular portions of the slots 164 and cause the latter to be thrown outwardly, and thereby, through the springs 165, move the inner or free ends of the positioning devices and clasp inwardly toward the

heel end of the last to cause said clasp to tightly embrace the said heel end. Upon the bar 1,620, (see dotted lines, Fig. 4,) extended transversely of the head and freely movable in the direction of its length in suitable bearings in the cap 174, are mounted the roller-studs 1,621, which enter the cam-slots 169 in the wiper-carriers 170 and cause opening and closing of said carriers when the latter are advanced or withdrawn, as will be hereinafter described. After having thus properly closed the ends of the clasp uniformly against the sides of the last further movement of the said operating-handle 177 causes the pin 176 to act against the end of the slot 175, and thereby move to the left, Fig. 4, the said actuator 172 to carry bodily forward the wiper-carriers and their wipers to move the latter over the last, the angular slots 169 at the same time operating through the studs 1,621 to close the wipers one toward the other to thereby lay the material tightly over and upon the bottom of the last. If either one of the wipers or lasting devices 173 encounters a thickened or obstructive portion of the material or is otherwise obstructed in its movement, as by meeting a raised channel-flap, it will act upon its roller-stud 1,620, and will thereby shift said stud, its carrying-bar, and the other stud, similarly lettered, to one side until the pressure upon both studs is the same, when the two plates may be advanced together, as described with reference to the toe plates or wipers.

It will be noticed that the forward end 175^x of the slot 175 is larger than the rear end, to enable the pin 182, when at that end of the slot, to have considerable lateral movement as the wiper-plates shift to the right or to the left to adapt themselves to the opposing material or resistance; yet when the handle 177 is returned to its original position to withdraw the wiper-plates from the last or the material thereupon said pin 176 will be moved into the narrower rear end of the slot 175 and will thereby operate to center the positioning devices and heel-clasp—that is, leave them in a straight position or in alinement with the longitudinal line of the machine, from which they will move either to the right or to the left, as may be required, in meeting and acting upon the next last placed in the machine.

The heel-wiper carriers 170, with their plates 173, are centered on the return of the same after lasting by pins 170^x, depending from the cap and which strike the retreating carriers and move them into central position. (Shown in Fig. 4.) For a similar purpose it will be noticed that the toe-wiper plates 104 are provided with projecting ears which, as said plates are returned to their normal position, engage cooperating pins 104^x on the head of the machine and by said pins are moved into central or straight position, from which they will move either to the right or to the left, as occasion may require, when meeting

and acting upon the next last placed in the machine.

From the foregoing description it will be seen that in a machine embodying my invention the lasting devices to act upon the material at the ends of the last, and herein shown in the form of wiper-plates, are not only moved to positively act upon and last the material over the last, but said lasting plates or devices are at all times free to shift to the right or to the left, their alinement of advance to conform to the varying swings of the ends of the last, due either to their being rights or lefts, or to varying models or forms of the ends of straight lasts, or to any other cause. My machine, therefore, may be said to contain wipers which are automatically positioned to properly act upon the ends of crooked lasts, however crooked they may be, and also automatically positioned to meet the ends of lasts, whether rights or lefts.

It is further clear that in my invention one end lasting device is free to move forward or inwardly with relation to or farther than another lasting device at the same end of the last if the latter device meets with a greater obstruction or resistance than the former. Thus if the obstruction is such as to stop one lasting device after it has moved inwardly one-fourth of an inch the other will still continue to the end of its full movement and last all of that end of the shoe except that portion adjacent the obstruction, which can only be lasted by dropping the shoe, raising the lasting device, or by hand. On the other hand, if the resistance to one lasting device is but slightly greater than that opposed to another device at the same end of the last the one having the least resistance will advance beyond the other until the resistance to both becomes equal, when both may move inwardly together, the latter operation being particularly noticeable when the devices are adapting themselves to rights and lefts or lasts presenting a difference in swing. It will now be evident that if either lasting device meets a channel-flap in advance of another the former will stop until the latter also meets the said flap, making it possible to always closely and accurately fit the upper against the flap and down into the channel.

Believing myself to be the first in a lasting-machine to provide for imparting the relative movements between the lasting devices and last hereinbefore described, I desire it to be understood that this invention is not limited in this respect, but comprehends the employment of any mechanism wherein said relative movements are obtainable whatever the construction and mode of operation of the lasting devices and last. I am the first, so far as I am aware, to provide for a perfectly free lateral relative adaptation of the end lasting devices and last or the material thereupon to enable said lasting devices at all times prop-

erly and evenly to move over or act upon the material to be lasted regardless of the detailed mechanism employed.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a lasting-machine, lasting devices to lay the upper over the bottom of the last at an end thereof, and means actuating both lasting devices to impart to one movement in excess of movement of another when the latter meets with undue resistance as compared with resistance to the former.

2. An organized lasting-machine containing a set of toe-lasting devices, and a set of heel-lasting devices to lay the upper over the bottom of a last, and means to impart to one of each set of said lasting devices movement in excess of movement of another lasting device of the same set when the latter meets with undue resistance as compared with the resistance to the former.

3. An organized lasting-machine containing a set of toe-lasting devices and a set of heel-lasting devices to lay the upper over the bottom of the last, and means to impart to the lasting devices of each set, lasting movements the alinement of which is varied and determined by the relative resistances opposed to the movement of the devices of each set, whereby said lasting devices automatically and freely adapt themselves to the ends of a last, whether a right or a left, whatever be its swing.

4. An organized lasting-machine, containing lasting devices for the toe and for the heel which act to lay the upper over the bottom of a last, said lasting devices at each end of the last being mounted at all times to swing freely transversely to accommodate lasts of varying swing, and means independent of said last to advance said lasting devices over the edges of the bottom of the last.

5. In a lasting-machine, lasting devices to act upon the material at the end of the last, actuating means for said lasting devices to cause the latter to freely shift to the right or to the left whenever during the lasting operation the resistance offered to one of said devices unduly exceeds that offered to another of said devices.

6. In a lasting-machine, lasting devices to act upon the material at the end of the last, and means to impart to one of said lasting devices inward movement in excess of another of said lasting devices, said lasting devices at all times being free to shift to the right or to the left when the advance movement of one unduly exceeds that offered to the advance movement of another during the lasting operation.

7. In an organized lasting-machine, the combination with a support to hold the last in substantially fixed position, of end lasting devices to act upon the material at the end of

the last, and means to impart to one of said lasting devices movement in excess of movement of another of said lasting devices when the latter meets with undue resistance from the last or the material thereupon.

8. In a lasting-machine, end lasting devices consisting of end-wiper plates, means to open and close said wiper-plates and to cause the same to move one in excess of another when the latter meets with undue resistance as compared with the resistance offered to the former.

9. An organized lasting-machine containing a set of toe-wiper plates, and a set of heel-wiper plates, and means to open and close the wiper-plates of each set, and to impart to one of the plates of each set movement in excess of movement of another plate of the same set when the latter meets with undue resistance, as compared with the resistance offered to the former.

10. A lasting-machine containing a support for a last, and end lasting devices consisting of wiper-plates, means to open and close the same for lasting, and means to enable said plates to freely and laterally move when opening and closing to meet varying lasts, either rights or lefts, or having different side inclinations.

11. In an organized lasting-machine, a support for a last, end lasting devices to act upon the material at the end of a last on said support, and means to effect a relative movement between one of said lasting devices and said last in excess of the relative movement between another of said lasting devices and last when the last-mentioned lasting device is opposed by an undue resistance as compared with the resistance of the first-mentioned last.

12. An organized lasting-machine containing a support for a last, a set of toe-lasting devices and a set of heel-lasting devices, and means to effect a relative movement between one of said lasting devices and said last in excess of the relative movement between said last and another of the lasting devices of the same set when the latter are opposed with undue resistance as compared with the resistance opposed to the former.

13. In a lasting-machine, lasting devices to act upon the material at the end of a last, means to impart to one of said lasting devices a movement at variance with the movement imparted to another of said lasting devices, and means to return the said lasting devices

always to substantially the same starting positions.

14. An organized lasting-machine containing a support for a last, and end lasting devices to act upon the material at the end of the last on said support, means to impart to the said last and lasting devices a relative movement, the relative movement of said last and one of said lasting devices being at variance with the relative movement of said last and another of said lasting devices, and means to return said last and said lasting devices to substantially the same relative position after one lasting operation and preparatory to the next.

15. In a lasting-machine, lasting devices to lay the upper over the bottom of the last at an end thereof, and means connected with a plurality of said lasting devices to move one of the same after a cooperating lasting device at the same end of the last has been stopped.

16. In a lasting-machine, the combination with a support for a last, of end lasting devices, and actuating means therefor, said end lasting devices being free to roll to meet the roll of the last and to shift transversely to meet the swing of the last, or to enable one to move relatively to the other when movement of the latter is obstructed.

17. In a lasting-machine, the combination with a support for a last, of end lasting devices, and actuating means therefor, said end lasting devices being movable to change their vertical inclination to meet the spring of the last to change their transverse inclination to meet the roll of the last and to move one in advance of another when the latter meets an undue obstruction as compared with the former.

18. In a lasting-machine, the combination with a support for a last, of a swinging toe-support, end lasting devices and actuating means therefor, said end lasting devices being constructed to tip to meet the spring of the last, to roll to meet the roll of the last and to move one in advance of another when the latter meets an obstruction.

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

MATTHIAS BROCK.

Witnesses:

FREDERICK L. EMERY,
LAURA T. MANIX.