

(No Model.)

10 Sheets—Sheet 1.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.

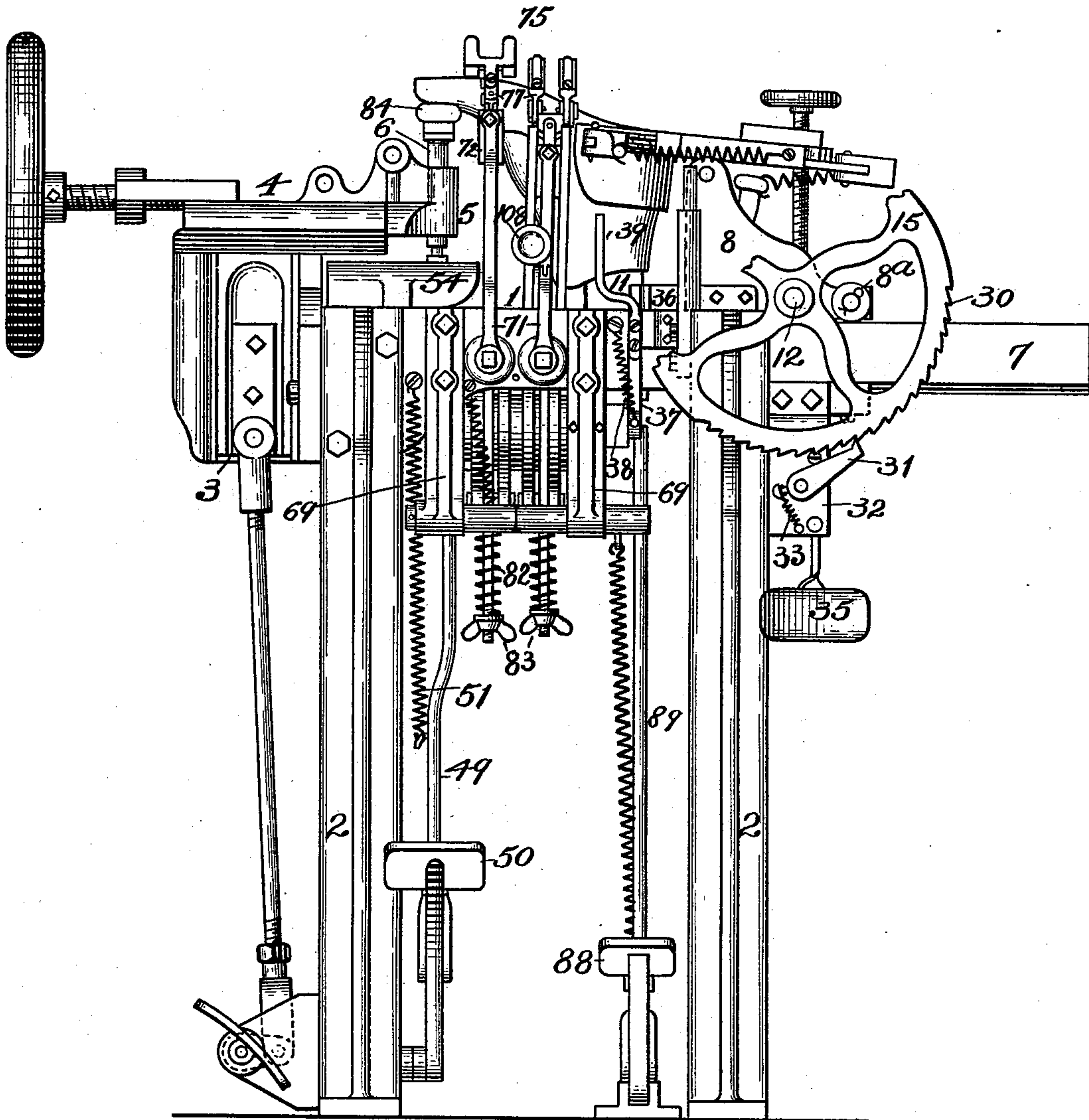


FIG. 1.

WITNESSES.
Mary E. Woodburn
John L. S. Roberts

INVENTOR.
Edward F. Grandy

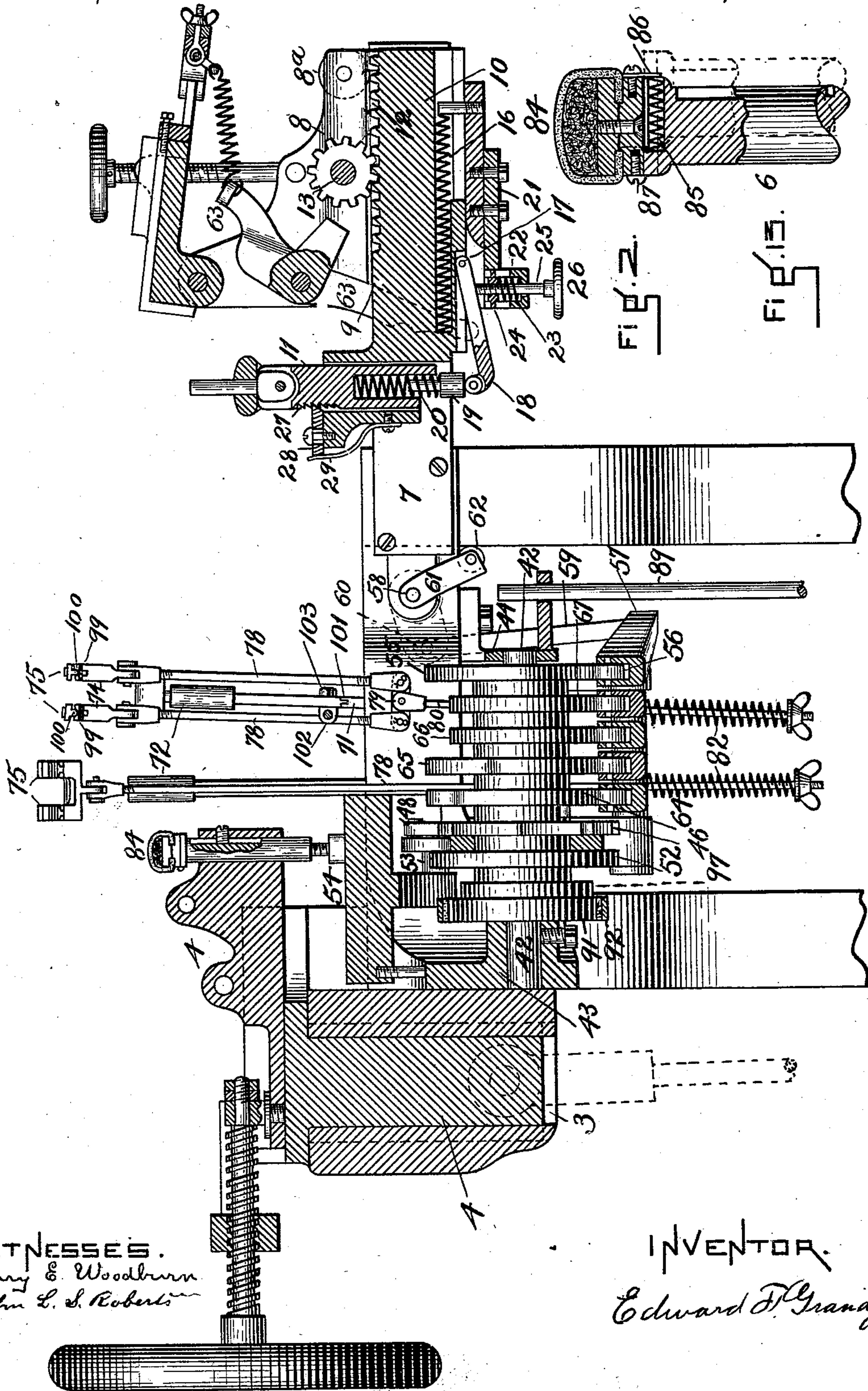
(No Model.)

10 Sheets—Sheet 2.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.



WITNESSES.
Mary E. Woodburn
John L. S. Roberts

INVENTOR.
Edward F. Grandy

(No Model.)

10 Sheets—Sheet 3.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.

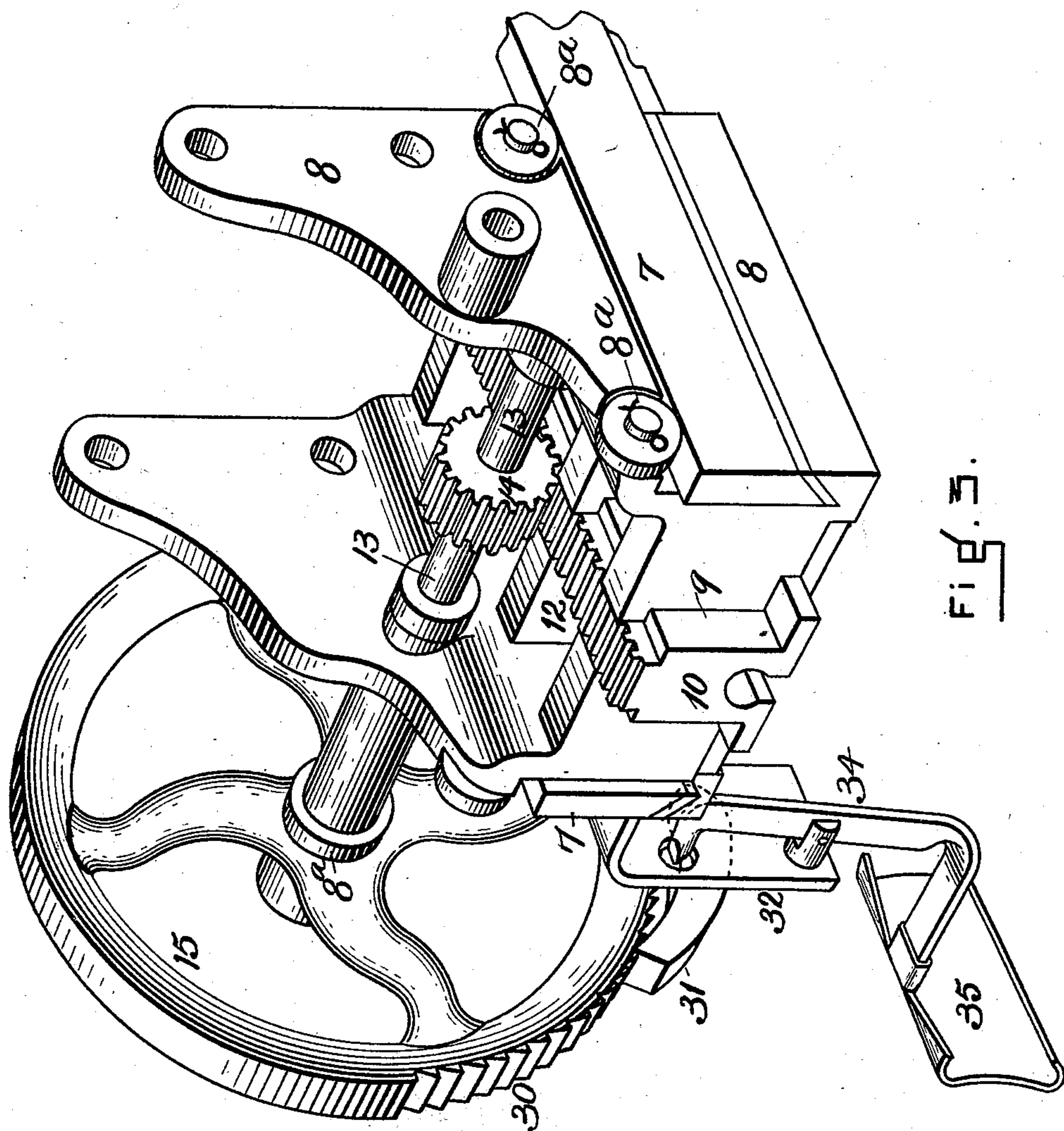


Fig. 3.

WITNESSES

Mary E. Woodburn
John L. S. Roberts

INVENTOR

Edward F. Grandy

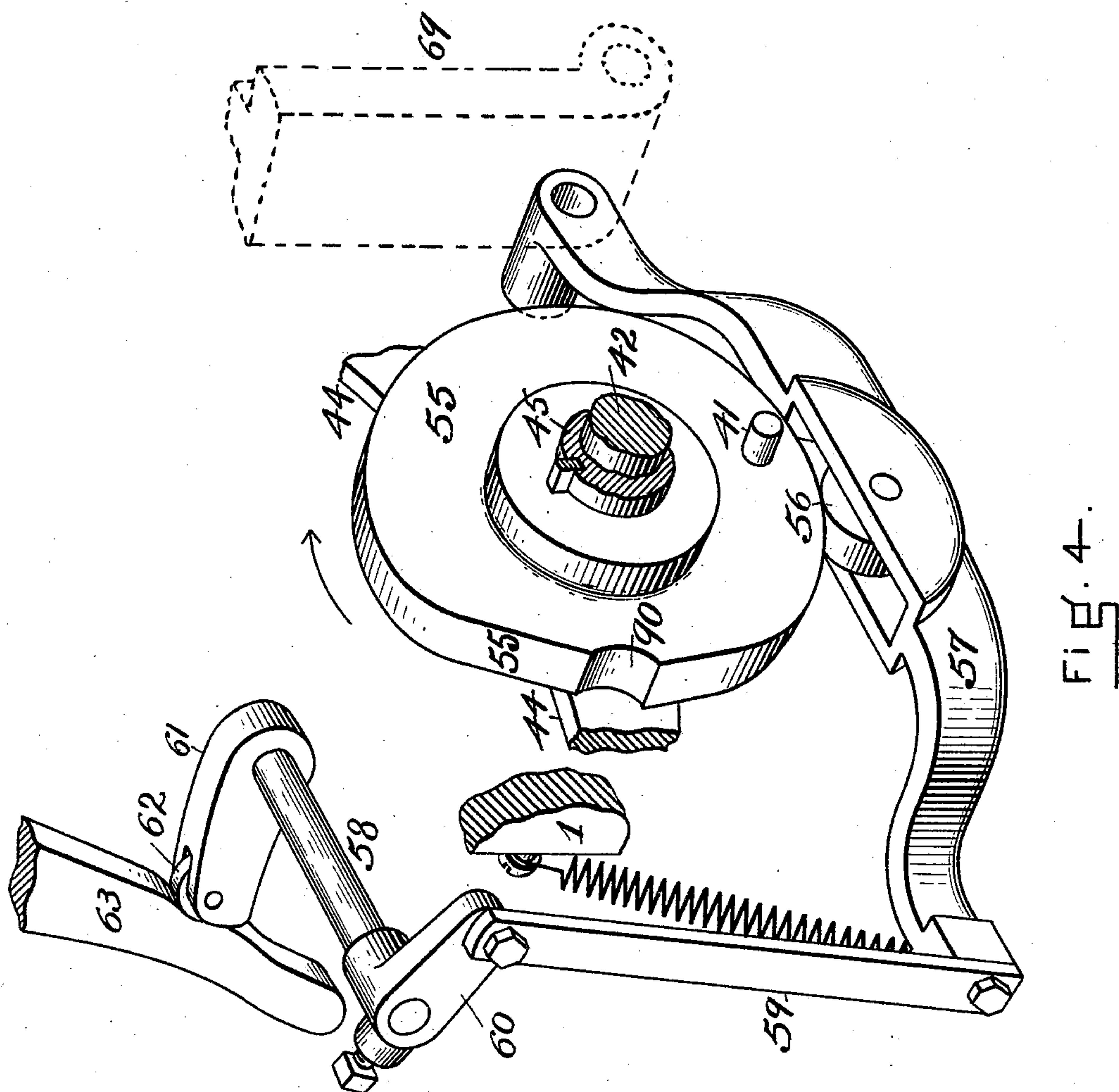
(No Model.)

10 Sheets—Sheet 4.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.



WITNESSES

Mary E. Woodburn
John L. S. Roberts

INVENTOR.

Edward H. Grandy

(No Model.)

10 Sheets—Sheet 5.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.

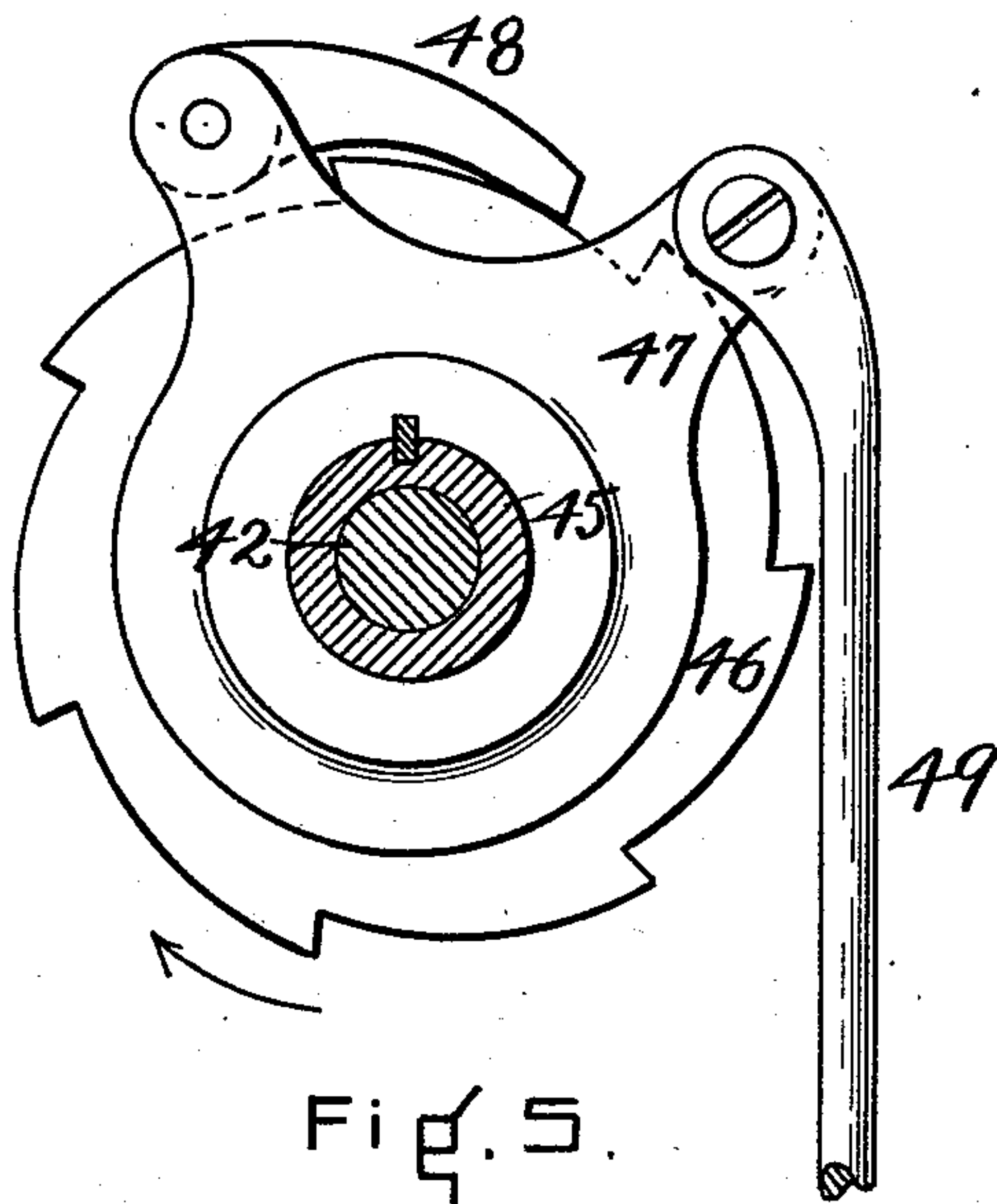


Fig. 5.

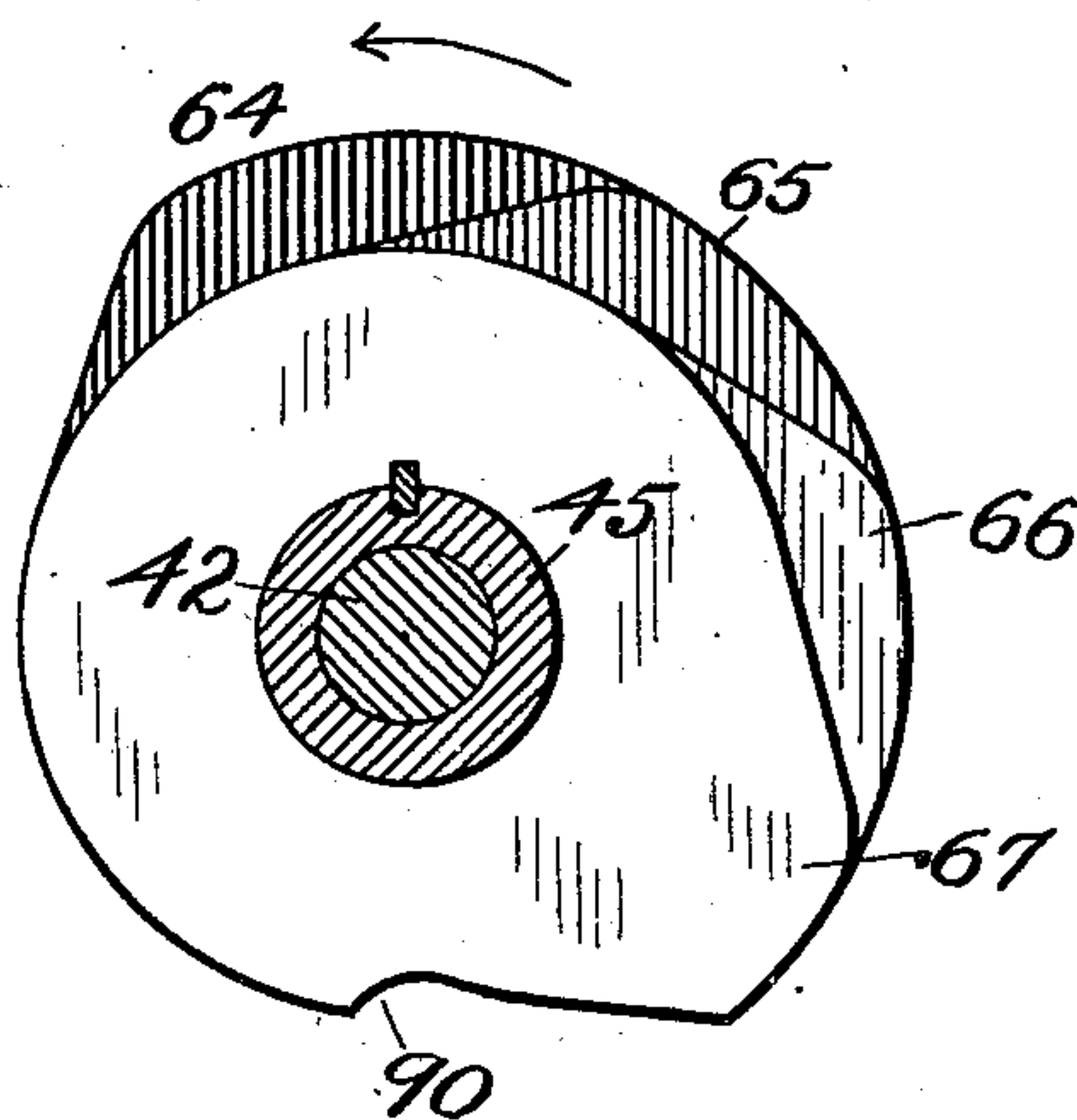


Fig. 6.

WITNESSES.

Mary E. Woodburn.
John L. S. Roberts

INVENTOR

Edward F. Grandy

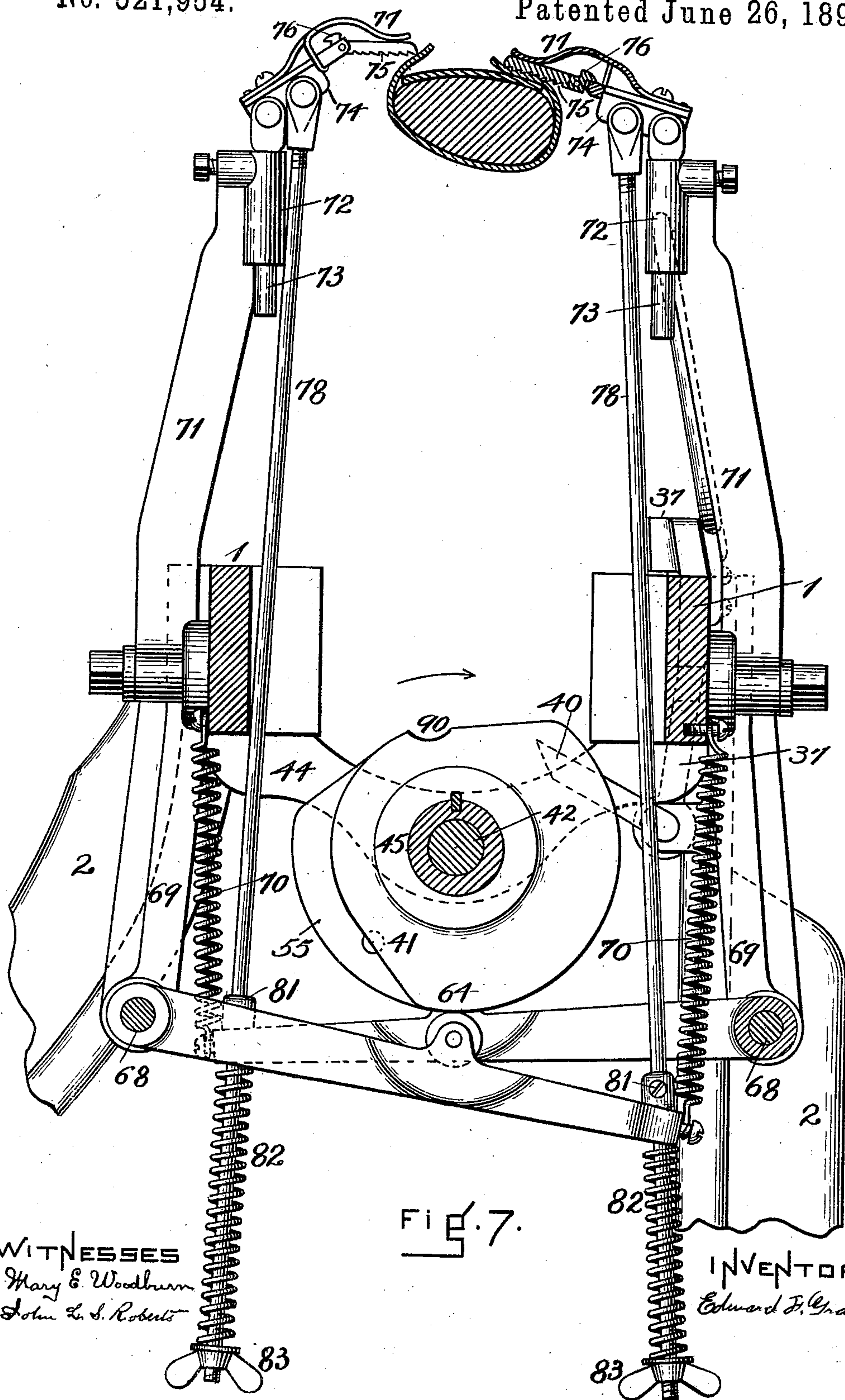
(No Model.)

10 Sheets—Sheet 6.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.



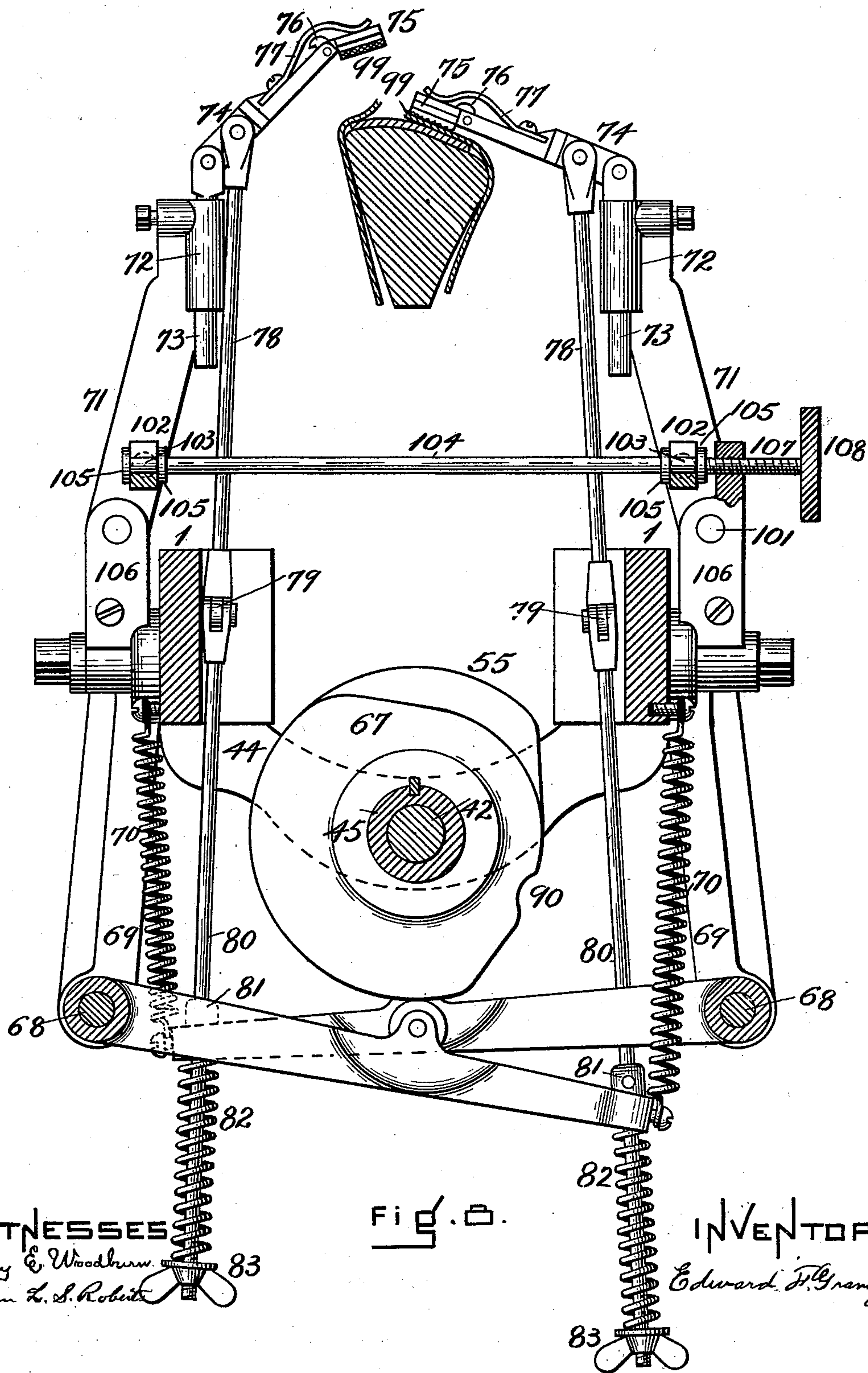
WITNESSES
Mary E. Woodburn
John L. S. Roberts

INVENTOR
Edward F. Grandy

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.



WITNESSES

Mary E. Woodburn

John L. S. Roberts

Fig. 2.

INVENTOR

Edward F. Grandy

(No Model.)

10 Sheets—Sheet 8.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.

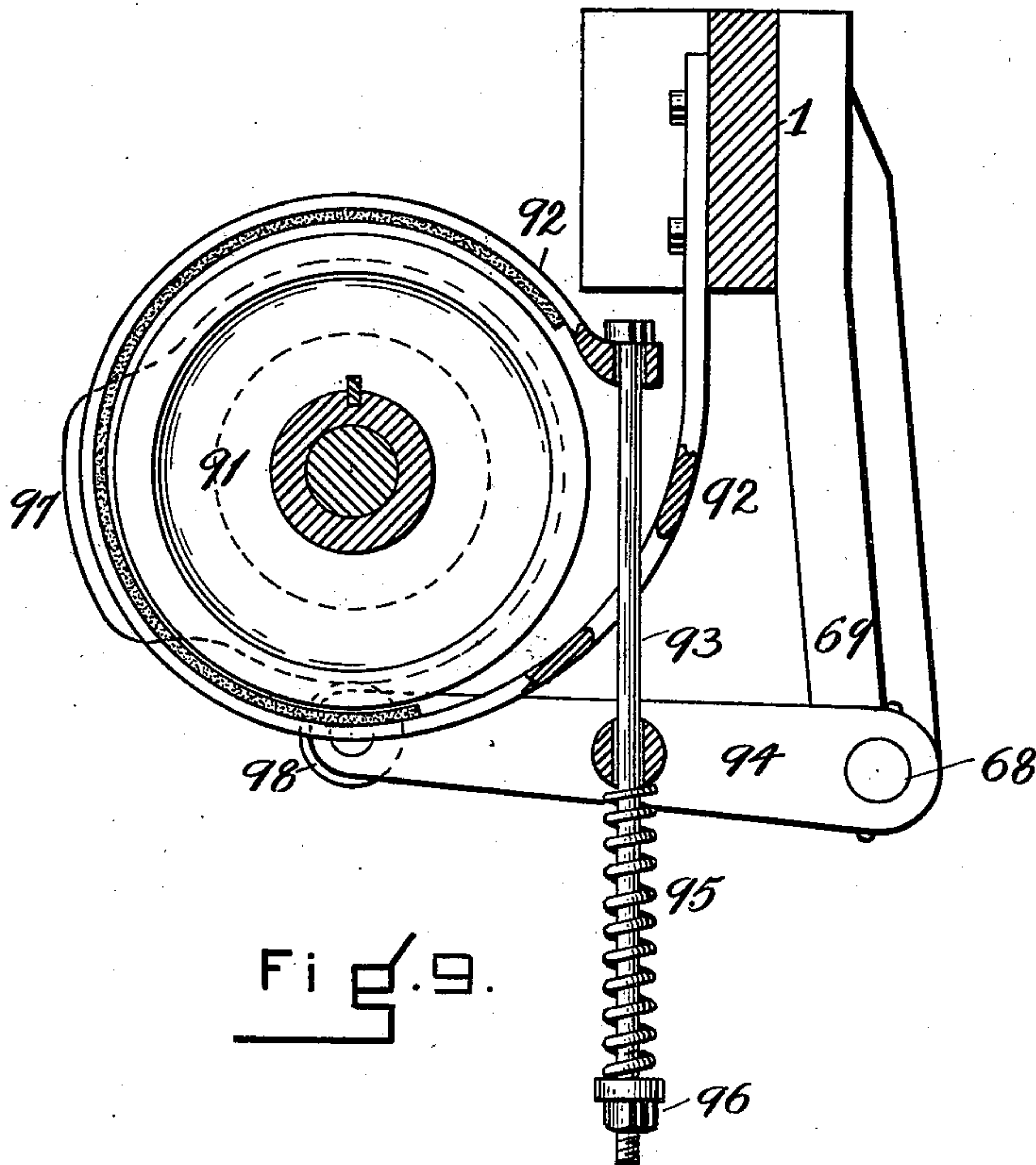


Fig. 9.

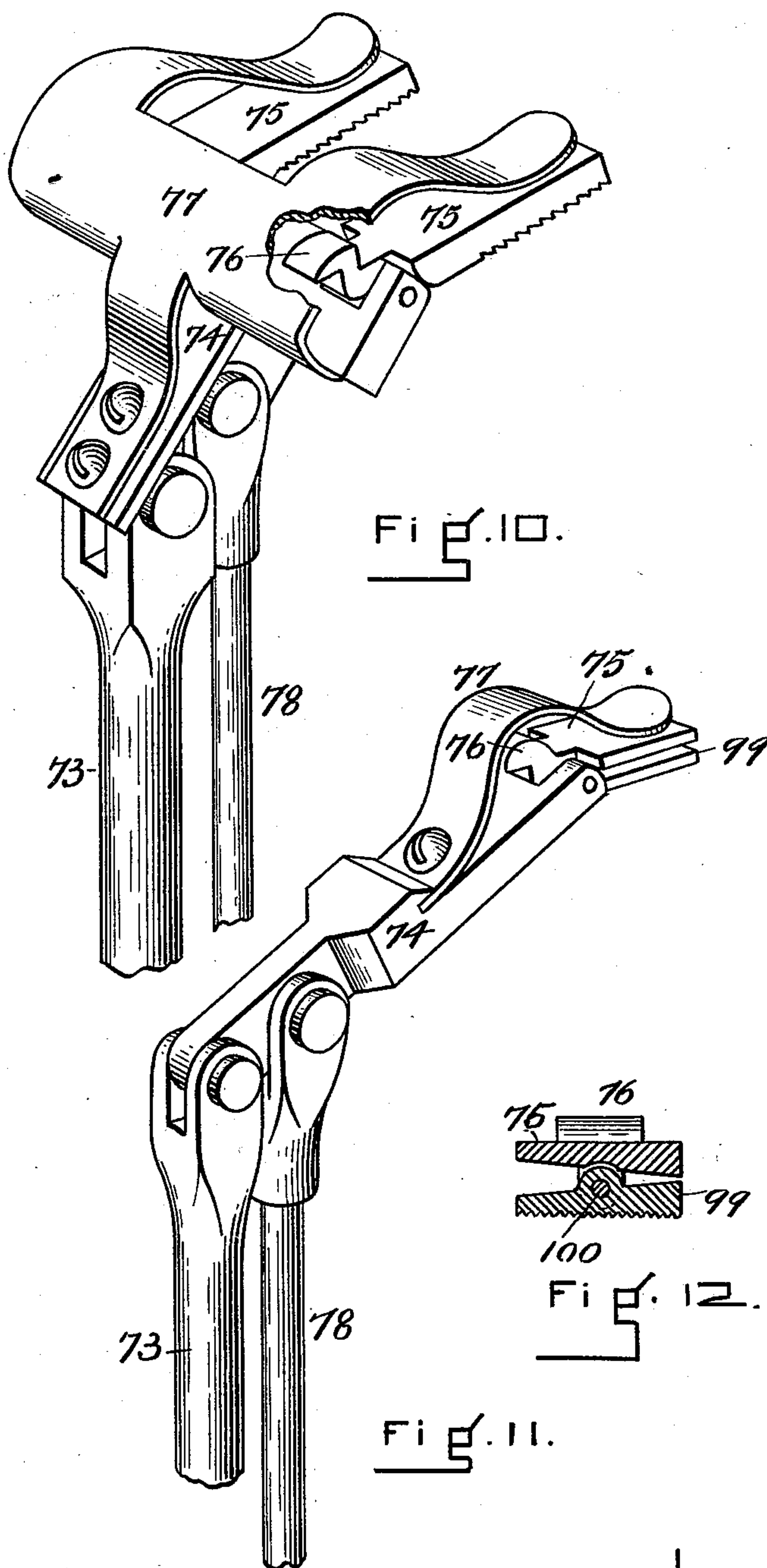
WITNESSES.
Mary E. Woodburn,
John L. S. Roberts

INVENTOR
Edward F. Grandy

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.



WITNESSES
Mary E. Woodburn
John L. S. Roberts

INVENTOR
Edward F. Grandy.

(No Model.)

10 Sheets—Sheet 10.

E. F. GRANDY.
LASTING MACHINE.

No. 521,954.

Patented June 26, 1894.

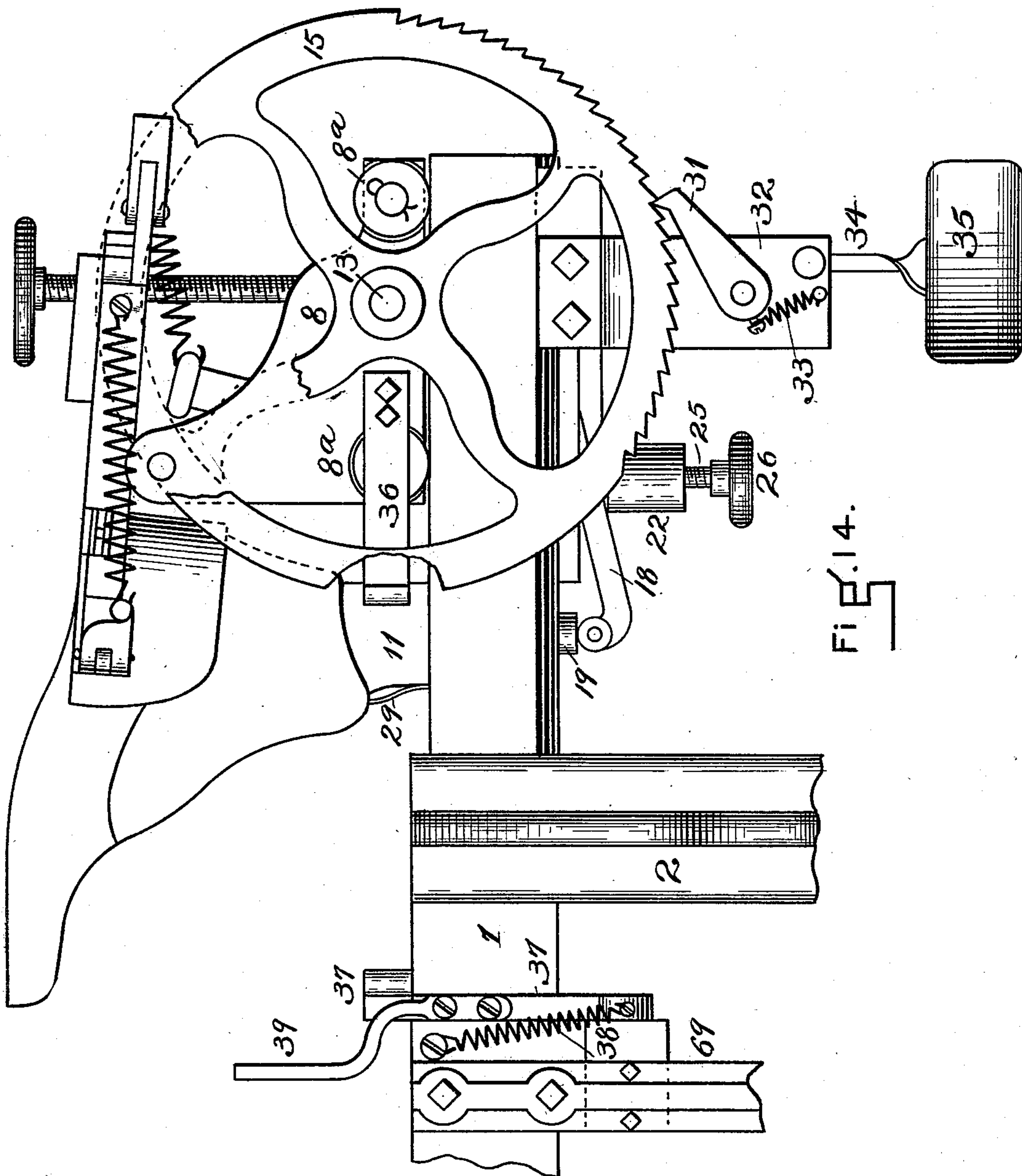


Fig. 14.

WITNESSES.
Mary E. Woodburn.
John L. S. Roberts

INVENTOR.
Edward F. Grandy

UNITED STATES PATENT OFFICE.

EDWARD F. GRANDY, OF EVERETT, MASSACHUSETTS, ASSIGNOR TO THE
GOODYEAR SHOE MACHINERY COMPANY, OF PORTLAND, MAINE.

LASTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 521,954, dated June 26, 1894.

Application filed August 4, 1893. Serial No. 482,331. (No model.)

To all whom it may concern:

Be it known that I, EDWARD F. GRANDY, a citizen of the United States, residing at Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Lasting-Machines, of which the following specification and accompanying drawings are such a full, clear, and exact description as will enable those skilled in the art to make and use the same.

The object of this invention, is to produce a machine specially adapted for operation upon shoes, which will present fewer obstacles to the use of the tack driving machine used to fasten the upper to the inner sole after the turning down process is completed, than do the machines before used to hold the upper preparatory to the tacking process.

This invention relates to the combination of improved jacking, and side holding mechanism, with the heel and toe lasting mechanism shown and described in the United States patents granted to George W. Copeland, Joseph E. Crisp and Edward F. Grandy March 4, 1890, to which reference is hereby made for details of said heel and toe lasting mechanism.

This invention also relates to a combination of treadle and cam mechanism whereby, the operation of a single treadle will cause the moving parts to move in pre-determined order as will hereinafter be described.

In the drawings Figure 1 is a front side elevation of the machine with the heel and toe lasting heads removed. Fig. 2 is a vertical longitudinal cross section of the upper part of the machine, showing the construction of the jacking and side holding mechanism. Fig. 3 is a perspective view looking from the rear or heel end of the machine, and showing the construction of a portion of the jacking mechanism. Fig. 4 is a detached view in perspective looking from the front or toe end of the machine, showing the mechanism for drawing the heel band close around the counter of the last. Fig. 5 is a cross section of the main shaft of the machine looking from the toe end, and showing the means for giving the requisite step by step revolution of said shaft by the use of a single operating treadle. Fig. 6 is a cross section of the main shaft looking

from the heel end, showing the relations of the cams operating the side holding clamps to each other. Fig. 7 is a vertical cross section of the upper part of the machine, showing the clamps for holding the upper at the ball of the last, and their operating mechanism. Fig. 8 is a vertical cross section of the upper part of the machine, showing the clamps for holding the upper at the shank of the last, and their operating mechanism. Fig. 9 is a vertical cross section of the main shaft, and a portion of the machine showing the brake which holds the main shaft in position during the fastening operation. Fig. 10 is an enlarged elevation in perspective of the clamps used at the ball of the last. Fig. 11 is an enlarged elevation in perspective of the clamps used at the shank of the last. Fig. 12 is an enlarged vertical cross section of one of the clamps used at the shank of the last. Fig. 13 is a vertical cross section of the longitudinal sliding toe rest, showing by full and dotted lines different positions thereof with relation to its fixed support or stem. Fig. 14 is an enlarged detached portion of the machine in front side elevation, showing a last jacked, and the carriage ready to be moved forward and be locked in operative position, and the locking mechanism therefor.

The frame of the machine consists of the parallel ties 1, which are supported by the legs 2 at the correct height for the operator, and to these ties are secured the various parts of the improved machine. At one end of the ties 1, there is formed upon or secured thereto the slideway 3, in which is mounted and moves the support 4, which carries the toe lasting head and the support 5, for the toe rest 6, all of which parts and their operating mechanism being similar to that described in the patents before referred to. To the opposite end of the parallel ties 1, there are formed upon or secured the bars 7, which form a track upon which the jacking and heel lasting mechanism is supported, and on which track it moves to and from the toe rest when the machine is operated. The lower edges of the bars 7, are beveled, and the frame or carriage, 8, when mounted thereon as shown by Fig. 3, will maintain their parallelism, as said frame is moved thereon.

The sliding frame or carriage, 8, is provided with rolls 8^a, which bear upon the upper square edges of the bars, 7, upon which said frame runs when it is moved. Upon the upper part of the carriage, 8, is mounted the heel lasting head and heel band of the former patents operating as therein described. Through the center of the carriage, 8, there is formed the guideway, 9, and fitted to slide in this guideway is the slide, 10, which carries the jack post, 11, as shown by Figs. 2 and 3. Upon the upper edge of the slide, 10, is formed the rack, 12, and mounted upon the shaft, 13, is the pinion, 14, which engages with the rack, 12, so that the hand wheel, 15, also fixed upon the shaft, 13, can be operated to move the jack post to and from the heel band; the shaft, 13, being mounted in bearings formed in the sides of the carriage, 8. In the center of the slide, 10, there is placed the spiral spring, 16, which acts to move the slide, 10, and the jack post from the heel band when the machine is opened to deliver the lasted upper.

The jack post, 11, moves vertically in the slide, 10, and is elastically and adjustably mounted therein as follows: To the under part of the slide, 10, there is pivoted at 17 the swinging arm, 18, and pivoted to the outer free end of this swinging arm is the support and guide, 19, for the spiral spring, 20, upon which rests the jack post, 11, the jack post having a pocket to receive and guide the spring, 20, formed therein. On the under side of the carriage, 8, there is formed upon or secured thereto the bar, 21, whose outer end is provided with the pocket, 22, which carries and guides the spring, 23. The upper part of the sides of this pocket, 22, is slotted, and fitted so that it will slide vertically, but not turn therein, is the nut, 24, which rests upon the spring, 23, and to which is fitted the adjusting screw, 25, provided with the small hand wheel, 26, by which the screw can be raised and lowered as desired.

The strength of the spring, 20, is made sufficient to hold up the jack post with a last placed thereon, and the strength of the spring, 23, is made sufficient to press the last upon the jack post firmly against the gage for height, formed upon one of the heel lasting plates, when the action of the hand wheel, 15, brings the heel of the last under said gage.

As shown by Fig. 2, the edge of the lever or bar, 18, rests upon the end of the screw, 25, and when the last is jacked as shown by Fig. 14, the spring, 20, is fully depressed, the lower end of the jack post is in contact with the upper surface of the guide, 19, and the superior tension of the spring, 23, is doing the effective work of holding up the jack post and last. The screw, 25, is only operated when the vertical thickness of the lasts varies considerably, or when it is desired to change the pressure of the heel of the last against the gage for height. The jack post is locked in the vertical position so that it cannot be

moved down by the action of the heel lasting plates, when they are folding down the upper, (and at the same time it is capable of being moved upward to give the final pressure, which fully irons down the upper) by the following described mechanism.

Formed upon the edge of the jack post farthest from the heel band, is the ratchet rack, 27, whose teeth are so formed that they will resist downward pressure, and the slot through the slide, 10, is made somewhat wider at the top than at the bottom, where it engages with the edges of the jack post, so that said jack post can swing a little lengthwise of the machine. The action of the spring, 19, always swings the top end of the jack post toward the heel band when the machine is at rest.

Mounted to slide upon the top of the slide, 10, opposite the ratchet rack, 27, is the sliding pawl, 28, which is pressed toward the jack post by the spring, 29, also secured to the slide, 10. The forward motion of the sliding pawl, 28, is so limited that it cannot engage with the teeth of the rack, 27, when the jack post is swung toward the heel band as far as possible and when in this position the jack post is free to reciprocate.

When the operator places a last upon the jack pin and moves the jack post, by the hand wheel, 15, toward the heel band, as soon as the heel of the last contacts with the center of the heel band, the jack post swings forward and the pawl, 28, engages with the correct tooth of the rack, 27, and the jack post is held fixed from vertical stress applied from above so long as held in that position.

If from any cause the last was below the desired height, at the time of contact with the heel band, the action of the spring, 23, would move the jack post up and the spring, 29, would yield and allow the pawl to move back, until the correct position was reached, when said pawl would act as before described.

To hold the jack post fixed firmly against the center portion of the heel band, the outer circumference of the hand wheel, 15, is provided with ratchet teeth, 30, and the swinging pawl, 31, hung upon the downward projection, 32, formed upon or secured to the carriage, 8, is drawn by the action of the spiral spring, 33, into contact with said ratchet teeth, 30, and thus retains the hand wheel, 15, in its set position, and the last firmly jacked as required, with the toe unsupported as shown by Fig. 14.

To release the hand wheel, 15, there is mounted upon the projection, 32, the swinging lever, 34, as shown by Fig. 3, whose upper end is inclined, so that when it is swung toward the pawl, 31, it will engage with the upper side of said pawl, and draw it from contact with the teeth of the wheel, 15, the lower end of said lever being provided with the plate, 35, against which the operator presses when it is desired to unjack the last.

To lock the carriage, 8, in operative position, a catch, 36, is secured to or formed upon

the side of the carriage so that it will engage with the swinging catch, 37, pivoted to the front of one of the ties 1, as shown by Figs. 1 and 14; which swinging catch is drawn toward the catch, 36, by the spring, 38, fixed to said catch and the tie, 1. The swinging catch, 37, is provided with the projecting handle, 39, by the use of which the operator can draw back said catch and move the carriage, 8, backward if desired for any purpose. The swinging carriage, 37, is also provided with the projecting arm, 40, Fig. 7 which is operated automatically to unlock the carriage, 8, in unison with the other parts of the machine by contact at the suitable time with a pin, 41, upon the face of one of the cams, 55, at the completion of the lasting process.

The position of the last after it is jacked, enables the operator readily to position the upper thereon, before running it into the machine and locking the carriage, 8, in position for the lasting process, at which time the toe rest is down, and the side holding clamps are above the edges of the upper as shown by Fig. 2.

The lasting process as practiced with this machine, consists in jacking the last, with the upper thereon, as hereinbefore described, running the jacked last into the machine, raising the toe rest, drawing the heel band tight around the counter, drawing over and clamping down the upper upon the inner sole; commencing at the ball of the foot and ending at the shank, at alternate sides, lasting the toe and heel, fastening the upper to the inner sole by tacks and then simultaneously releasing the various holding devices and removing the lasted upper from the machine.

Most of the operations were performed in the preceding machines by the manipulation of a treadle for each operation.

In the present machine, a single treadle, which can be depressed without change of the operator's position, is used in the place of the treadles aforesaid. This treadle revolves a sleeve upon which is fixed the cams which give the desired motions, the whole device being constructed as follows: A supporting shaft, 42, is fixed between the cross bars, 43 and 44, connecting the parallel ties, 1, and fitted to revolve upon this shaft is the long sleeve, 45, Figs. 4 to 9. Fixed upon this sleeve are the cams operating the desired parts of the machine. To revolve the sleeve, 45, at the proper intervals, there is fixed upon it the ratchet wheel, 46, Fig. 5, having a single tooth for each motion it is desired to give the sleeve. Loosely mounted upon the sleeve, 45, is the disk plate, 47, having the pawl, 48, hung upon one of its projecting arms, so that it will engage with the teeth of the ratchet wheel. To the other projecting arm of the disk, 47, there is attached one end of the connection, 49, whose lower end is attached to the foot treadle, 50, Fig. 1 which the spring, 51, holds at its highest elevation when said treadle is at rest. Each depression of the

treadle, 50, by the foot of the operator causes the cam sleeve, 45, to revolve one segment of its revolution.

With the machine in the starting position and the carriage, 8, locked in operative position, the toe rest 6, is raised upon the first depression of the treadle, 50, by the action of the cam, 52, Figs. 2 and 6, which acts upon the roll, 53, fixed upon the swinging support, 54, for said toe rest. At the second depression of the treadle, 50, the heel band is drawn tight around the counter of the last, by the action of the cam, 55, which acts upon the roll, 56, fixed upon the lever, 57, which lever is connected to the rock shaft, 58, mounted in the rear tie, 1, by the connection, 59, and the arm, 60, fixed upon the outer end of said shaft as shown by Figs. 2 and 4. The arm, 61, formed upon or secured upon the inner end of the rock shaft, 58, with the roll, 62, mounted upon its free end, acts in turn upon the lever, 63, in the usual manner as shown by Fig. 4. The side holding clamps are then drawn down by successive motions of the treadle, 50, which cause the cams, 64, 65, 66, and 67, in the order named, to act each upon its individual lever.

The levers hereinbefore mentioned are substantially alike in construction and operation and are mounted alternately upon the pins, 68, which are supported in dependent arms, 69, secured to or formed upon the ties, 1, as shown by Figs. 1, 7 and 8. The outer free ends of these levers are connected to the ties, 1, by the spiral pull springs, 70, which hold their rolls at all times against the edges of their operating cams as shown by Figs. 4, 7 and 8.

The side holding mechanism consists of clamps, which are swung vertically to and from the last by the action of the free ends of their operating levers, and they are mounted, constructed, and operated as follows: These clamps are arranged to operate singly or in pairs as desired, and the clamp or groups of clamps, are moved by their cams, so that the clamp on one side is moved first, and then the opposite one, commencing with one of the clamps at the ball of the last.

Bolted to the outer sides of the ties, 1, so that they can be swung at will lengthwise of the last, are the swinging standards, 71, Figs. 1, 7 and 8, having sockets, 72, at their upper free ends, which sockets are provided with suitable set screws. Fitted to turn and slide in the sockets, 72, are the pins, 73, whose upper ends are forked, to receive the swinging levers, 74, whose outer ends are also forked, to receive two clamps as shown by Fig. 10 or one clamp, as shown by Fig. 11. The clamps, 75, are provided with stops, 76, which limit their swinging motion in the levers, 74, so that they can swing about twenty degrees downward, and be rigid when parallel with said levers, 74, as shown by Figs. 7 and 8. Springs, 77, are fixed to the levers, 74, which press the clamps, 75, down with the desired

tension. When the clamps, 75, are drawn toward the last as soon as they contact with the leather of the upper, the springs, 77, give back and the swinging motion of the clamp gives an inward motion to its contacting surface, which, as said surface is serrated, causes the clamp to draw the upper tighter around the last than if said clamp was swung directly down upon the turned over upper. These clamps are drawn down toward the last by the rods, 78, which may be single and connected directly to the cam levers, as shown in Fig. 2 where the levers, 74, are shown as carrying a pair of clamps, or the rods, 78, may be connected to a cross link, 79, which is connected in turn to a single rod, 80, which is directly connected to the cam levers. The connection of the rods, 78 or 80, is made by passing the rods through holes formed in the free ends of said levers with a collar, 81, fixed to the rods above the cam levers so that the levers will always raise the clamps to the same height when elevated by the springs, 70.

Below the cam levers the spiral push springs, 82, are placed around the lower ends of the rods, 78 and 80, whose tension adjusted by the thumb nuts, 83, determines the pressure of the clamps, 75, upon the upper when the cam levers are drawn down by the rigid action of their operating cams.

If desired, the cams hereinbefore described may be constructed double, so that the clamps will operate alternately with relation to each other, and also operate alternately with relation to right and left lasts, so that it will require one full revolution of the cams to last a pair of uppers.

In the machines the subject matter of the patents hereinbefore mentioned, after the last has been firmly jacked its toe rests or is pressed down upon the toe rest, which is carried by and moves with the toe lasting head during the toe lasting process. As the toe lasting head requires to be moved to and from the last during said process the friction of the top part of the toe rest upon some grades of material is undesirable and affects the finish of the upper. To remedy this defect, the top part, 84, of the toe rest, 6, in the present machine is fitted to slide on a suitable dovetail formed on the lower part, 6, as shown by the full and dotted lines of Figs. 2 and 13. A pocket to receive a light spiral spring, 85, is formed in the lower part, 6, and a plate, 86, is secured to the side of the top part, 84, toward the heel of the last and a stop screw, 87, is fixed to the opposite side of the part, 84, which holds it in the position shown by the full lines against the pressure of the spring, 85, when the machine is at rest. When the toe lasting process commences, the toe lasting plates are projected somewhat under the end of the toe of the last, and as said plates are moved toward the last, the top part of the toe rest will compress the spring, 85, and remain stationary upon the upper while the lower part, 6, will move to the position

shown by the dotted lines of Fig. 13. When the last is removed from the machine, the spring 85, acts against the plate, 86, and returns the top part of the toe rest to its normal position.

After the heel lasting process is completed the upper is ironed down by the operator who depresses the treadle, 88, and forces the upper end of the rod, 89, Figs. 1 and 2, against the under side of the swinging arm, 18, which causes the jack post, 11, to raise the last toward the heel lasting plates with the desired pressure.

The cams fixed upon the sleeve, 45, are made of such shape that they will depress the levers serially at the correct times, and then hold said levers so depressed until the last lever of the series has been depressed, and the last holding clamp moved down upon the upper. From this position, the form of all of the cams is such that the next depression of the treadle, 50, will cause all of the cams to allow the return springs to act and move the various levers connected thereto back to their starting position where as shown by Figs. 4, 6, 7 and 8, the cams are provided with a slight depression, 90, which engages with the cam rolls on the levers and holds the sleeve, 45, in the starting position, ready for another serial operation. The requisite variation in the strength of the various springs acting upon the return inclines of the cams, and the different movements which different operators give to the treadle, 50, will at times cause the cams to acquire sufficient momentum to overrun the depression, 90, and raise and hold up the toe rest, 6. Making the depression, 90, of sufficient depth to catch and hold the cams under all conditions would give an undesirable jar to the machine and also require extra exertion on the part of the operator in giving the first active motion to the cams. To insure the perfect stopping of the cam sleeve under all conditions there is fixed to said sleeve the brake wheel, 91, Figs. 2 and 9, whose brake strap, 92, is secured at one end to the front tie, 1. The free end of the brake strap, 92, is connected to the rod, 93, which rod is connected as shown by Fig. 9, to the lever, 94, which lever is hung upon the rear pin, 68. The spring, 95, around the lower part of the rod, 93, adjusted by the screw nut, 96, governs the pressure of the brake strap, 92, when the lever, 94, is depressed by the action of the cam, 97, upon its roll, 98. The brake cam, 97, is fixed upon the sleeve, 45, and so located with reference to the operating cams, that the brake strap, 92, commences to act when the last holding clamp is nearly drawn and is relieved just as the slight depression, 90, is in correct position to engage with the various cam rolls.

By the above described device all irregular effects of momentum are overcome, and at the same time the cams are held stationary during the tacking process.

By inspection of Fig. 1, it will be seen that

the longitudinal angle of the last at the shank is considerable, and that as the shank holding clamps are swung lengthwise the last by the movement of the standards, 71, to bring said clamps into the desired position for lasts of varying lengths, the working surfaces of said clamps will be presented to surfaces of different angular inclinations. To cause the working surfaces of the shank holding clamps to bear fair upon the upper in all positions, these working surfaces are constructed as shown by Figs. 11 and 12, the working surface, 99, being pivoted to the part, 75, by the pin, 100, so that it can swing upon said pin lengthwise of the last. This joint causes the surface, 99, to conform by contact to the angle of the bottom of the last, and thus be presented fair to the turned down upper without danger of injury thereto.

In lasting machines of the class herein described, the heel and toe are held fixed centrally with the machine when the last is jacked and locked into operative position. Many of the lasts used at the present time have very narrow shanks and these shanks have considerable longitudinal curve with reference to the median line of heel and toe. If the standards carrying the shank holding clamps were fixtures, transverse or crosswise the last, the ends of said clamps would either pass completely across the shank, or not be in position to contact therewith as the lasts used changed from right to left.

Figs. 1, 2 and 8 show the means of adjustment by which the correct location of the ends of the shank holding clamps is simultaneously made. The standards, 71, are jointed at, 101, so that they can be swung crosswise the last, and pivoted to the upper jointed part are the bearings, 102, which bearings are free to turn upon their pivot pins, 103. Mounted in the bearings, 102, is the shaft, 104, having the collars, 105, fixed upon it each side of the bearings, 102, which collars preserve the relative distance apart of the sockets, 72, as the two united standards are swung crosswise the last. Secured to the fixed part of the front standard, 71, is the plate, 106, whose upper end is enlarged and formed into a suitable screw nut. To this screw nut is fitted the screw, 107, formed on the projecting end of the shaft, 104, which screw when turned by its head, 108, will move in unison and hold the ends of the shank holding clamps in any desired position with reference to the center of the shank of the last.

It will be observed that in this specification the operating cams are mounted on a long sleeve, 45, revolving on a fixed shaft, 42. It is evident that the cams may be mounted directly upon the shaft, 42, in which case the shaft should be provided with suitable bearings secured to or formed on the frame or parallel ties 1, 1, thereof.

Having thus described my invention, its

construction and mode of operation, what I claim, and desire to secure by Letters Patent, is—

1. In a lasting machine, the combination of a frame supporting the heel lasting mechanism, a slide reciprocating therein, a swinging jack post reciprocating in said slide substantially as described, lever and spring mechanism for raising said jack post pivoted to said slide, a stationary adjustable support fixed to said frame and engaging with said lever, and ratchet and pawl holding mechanism for said jack post, all operating substantially as described, and for the purpose set forth.

2. In a lasting machine, the combination of a frame supporting the heel lasting mechanism, a slide carrying the jack post reciprocating therein, a return spring for said slide, rack and pinion mechanism for moving said slide with reference to said frame, ratchet and pawl mechanism for locking said slide in operative position and a swinging lever for releasing said slide all operating substantially as described.

3. In a lasting machine the combination of a carriage supporting the jacking and heel lasting mechanism, a track upon which said carriage moves, spring catch mechanism which holds said carriage in operative position, a lever connected to the catch mechanism, and a pin for engaging with said lever fixed at the desired angular position upon one of the operating cams, substantially as and for the purpose set forth.

4. In a lasting machine, the combination of operating cams mounted to revolve below the jacked last, substantially as described, treadle operated ratchet and pawl mechanism to revolve said cams and brake mechanism for said cams, lever, roll and suitable connecting mechanism for setting and releasing said brake which is operated by the revolution of said cams, all substantially as described and for the purposes set forth.

5. In a lasting machine, the combination of operating cams mounted to revolve below the jacked last, substantially as described, treadle operated ratchet and pawl mechanism to revolve said cams, swinging side holding clamps mounted above the jacked last, and lever and rod connections between said holding clamps and said operating cams, all substantially as described.

6. In a lasting machine, the combination of swinging stands mounted upon the sides of the machine, swinging levers mounted upon their upper free ends, swinging holding clamps pivoted to said levers, springs and stops for said clamps all adjustably located above the bottom of the last held in the machine, and suitable operating mechanism connected to said levers which move them down and upon said last, all substantially as shown and described.

7. In a lasting machine, holding clamps, having a swinging auxiliary contacting face

pivoted thereto, substantially as shown and described.

5 8. In a lasting machine, a toe rest or support provided with a longitudinal reciprocating contacting face, substantially as shown and described and for the purpose set forth.

9. In a lasting machine, the combination of longitudinal swinging stands mounted upon the sides of the machine joints in said stands
10 whereby their top members can be swung crosswise the machine, holding clamps mounted on said top members, a jointed connection between opposing pairs of said top members,
15 and adjusting mechanism adapted to swing said top members in unison, substantially as and for the purpose set forth.

10. In a lasting machine, the combination of a carriage supporting the jacking and heel lasting mechanism, a slide reciprocating therein, a swinging jack post reciprocating 20 in said slide, lever and spring mechanism for raising said jack post pivoted to said slide, a track which supports said carriage, mechanism for locking said carriage in operative position on said track, treadle and rod mechanism 25 mounted on the frame of the machine and located to engage with the jack post raising lever, when said carriage is locked in position.

EDWARD F. GRANDY.

Witnesses:

MARY E. WOODBURN,
JOHN L. S. ROBERTS.