(No Model.) 2 Sheets—Sheet 1

E. S. & C. R. GORHAM.

ROTARY CUTTING VENEER MACHINE.

No. 397,181. Patented Feb. 5, 1889.

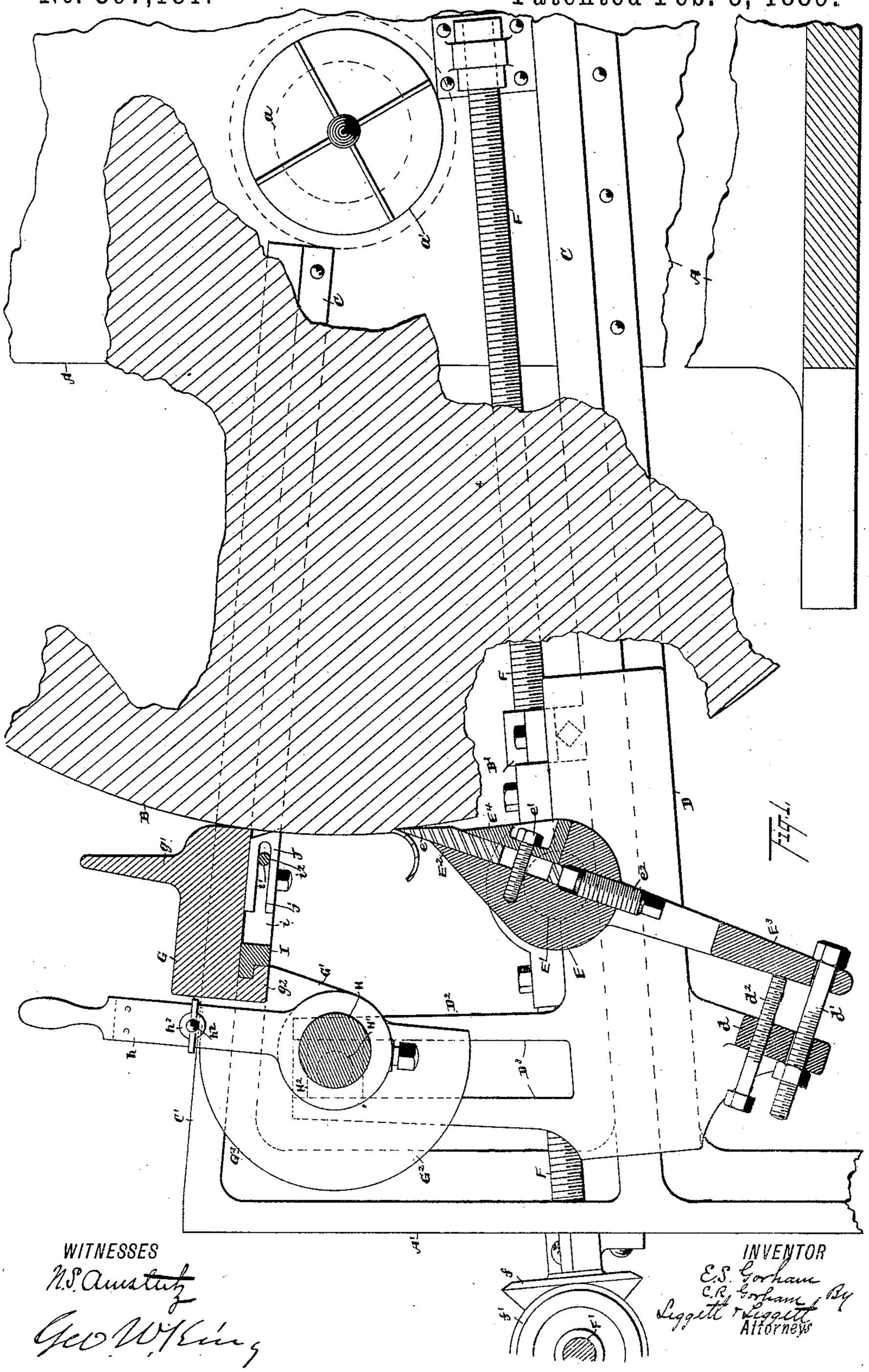

Fig. 1.

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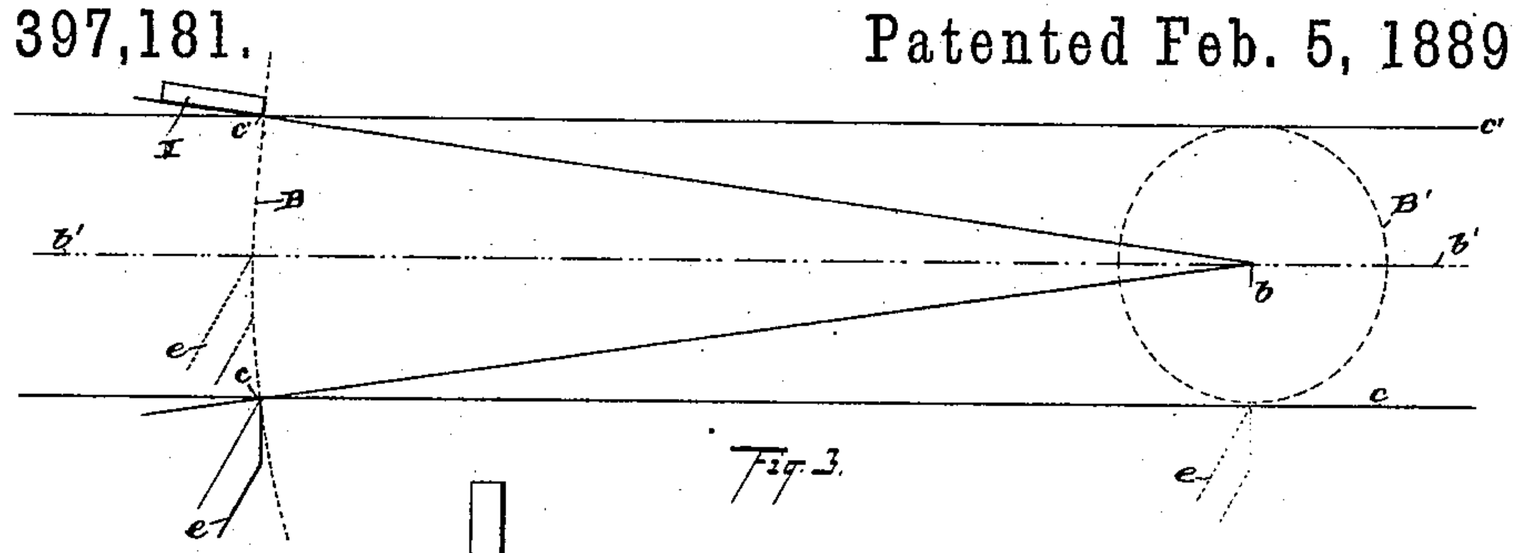

Fig. 3.

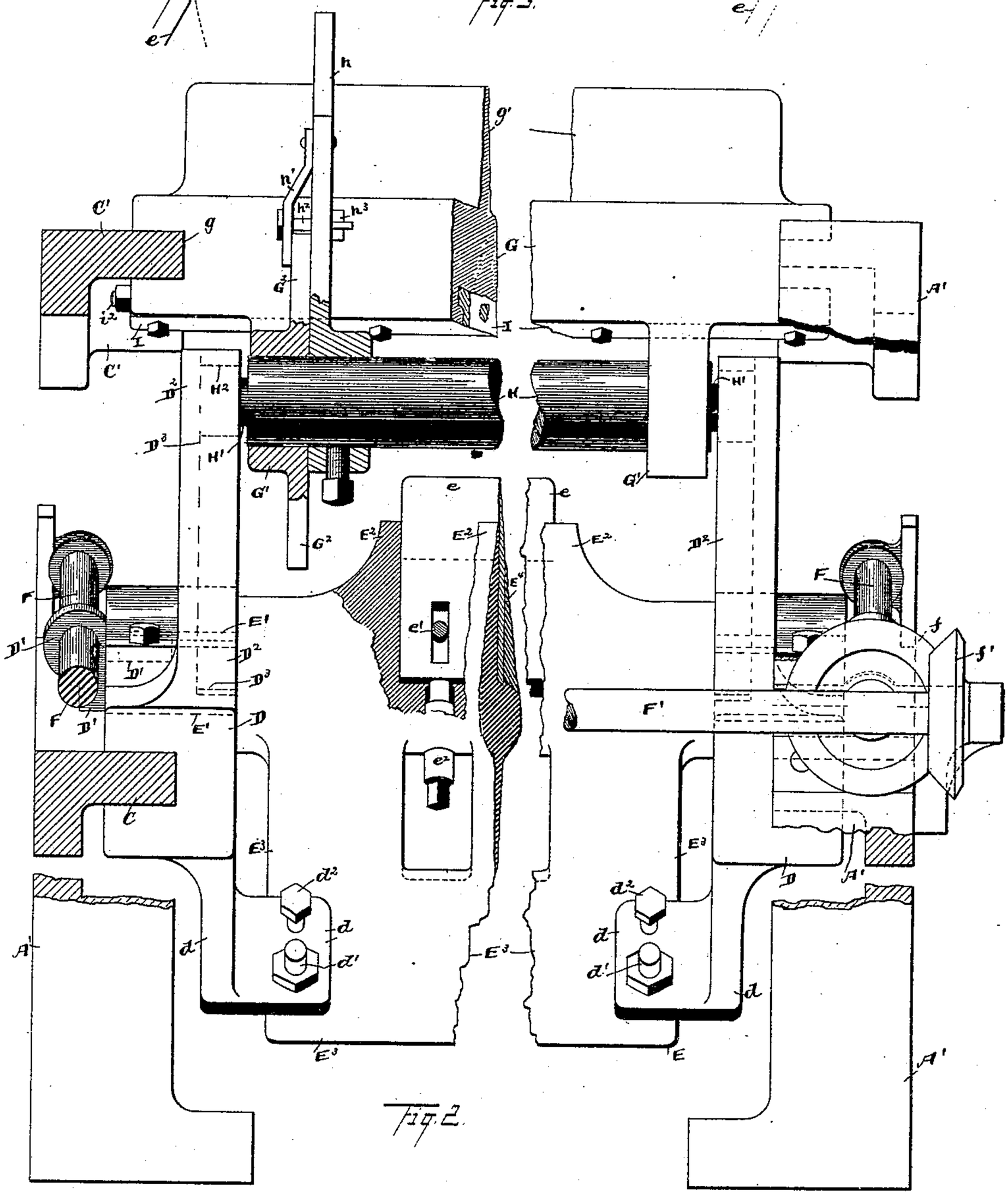

Fig. 2.

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UNITED STATES PATENT OFFICE.

EZRA S. GORHAM AND CHESTER R. GORHAM, OF EUCLID, OHIO.

ROTARY-CUTTING VENEER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,181, dated February 5, 1889.

Application filed April 21, 1888. Serial No. 271,387. (No model.)

To all whom it may concern:

Be it known that we, EZRA S. GORHAM and CHESTER R. GORHAM, of Euclid, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rotary-Cutting Veneer-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to improvements in rotary-cutting veneer-machines in which the knife-bearing mechanism travels on ways that are inclined to an assumed central plane of the log, such plane being horizontal or otherwise, as the case may be, by means of which the knife-edge as it is moved inward in the reduction of the log gradually approaches such central plane, to the end that the knife is kept at the proper cutting-angle relative to the diminishing periphery of the log without changing the absolute pitch of the knife relative to such central plane during such reduction. The presser-bar, or the cross-head bearing such presser-bar, travels on ways that converge with the ways bearing the knife as these respective ways extend toward the axis of the log, by means of which the presser-bar and knife, that are somewhat widely separated at the periphery of a large log, gradually approach each other, moving approximately on radial lines of the log as the latter is reduced in size, to the end that, the presser-bar having been adjusted toward or from the log, according to the thickness of veneer desired, and the presser-bar being fed uniformly with the knife, a uniform pressure is had of the presser-bar against the log during the reduction of the latter and without changing the thickness of veneer.

Our invention also relates to details of construction hereinafter described and claimed.

In rotary-cutting veneer-machines the knife should operate on the principle of a wedge, and to produce the best results the two faces of the knife adjacent to the cutting-edge should receive equal pressure, respectively, from the log and from the veneer being cut. The thinner the more flexible is the veneer, bending more readily away from the knife, and consequently producing less pressure on the veneer side of the knife, by reason of which the thinner the veneer the more the knife should be canted or inclined toward the log. The pitch of the knife having been adjusted according to the thickness of veneer to be cut, there still remains another difficulty to be overcome—to wit, the larger the circle of the log on which the knife is cutting the harder the log will press against the log side of the knife with a given adjustment of the latter, by means of which, if the knife has been adjusted to cut freely when the log shall have been reduced to, say, eight or ten inches in diameter, with such adjustment of the knife, if the log were of large size—say three or four feet in diameter—the knife would not cut at all on such large circle unless the knife were drawn with great force by means of the feed-screws against the log, and even then would not cut smooth and do good work. Heretofore, for overcoming this difficulty, mechanism has been provided for automatically and gradually canting the knife in the direction away from the log during the reduction of the latter. Such mechanism was more or less complicated and expensive to build and keep in repair. We have discovered that the same end may be attained by much simpler and less expensive mechanism, as hereinafter described; also, with such automatic knife-tilting mechanism the presser-bar was supported from the same ways that supported the knife, and no provision was made for shifting the presser-bar toward and from the log with the canting of the knife, and consequently on a large log the presser-bar pressed too hard on the log, and such pressure was diminished with the reduction of the log.

Our improvement, by means of which these difficulties are overcome, will be more readily understood by reference to the accompanying drawings.

Figure 1 is a side elevation, partly in section. Fig. 2 is an end elevation, and Fig. 3 is a diagrammatic view showing the relative position of the presser-bar and knife and the log as the latter decreases in size.

In carrying out our invention the greater part of the machine may be of ordinary construction. For instance, the supporting-frame, the live-spindles and heads for rotating the log, and the mechanism for driving and adjusting these spindles, and the feed-

mechanism may, in the main, be copied from any one of several varieties of rotary-cutting veneer-machine already in use. It is therefore considered necessary only to briefly mention such parts of the machine.

A preferable supporting-frame, as far as shown, consists of heavy standards A and posts A′, with the necessary tie-bars, braces, &c. In suitable boxes connected with standards A are journaled the live-spindles *a*, the latter being provided with heads *a′* for engaging the ends of the log B.

C C and C′ C′ are ways on which respectively operate the knife-head E and cross-head G. Sliding blocks D embrace ways C, and in suitable boxes connected with these sliding blocks are journaled the trunnions E′ of knife-head E. The knife-head is usually made of cast-iron, on account of the cheapness of this material, and should be stiff and strong, and to this end a preferable form thereof in cross-section is that shown in Fig. 1. The upwardly-projecting flange E^2 of the knife-head supports knife *e*, and the depending re-enforcing flange E^3 serves also as a lever with which to turn the knife-head on its axis and in rigidly holding such adjustment. A cap, E^1, is located in front of the knife for clamping the latter by means of the securing bolts or screws *e′*. Adjusting-screws e^2 or other suitable devices are had for adjusting and supporting the knife edgewise. Blocks D have, respectively, on their inner faces lugs or arms *d*. Bolts *d′* pass loosely through holes, respectively, in these arms and in flange E^3, near the bottom of each, and adjusting-screws d^2 engage threaded holes in arm *d*, the ends of these screws abutting flange E^3. By manipulating these bolts and screws the knife-head may, first, be turned on its axis to give the desired pitch to the knife, and then rigidly secured to hold such adjustment.

F F are the feed-screws, and these are journaled in suitable boxes connected with the frame-work of the machine, these screws engaging suitable nuts, D′, connected with blocks D. On these feed-screws are mounted beveled pinions *f*, and these latter engage beveled pinions *f′*, mounted on shaft F′, by which arrangement of parts the two feed-screws are rotated in unison and the knife is kept parallel with the axis of the log.

Blocks D are provided with upwardly-projecting arms D^2 for operating cross-head G, and these arms on their opposing or inner faces are provided with longitudinal channels or ways D^3. Cross-head G is provided with arm G′, the latter being pierced laterally for receiving shaft H, forming journal-boxes for the latter. This shaft has eccentric-wrists H′, in line with each other, and on these wrists are mounted blocks H^2, these blocks fitting nicely in channel D^3. A lever, *h*, is mounted on shaft H for turning the latter on its axis in adjusting the cross-head and presser-bar toward and from the log. Plate G^2 is connected or integral with one of the arms G′, and lever *h* operates by the side of this plate. A locking-bar, *h′*, is fastened to lever *h* with bolt h^2 and thumb-nut h^3 for clamping the lever to the plate. By loosening this nut the lever may be turned in either direction in adjusting the presser-bar toward or from the log, and such adjustment is held by tightening the nut.

The throw of eccentric-wrists H′ for the purpose of adjusting the presser-bar according to the thickness of veneer need not usually exceed a half an inch; but for moving the presser-bar back out of the way in whetting the knife the throw of these wrists had better be at least an inch.

Cross-head G rests and travels on ways C′, the cross-head having grooves *g*, that fit the ways, to prevent possible end movement of the cross-head. The cross-head is re-enforced by ribs *g′* and g^2 to make it stiff and strong.

I is the presser-bar, the same being bolted to the under side of cross-head G, so as to engage the under surface of ways C′. The presser-bar is preferably a steel plate about an inch thick and perhaps five or six inches (more or less) in width. Bar I is slitted transversely through and through, the slits *i* commencing at the forward edge thereof and extending to near the back edge, these slits occurring at points where slitting-knives J are likely to be wanted. A longitudinal hole, *i′*, is made through bar I from end to end and near the front edge of the latter for receiving bolt i^2 for clamping the slitting-knife. Knives J are of thin plates of steel that fit nicely in slits *i*, each knife having a slot, *j*, for straddling bolt i^2. Any of these slitting-knives that are not wanted for the time being may be removed and blocks of equal thickness inserted in place thereof, or such knives may be slid endwise until they are flush with the face of the presser-bar. By tightening bolt i^2 these slitting-knives are clamped and firmly held, such knives of course having previously been adjusted so that they protrude from the presser-bar more or less, according to the thickness of veneer to be slitted. As the presser-bar extends under ways C′ the ends of bolt i^2 are always accessible for purposes of setting and changing the slitting-knives. The principles on which the machine is intended to operate will be better understood by referring to diagram Fig. 3.

Circles B and B′ represent the periphery of the log, respectively, before and after the reduction, and *b* represents the axis of the log. Let line *b′ b′* represent a plane through the center of the log, and, for convenience, we will suppose that this line and the plane that it represents are horizontal. Suppose the beveled face of the knife that is next to the log be set vertical. With such arrangement, if the edge of the knife engage the log at the intersection of line *b′ b′*, as shown in dotted lines, the beveled face of the knife would represent a tangent to the log, and the knife in such position would not cut at all. Suppose

the knife, without changing the pitch thereof, was depressed, as shown in solid lines just below the dotted lines, so that the edge of the knife would engage circle B at the intersection of line *c c*. The knife in such position would certainly cut. If the edge of the knife were moved along line *c c*, when circle B′ was reached the knife would not cut, but would only scrape the log. On the other hand, suppose the knife-edge were fed along the radial line *c b*, or to describe a plane making an angle with the plane of the beveled face of the knife greater than a right angle, in which case, if the knife at the commencement engage the log at the proper cutting-angle, such cutting-angle relative to the log would remain the same during the reduction of the latter, and the knife would cut equally well whether the log was large or small. From our experiments thus far the proper inclination of line *c b* to line *b′ b′* should be about an inch to the foot. At least such inclination will give good results. Ways C C are set parallel with line *c b*, but far enough below to accommodate the knife-head, &c. In rotary-cutting veneer-machines a presser-bar is considered indispensable. Otherwise, if there is any lost motion in the feed screws or mechanism or any springing of the parts, the veneer will vary in thickness. With the presser-bar engaging the log with sufficient pressure to take up the lost motion and springing of the parts, there is no difficulty in cutting the veneer of uniform thickness.

It is not practical, for various reasons, to set the presser-bar directly back of the knife-edge, among which reasons may be mentioned that there are many slivers and spalts loosened by the knife, and these would wedge in between the presser-bar and knife and cause endless trouble. The presser-bar, therefore, should not only be adjusted rearward of the line of the knife-edge, according to the thickness of veneer, but should be located some little distance above or from the knife-edge. The knife-edge and presser-bar being thus separated, if they were moved on parallel lines in the reduction of the log, another difficulty would present itself—to wit, between points separated a given distance, such points being represented, respectively, by the presser-bar and by the beveled face of the knife, a log of small diameter would reach through between such points much farther than a log of large size. For instance, suppose the presser-bar and knife-edge to be properly located, as shown in solid lines, applied to circle B, and suppose the knife-edge and presser-bar were moved forward on parallel lines *c c* and *c′ c′*. With such arrangement, when circle B′ was reached the log could pass bodily between the knife-edge and the presser-bar, and the veneer would increase in thickness as the knife and presser-bar were moved toward the center of the log. In place of this, the knife, being moved, as aforesaid, on radial lines *c b* and the presser-bar by means of inclined ways C′ C′, is moved on radial lines *c′ b*, in which case the distance between the knife-edge and presser-bar will be in proportion to the size of the log, and if the parts were properly adjusted at the commencement of the cutting operation the veneer will be of uniform thickness, and the pressure of the presser-bar on the log will be uniform during the reduction of the log. It will be understood that the central plane of the log (represented by line *b′ b′*) need not be horizontal, as assumed, for convenience. For instance, if the machine were turned upon its end or set at an angle, for instance, of forty-five degrees, the operation of the mechanism would be the same; but the central plane of the log would then be vertical or at an angle of forty-five degrees from a horizontal line, and some terms used in this specification—such as "vertical," "above," and "below," &c.—are used relative to an assumed horizontal central plane of the log.

What we claim is—

1. In a rotary-cutting veneer-machine, the combination, with a knife and mechanism for pivotally supporting, adjusting, and feeding the same, of ways for such knife-supports to travel on, said ways being so disposed that the edge of the knife in its movement describes a plane making an angle with the plane of the beveled face of the knife greater than a right angle, substantially as set forth.

2. In a rotary-cutting veneer-machine, the combination, with presser-bar, knife, and mechanism for supporting and feeding each in unison, of ways, respectively, for the presser-bar and knife mechanism to travel on, such ways converging in the direction toward the axis of the log, substantially as set forth.

3. In a rotary-cutting veneer-machine, the combination, with converging ways, substantially as indicated, of knife and presser-bar operating, respectively, on the different ways, the said knife and presser-bar being operatively connected, so as to move in unison by means of one set of feed mechanism, substantially as set forth.

4. In a rotary-cutting veneer-machine, the combination of inclined ways, sliding blocks mounted on such ways, knife-head having trunnions journaled in the sliding blocks, bolts, and adjusting-screws for turning the knife-head on its axis and rigidly holding the adjustment of the knife-head, substantially as set forth.

5. In a rotary-cutting veneer-machine, the combination, with knife and knife-stock, the latter being pivotally mounted on sliding blocks, of ways for such sliding blocks to travel on, such ways being so disposed that the edge of the knife in its movement describes a plane making an angle with the plane of the bevel face of the knife greater than a right angle, substantially as set forth.

6. In a rotary-cutting veneer-machine, the combination, with knife and supporting mech-

anism and presser-bar, of converging ways, substantially as indicated, whereby the knife-head and presser-bar are fed along different radial lines of the log, substantially as set forth.

7. In a rotary-cutting veneer-machine, the combination, with two sets of ways, knife and supporting mechanism, presser-bar, and supporting cross-head operating, respectively, on such ways, substantially as indicated, of upright ways connected with the knife mechanism, and sliding blocks operating in such upright ways, the sliding blocks being connected with the cross-head of the presser-bar, the parts being arranged substantially as described, whereby the presser-bar is actuated by the movement of the knife-mechanism, substantially as set forth.

8. In a rotary-cutting veneer-machine, the combination, with presser-bar and cross-head, substantially as indicated, of shaft journaled in boxes connected with such cross-head, said shaft having eccentric-wrists and sliding blocks journaled on such wrists, and ways for embracing such sliding blocks, said ways being connected with the knife-supporting mechanism, the parts being arranged substantially as indicated, whereby the presser-bar is adjusted toward or from the log by rotating such shaft, substantially as set forth.

In testimony whereof we sign this specification, in the presence of two witnesses, this 27th day of December, 1887.

EZRA S. GORHAM.
CHESTER R. GORHAM.

Witnesses:
CHAS. H. DORER,
ALBERT E. LYNCH.