(No Model.) 2 Sheets—Sheet 1.

E. A. KIMBALL.

MACHINE FOR TURNING IRREGULAR FORMS.

No. 498,170. Patented May 23, 1893.

Fig. 2.

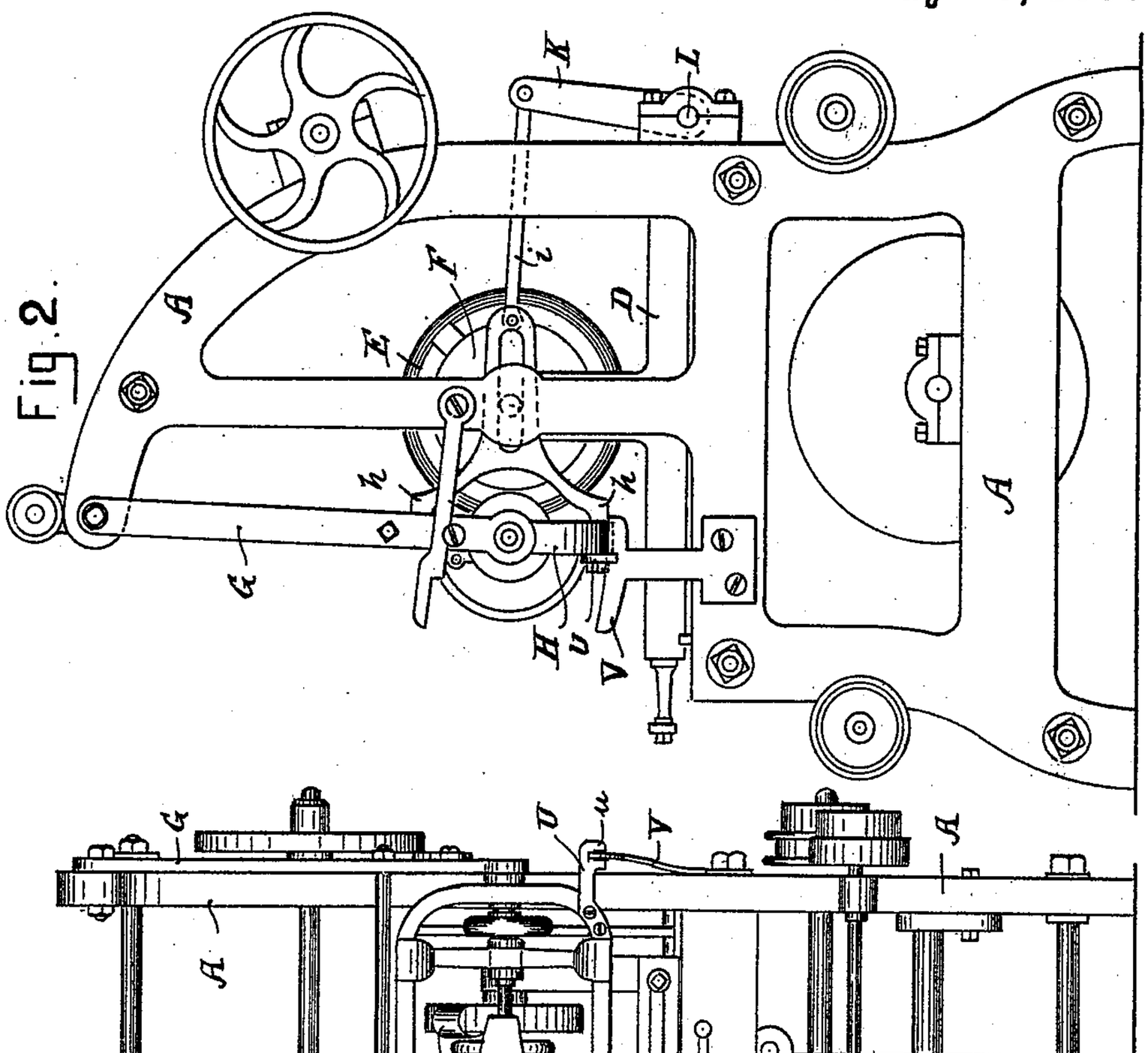
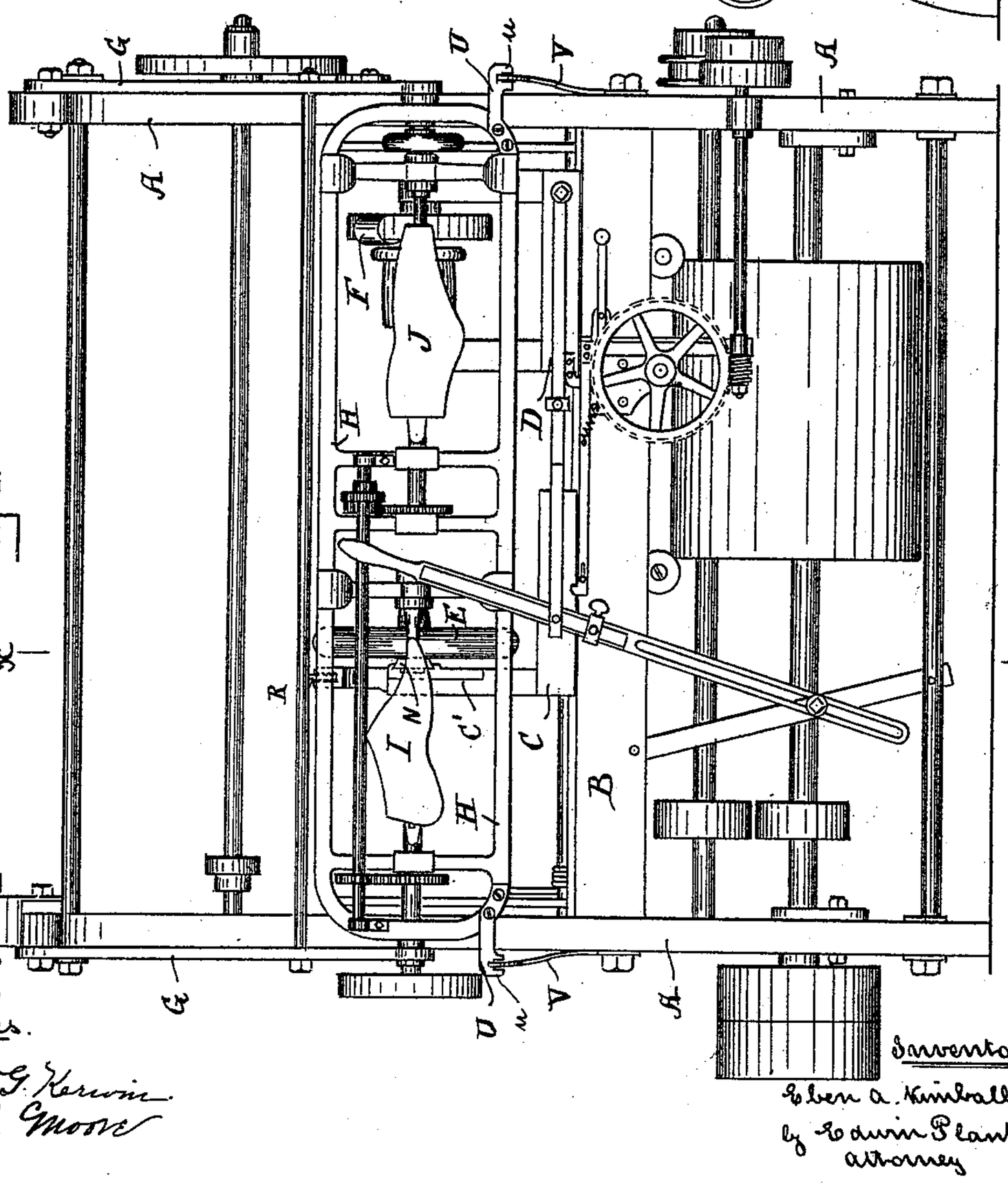


Fig. 1.



Witnesses.
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John J. Moore

Inventor.
Eben A. Kimball
by Edwin Planta.
Attorney

(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

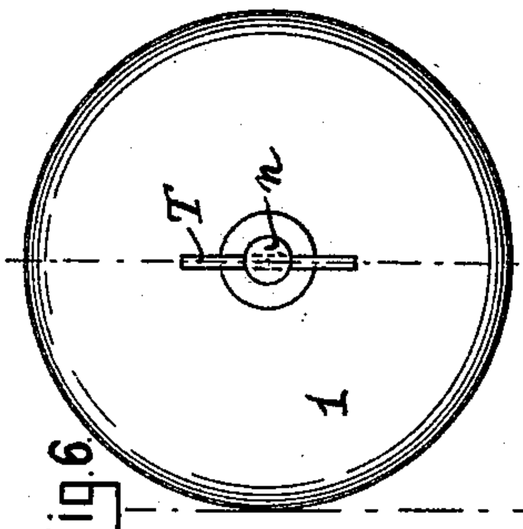


Fig. 7.

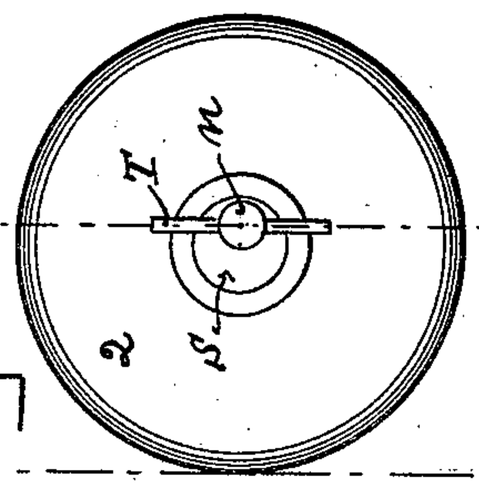


Fig. 8.

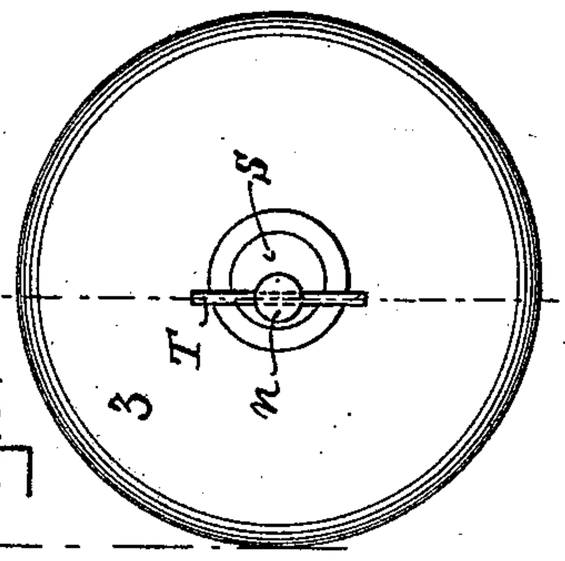


Fig. 5.

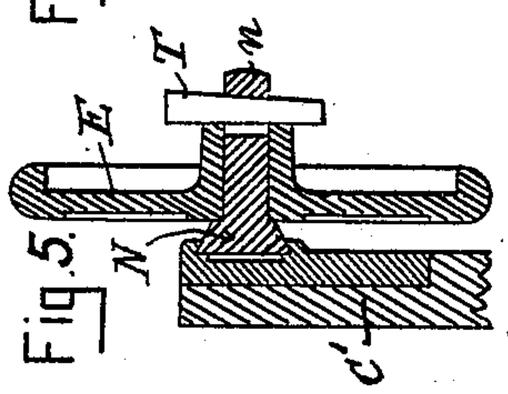


Fig. 4.

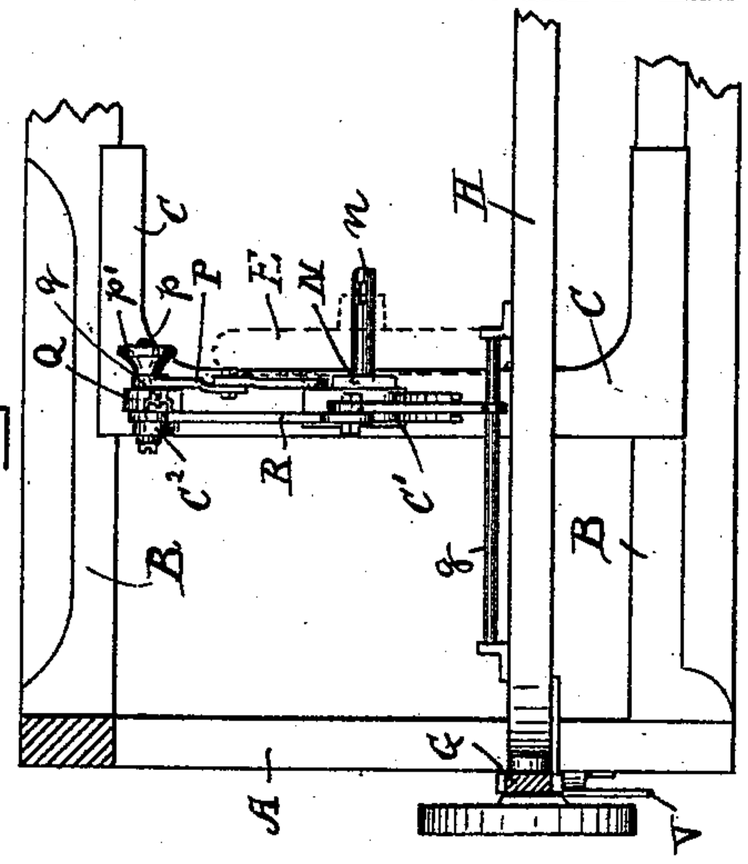


Fig. 10.

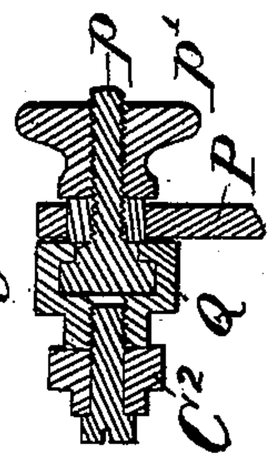


Fig. 9.

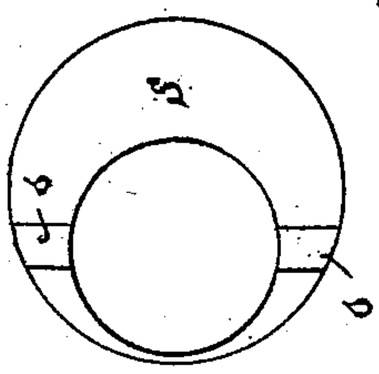
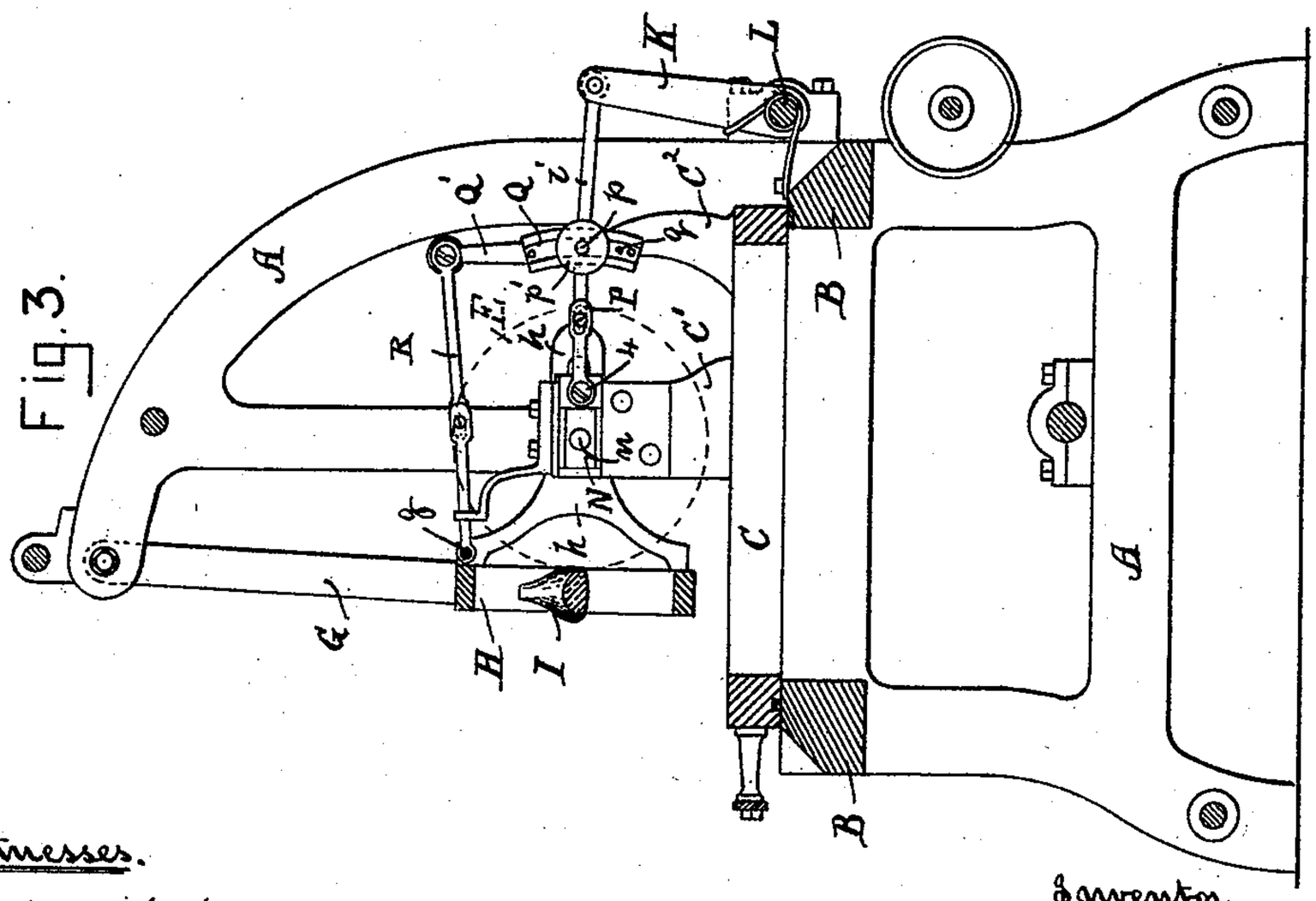


Fig. 3.



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John J. Moore.

Inventor.
Edwin A. Kimball
by Edwin Slauter.
Attorney.

UNITED STATES PATENT OFFICE.

EBEN A. KIMBALL, OF BROCKTON, MASSACHUSETTS.

MACHINE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 498,170, dated May 23, 1893.

Application filed July 27, 1891. Serial No. 400,894. (No model.)

To all whom it may concern:

Be it known that I, EBEN A. KIMBALL, a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Machines for Turning Irregular Forms, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to that class of machines employed for turning irregular forms and is particularly adapted for turning lasts for boots and shoes.

The invention consists in means for adjusting and retaining the model wheel in position to make the last the same as, or respectively larger, or smaller, than the model while preserving the relative proportion of the parts of each last, and also in certain details of construction as hereinafter fully described and pointed out in the claims.

Referring to the accompanying drawings: Figure 1— represents a front view of a machine for turning irregular forms embodying my invention. Fig. 2— is a side view of the same. Fig. 3— is a vertical transverse section taken on line *x*, *x*, of Fig. 1. Fig. 4— is a sectional plan view of one end of the machine and the traveling frame carrying the model wheel. Fig. 5— is a sectional view of the model wheel and its support. Figs. 6, 7 and 8 are views of model wheels of different sizes mounted according to my invention. Fig. 9— is a full size end view of an eccentric bushing. Fig. 10 is a sectional detail view.

A, represents the side frames of the machine, B the bed upon which travel the frames C, D, carrying the model wheel E, and cutter wheel F.

G, G, are swinging arms fulcrumed at their upper ends to the front part of the side frames A. To the lower ends of the swinging arms G, is pivoted a rectangular frame H, that carries the model I, and the block J, to be cut, which latter are secured in any convenient manner, and which can be caused to turn in the same or in opposite directions as may be required by suitable gearing as shown.

h, *h*, are arms secured to the rear of the rectangular frame each arm having a slot through which a stud or screw passes, owing to the arms *h*, being guided by the slots and studs in a straight line the frame H, is turned by said arms on its pivots in the arms G as it is thrown out or drawn in according to the position of the last, the rear end of each arm *h*, being by a bar *i*, and arm K, connected to a rocker shaft L.

The traveling frame C, is formed with a standard C′, having on one side near the top a dove tail groove in which a corresponding dove-tail plate N, is free to slide, to which is secured a spindle or stud *n*, for carrying the pattern wheel E. To the sliding plate N, is attached an adjustable arm P, the outer end of which is connected to a dove-tail or T-shaped plate carrying a screw *p*, said plate working in a corresponding dove-tail or T shaped groove *q*, formed in a curved plate Q, fulcrumed at its center to a standard C², at the rear of the frame C. The curved plate Q, is a section of a true circle the center being the point 4, where the arm P, is connected to the sliding plate N. Upon the screw *p*, is mounted a nut *p*′, so that the sliding plate may be secured in an desired position in the curved plate Q. Pins or stops are placed in the groove *q*, to prevent the sliding plate that works in said groove from dropping or being pulled out when raised or lowered for the purpose of adjustment.

From the upper end of the curved plate Q, extends an arm Q′, the end of which is by an adjustable connecting rod or bar R, attached to and free to slide on a rod *g*, secured to the frame H, so that when the frame H, is thrown out or in the bar R, imparts a corresponding movement to the curved plate Q, and through it and the bar P, to the sliding plate N, that carries the model wheel E, whereby the relative proportions of the last are maintained.

When the bar P, is secured in the center of the curved plate Q, (as shown) the face of the model wheel will always be on a line with the face of the cutters, and a last of the same size be produced, but when the bar P, is secured below the center, the plate N, (and with it the model wheel) will be drawn back, when the frame carrying the block and model is moved forward and a last of smaller size will be cut, but when the bar is secured above the center, the plate N, will be thrown forward and a larger sized last will be cut.

The operation of these parts is as follows:—

The model I, and block J, to be cut having been secured in the frame H and supposing the block has to be cut to the same size as the model I, then the rear end of the bar P, is by the nut p', clamped on the fulcrum of the curved plate Q, and will not be affected by any oscillation of the same, and as the forward end of said bar is fulcrumed to the sliding plate N, the latter will be held stationary during the entire operation of cutting the last and the effect will be the same as though the pattern wheel was mounted upon a fixed stud; but supposing it is desired to cut a last a size larger than the model then the end of the bar P, will have to be secured above the center of the curved plate Q, and as said plate Q, is connected to the frame H by arm Q', and connecting rod R, the plate Q, will be caused to oscillate as the frame H, is thrown out or in by the pattern wheel E, operating upon the model and the sliding plate N, will be thrown forward as the frame H is moved outward and a last of a larger size is produced, but if a last of a smaller size than the model is required the end of the bar P, is secured to the plate Q, below its center and the sliding plate will then be caused to recede as the frame H, is moved outward. Thus when turning a last the same size as the model the end of bar P, being clamped on the fulcrum of the curved plate Q, the model wheel has no movement except what rotary motion is imparted thereto by the frictional contact with the model, and operates the same as though it was mounted upon a fixed stud. In turning a last of a size larger than the model the end of the bar P, is secured above the fulcrum of the curved plate Q, and the center of the pattern wheel is thrown forward; now supposing the left hand side of the last or model to be next to the model wheel, as the model is rotated and its upper end comes into contact with the pattern wheel the frame H, is thrown outward and by reason of the curved plate being connected to the frame H, it is caused to tilt and as the stud upon which the pattern wheel is mounted being connected to the curved plate above its center the pattern wheel has also been caused to advance thereby throwing the frame H, outward the distance that said wheel has been caused to advance above and beyond what it would have been thrown out if the wheel had been mounted upon a stationary pin, as the last continues to rotate the frame H, recedes until the right hand side of the last is in contact with the pattern wheel which has also been caused to recede by the bar R, operating the curved plate Q, but only in proper proportion the center of the pattern wheel being still in a proportionately advanced position; the sole portion of the model then comes into contact with the pattern wheel and the frame H, is again thrown outward and also the pattern wheel in a regular proportion in the manner before described; after which the model is turned to the position in which it first started. This operation is repeated as the model is rotated and at the same time the carriages C, D, are caused to travel so that the pattern wheel travels over the entire length of the model while the cutters travel over the block to be cut. It will readily be seen that as the frame H, is moved outward a great or small distance that the center of the pattern wheel is also proportionately shifted in advance of the center of the cutter wheel. Thus a last of a larger size is produced, but such shifting is less than the movement of the frame H, in the proportion which the lever arm controlled by the frame H, bears to the lever arm controlling the pattern wheel stud.

In producing a last of a smaller size than the model the end of the bar P, is secured below the fulcrum of the curved plate Q. Thus the action is reversed, that is to say, as the frame H, is caused to advance by the model coming into contact with the pattern wheel, the latter is caused to recede in a proportionate manner thus bringing the center of said pattern wheel at the rear of the center of the cutter wheel whereby a smaller last is produced. Of course it is understood that while these changes are being made in the position of the model wheel as above described the center of the cutter wheel is always in the same position in relation to the front of the machine.

In turning lasts larger or smaller than the model, in order to maintain the exact proportions it is necessary also to use model wheels of different diameters and thicknesses and the front central portion of the wheels in all cases has to be on a line with the front central portion of the cutters when the swinging frame is at its lowest point. In order to accomplish this without shifting the stud n, upon which said wheels are mounted, I secure upon the stud an eccentric bushing S, when a last larger or smaller than the model is required, upon which bushing the required model wheel is placed, but when a last of the same size as the model is required, the model wheel is then mounted directly upon the stud n.

To preserve a uniform proportion in grading larger or smaller than a fixed sized model it is necessary to change the arc of the circle of the model wheel and also the width of its contact face so that when it is desired to cut a last the same size as the model then a medium size wheel, (as 1,) is mounted directly upon the stud n, but when a smaller size last than that of the model is required the eccentric bushing S, is first placed upon the stud n, so as to throw its center forward and a smaller wheel (as 2) is mounted thereon as shown and when a larger size last than that of the model is required the eccentric bushing is placed upon the stud n, so as to throw it backward and a large wheel (as 3) is mounted thereon, the sliding plate N being operated as before described.

In Fig. 6 I have shown the model wheel 1, mounted directly upon the stud n, which

wheel is of the same diameter and shape as the arc of the circle scribed by the finishing cutter on the cutter wheel F.

In Fig. 7 I have shown a model wheel 2 of smaller diameter mounted upon an eccentric bushing S, secured to the stud *n*, so that its front central portion is in the same position as that of wheel 1, and in Fig. 8 I have shown a larger wheel 3, mounted upon the bushing set in the opposite direction, so that its front central portion is in the same position as that of wheels 1 and 2.

In order to secure the eccentric bushing S, to the stud *n*, a slot *s*, is cut in one end (see Fig. 9) which slot corresponds with a slot formed in the stud *n*, so that when placed upon the stud in either direction the slot in the bushing will be opposite that in the stud *n*, so that a wedge shaped key T, can be inserted and retain it and the pattern wheel in place, the hub of the wheel projecting a short distance over the slot in the stud *n*, so that the wedge shape and weight of the key T, will keep the wheel in its proper position.

When a medium sized wheel is to be used the eccentric bushing is not required and the wheel is held in place by the key T, coming against the hub of the wheel as shown in Fig. 5.

The above applies only to the proportions of the thickness, width or diameter of the last and not to the proportions lengthwise which is obtained by conveying a longer or shorter motion to the model carriage than that imparted to cutter carriage which is well understood by persons skilled in the art and wheels of different diameters and widths are necessary to maintain these longitudinal proportions as is also well understood by those skilled in the art.

As the model wheel passes over the model when it comes to an enlarged portion it causes a strain upon the swinging frame, and the tendency is to give it a slight lateral motion. In order to prevent this I secure to the one or both ends of the frame H, an arm U, (see Figs. 1 and 2) having a downwardly projecting end *u*, in which a slot or recess is formed, and to the side frames A, I secure guides V, the upper ends of which fit into the slot in the arm U, thus holding the frame H, in place and preventing lateral motion.

The parts of the machine not lettered or described are of well known construction, and familiar to those skilled in the art, and are only shown in the drawings to make the connection of my improvements more clear.

What I claim as my invention is—

1. In a machine for turning irregular forms, a sliding plate carrying a stud upon which the model wheel is mounted, said plate working in a groove in a standard on the sliding frame and connected to a fulcrum free to be adjusted in, and clamped to a curved swinging plate, the upper end of which is connected to the frame that carries the model and block to be cut, substantially as and for the purpose set forth.

2. In a machine for turning irregular forms, the combination of the sliding frame C, the standard C′, having a dovetail groove on one side, the dovetail plate N, carrying the stud *n*, upon which the model wheel is mounted, the curved swinging plate Q, connected to the sliding plate N, by rod P, an adjustable fulcrum *p*, and nut *p*′, said plate Q, being also connected to the frame H, by arm Q′, connecting rod R, and rod *g*, substantially as and for the purpose set forth.

3. In a machine for turning irregular forms a curved slotted swinging plate Q, swing frame H, and suitable connections between it and the plate Q, also suitable connections between said plate Q, and the model wheel so that the model wheel is operated from the swing frame H, to cause it to advance or recede when a last smaller or larger than the model is to be cut substantially as set forth.

4. In combination with the pattern wheel of a machine for turning irregular forms, such as described an eccentric bushing S, having a slot *s*, in one end thereof, substantially as and for the purpose set forth.

5. In combination with a pattern wheel of a machine for turning irregular forms such as described an eccentric bushing S, having a slot *s*, in one end thereof, a slotted stud *n*, upon which said bushing is mounted and a wedge shaped key T, substantially as and for the purposes set forth.

6. In a machine for turning irregular forms, arms secured to the swinging frame that carries the model and block to be cut, said arms engaging with guides secured to the side frames whereby lateral motion of the swinging frame is prevented, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 9th day of July, A. D. 1891.

EBEN A. KIMBALL.

Witnesses:
L. W. HOWES,
EDWIN PLANTA.