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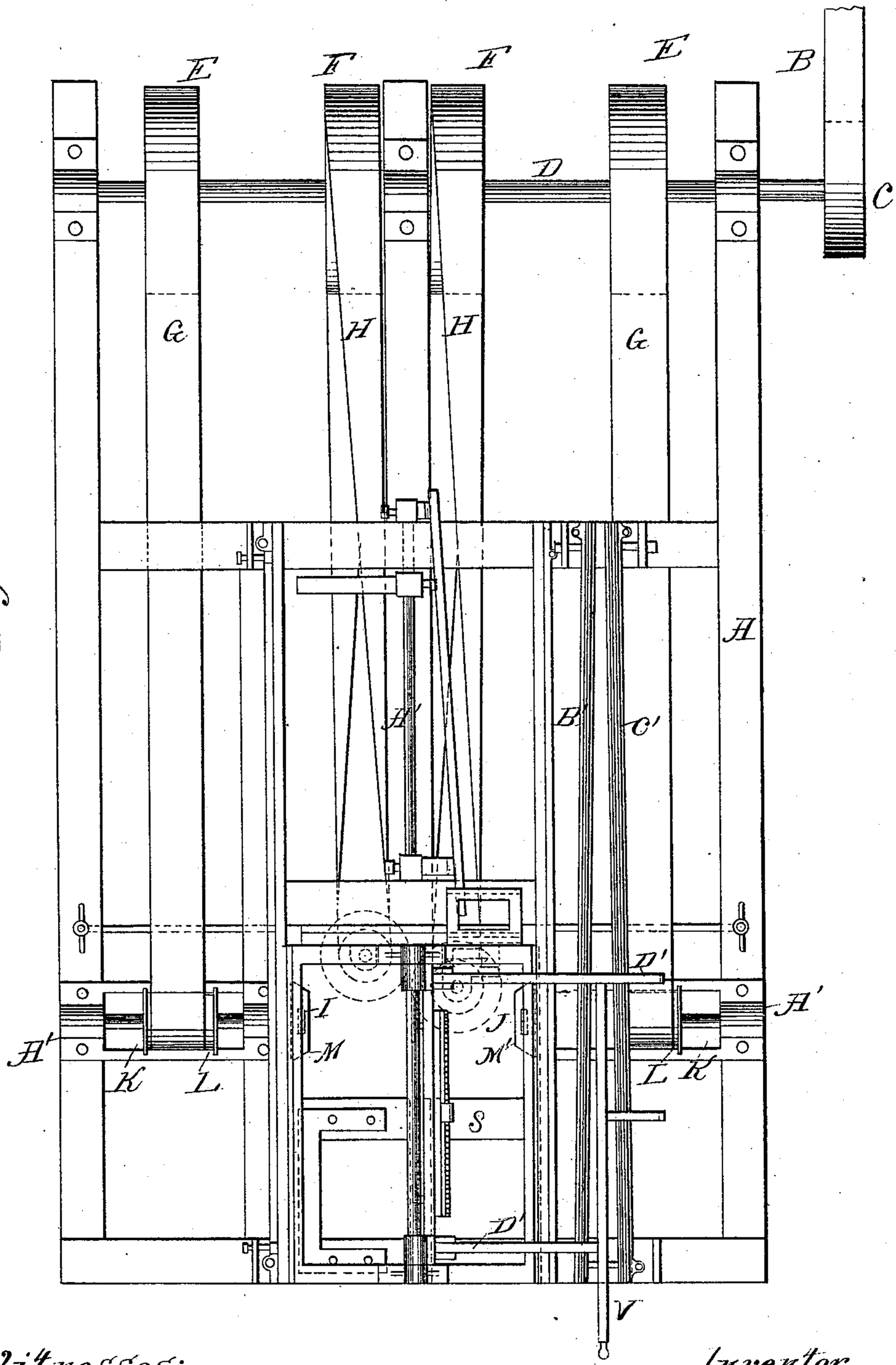
F. CHICHESTER.

DOVETAIL TONGUING AND GROOVING MACHINE.

No. 251,349. Patented Dec. 27, 1881.

Fig. 1.



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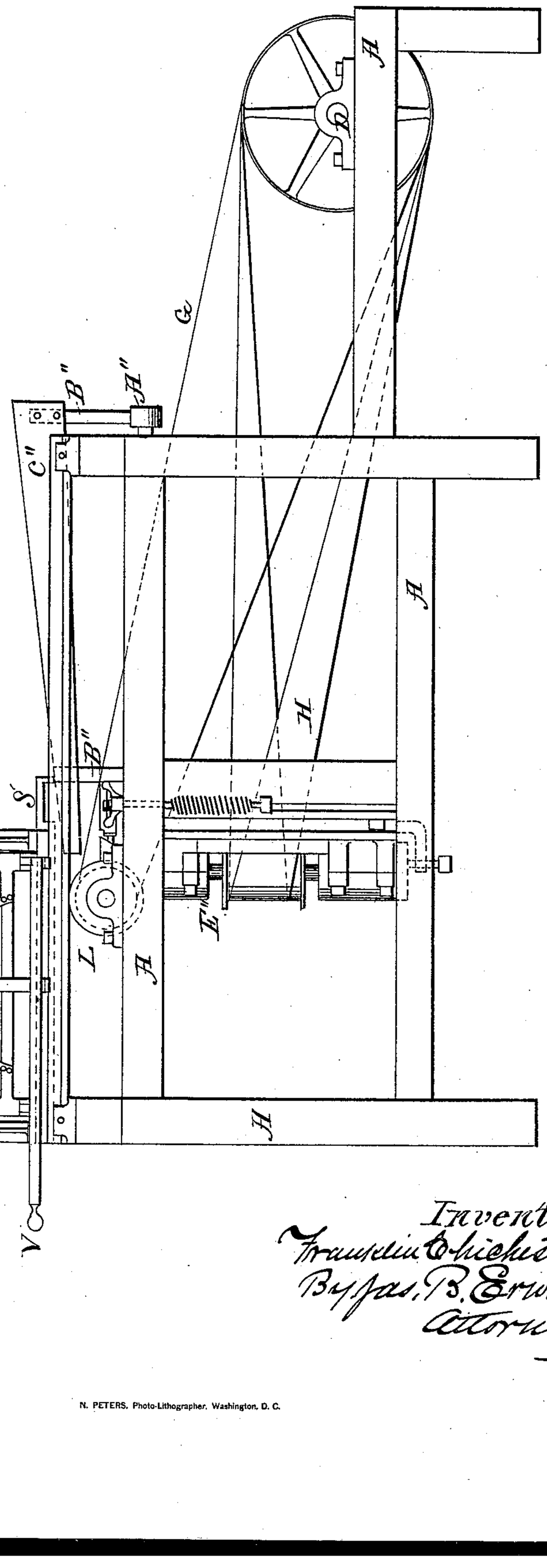

Fig: 2.

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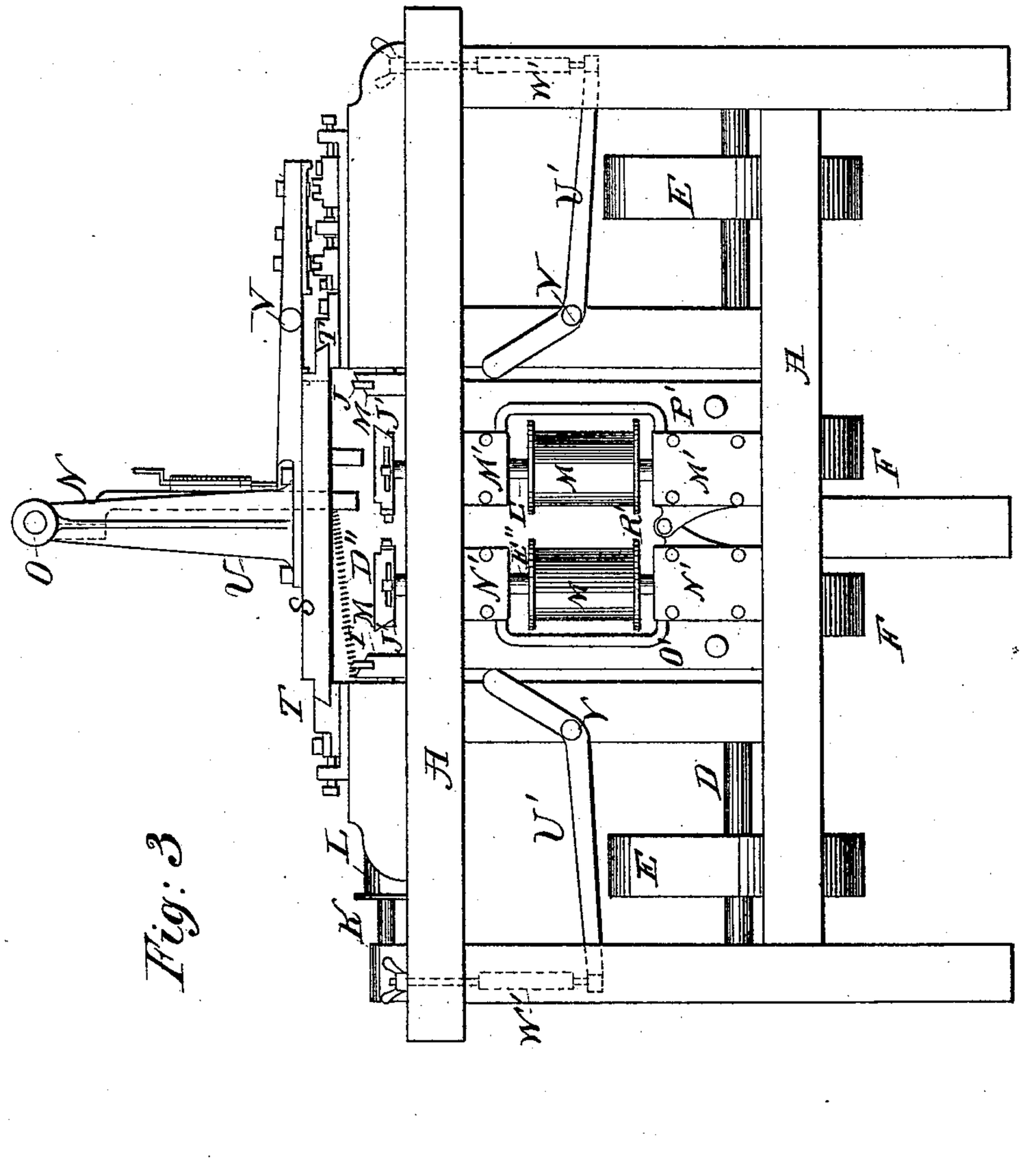

Fig. 3

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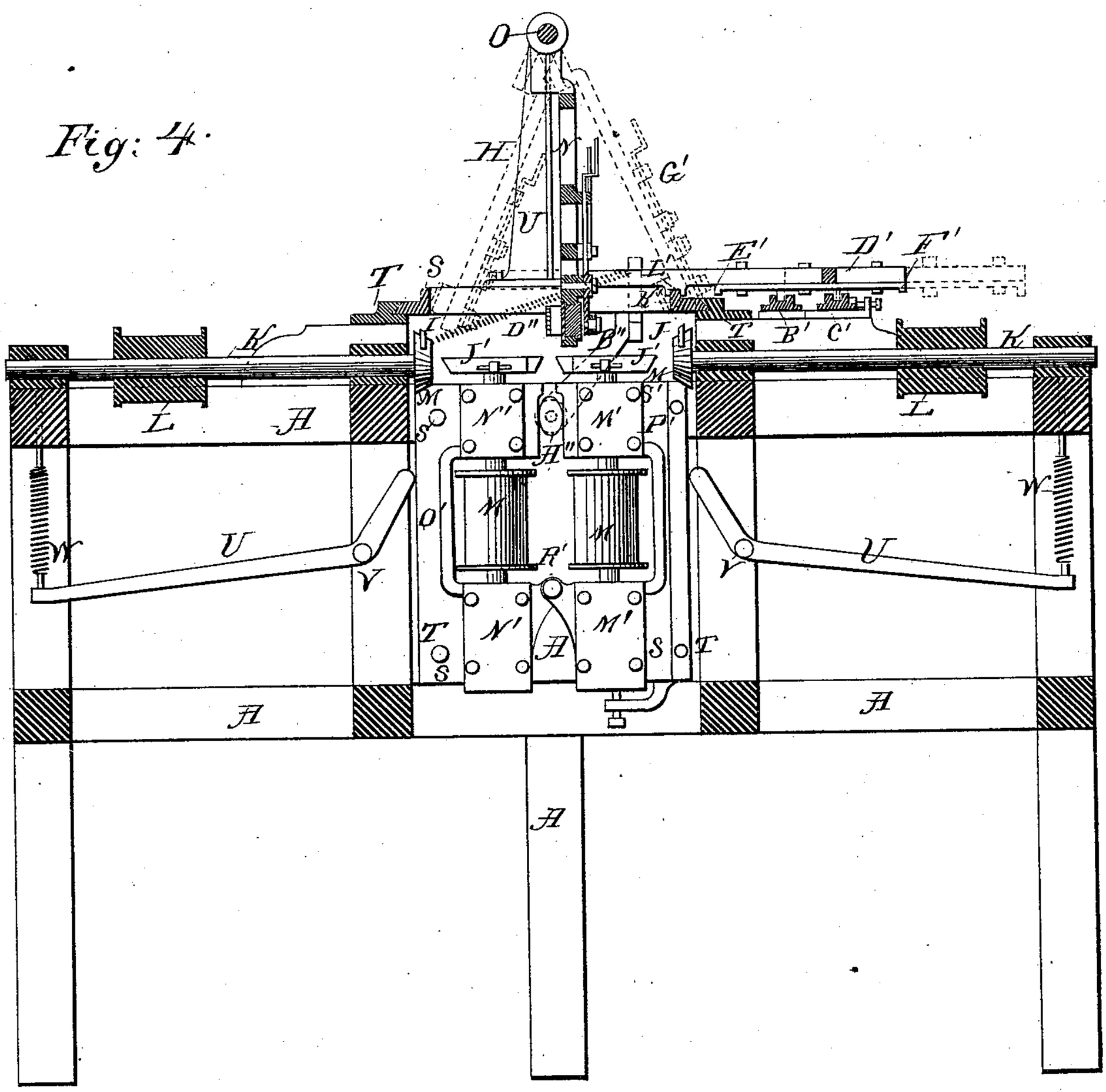
Fig: 4.



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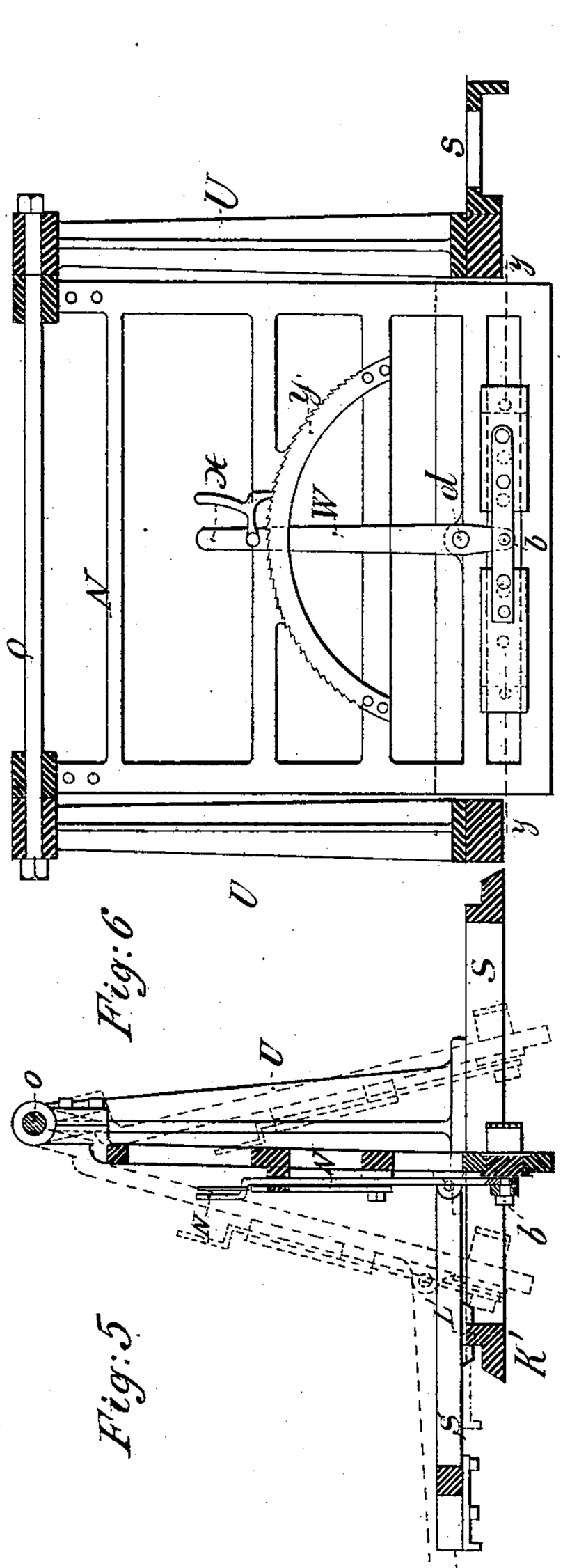

Fig: 6

Fig: 5

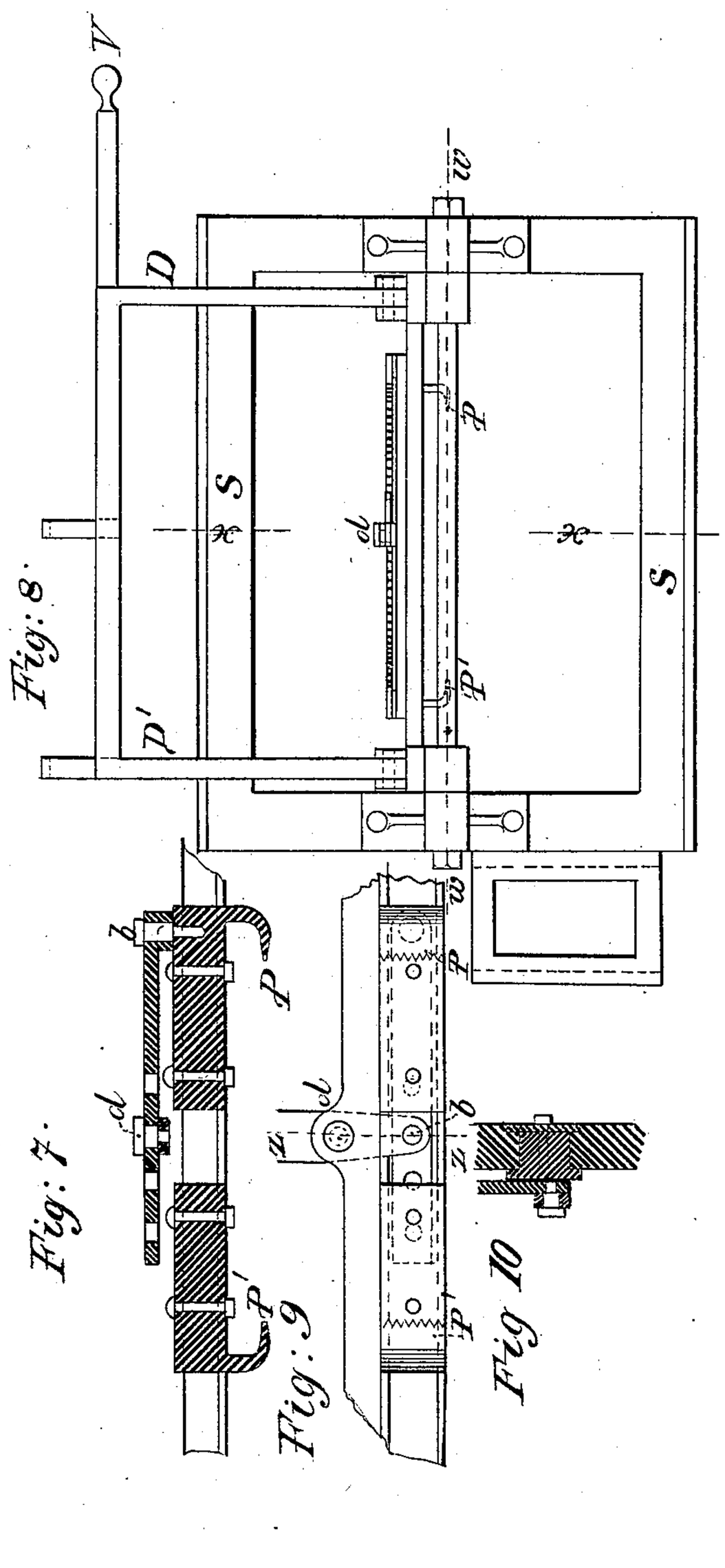

Fig: 8.

Fig: 7. Fig: 9 Fig 10

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Fig: 12

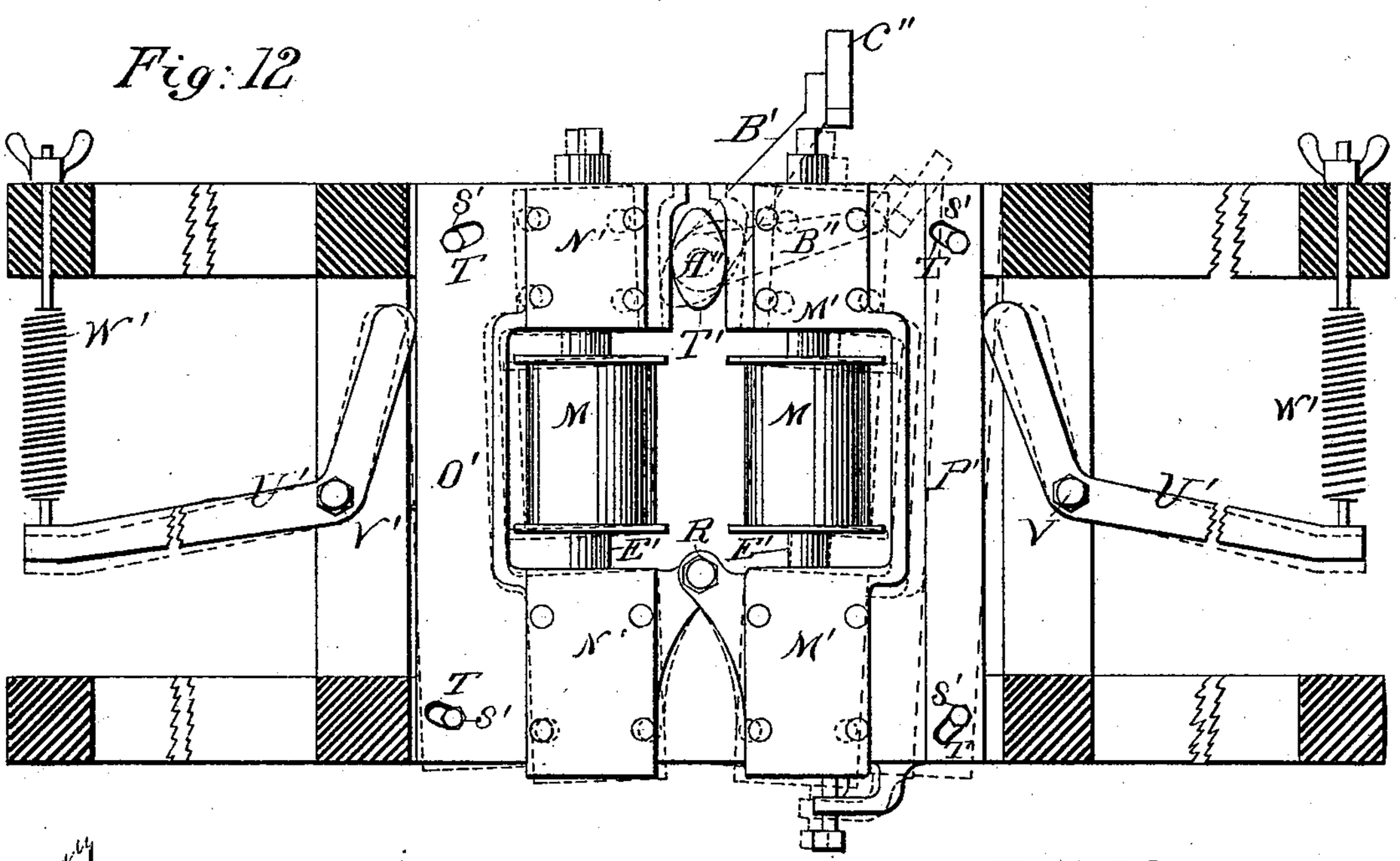
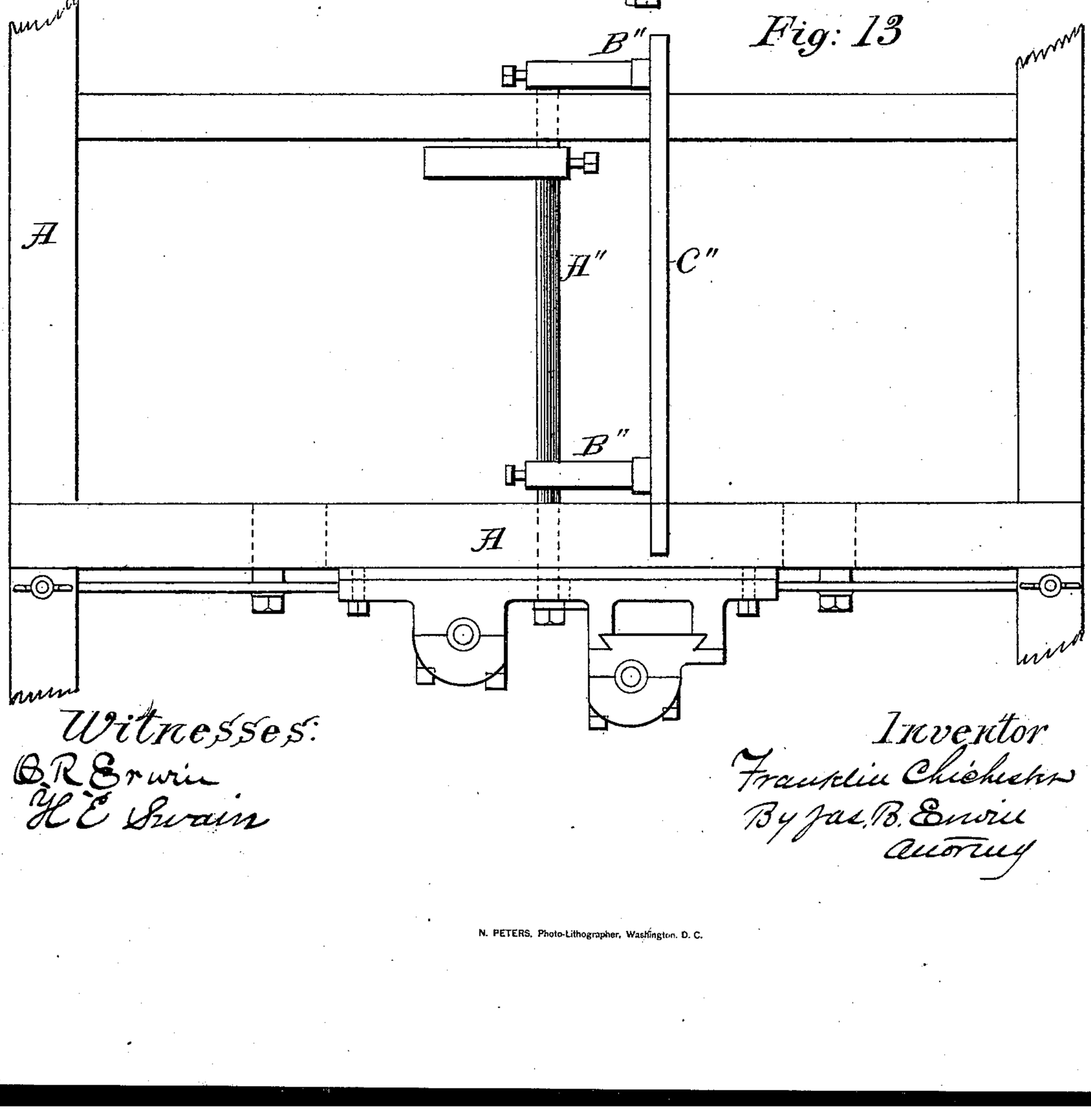


Fig: 13



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DOVETAIL TONGUING AND GROOVING MACHINE.

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Fig: 16

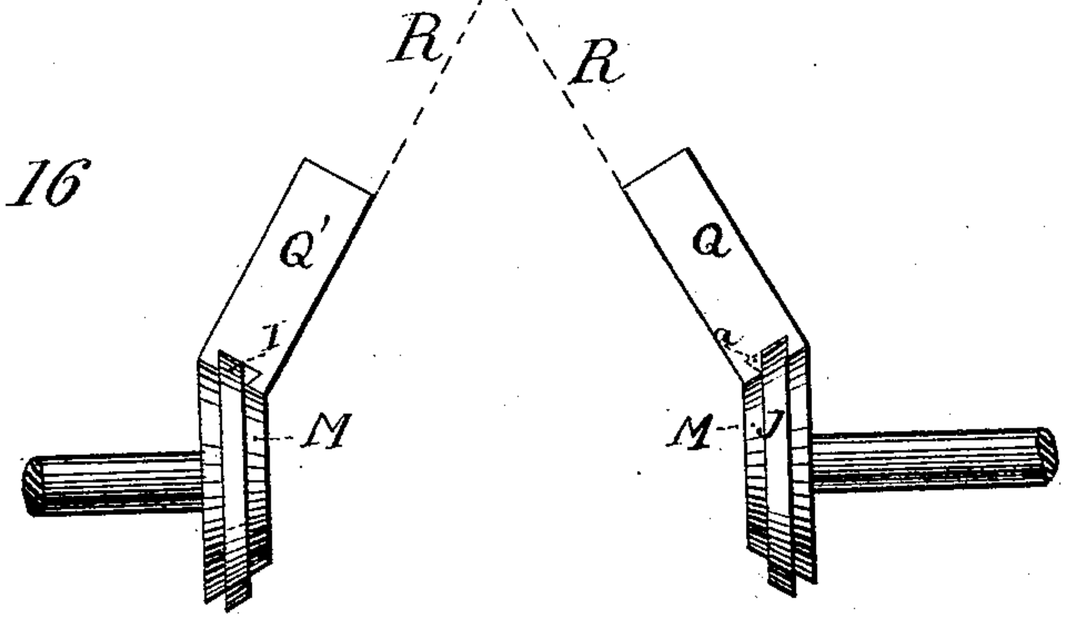


Fig: 15

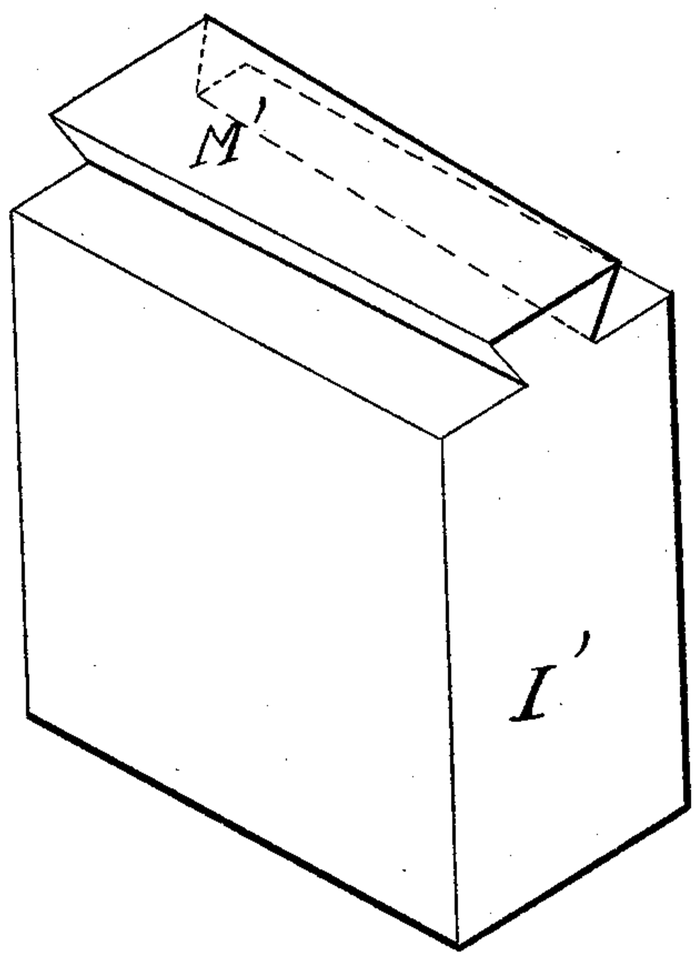
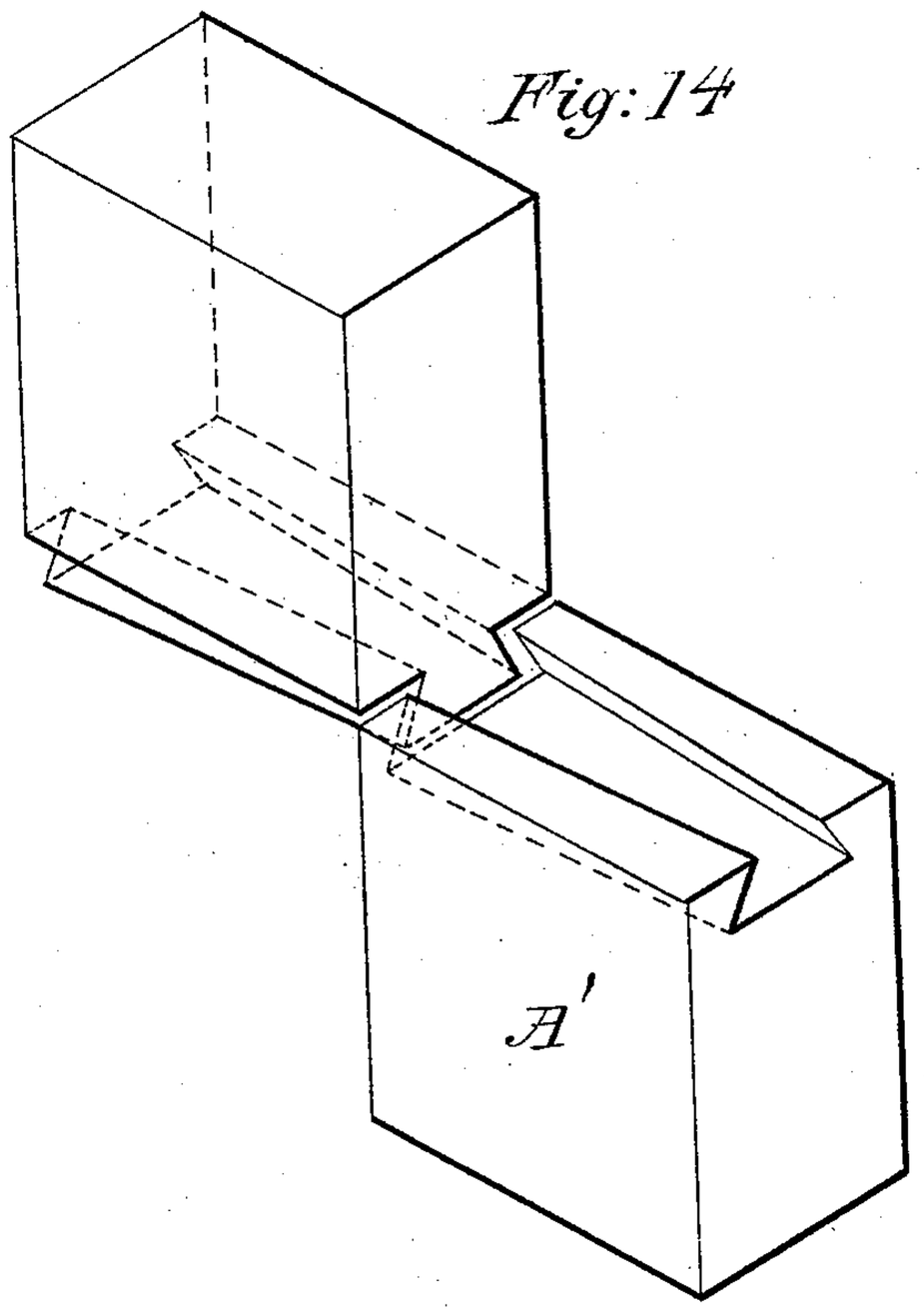


Fig: 14



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UNITED STATES PATENT OFFICE.

FRANKLIN CHICHESTER, OF MILWAUKEE, WISCONSIN.

DOVETAIL TONGUING AND GROOVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 251,349, dated December 27, 1881.

Application filed April 12, 1881. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN CHICHESTER, a citizen of the United States, residing at the city and county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Machines for Making Dovetail Tongue and Groove Joints; and I 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures marked thereon, which form a part of this specification.

The object of my improvement is to provide a machine with which the tongue and groove may be made tapering.

Heretofore the tongue and groove of dovetail joints have been made of uniform width from one end to the other. It is obvious that when thus formed, if the joints are closely fitted to each other, it becomes exceedingly difficult to unite them, except for short distances only. When the tongue and groove are made tapering the narrow end of the tongue is easily inserted into the wide end of the groove, and the two parts are quickly and easily united, but little force being required at the latter part of the operation in driving the wedge-shaped tongue into the conversely-shaped groove, whereby the parts are drawn into such close contact with each other that an almost imperceptible joint is formed. The joints thus formed by my machine are more especially adapted to uniting two or more pieces in the construction of wooden chair-bottoms.

My invention is further explained by reference to the accompanying drawings, in which—

Figure 1 represents a plan view. Fig. 2 is a side view. Fig. 3 is a front end view. Fig. 4 is a transverse section drawn at section-line A′ A′ of Fig. 1. Fig. 5 is an end section of the swinging gate. Fig. 6 is a side view of said gate. Fig. 7 represents a section at *x y* of Fig. 6. Fig. 8 represents a top view of the swinging gate and reciprocating carriage. Fig. 9 represents a front view of the dogs shown in section in Fig. 7. Fig. 10 represents a section at *z z* in Fig. 9. Fig. 12 is a detailed end section drawn back of the groove-cutters. Fig. 13 represents a detail of the frame beneath the reciprocating carriage, showing the device for separating the cutters as the tapering tongue is being cut. Fig. 14 represents a tapering dovetailed groove cut by my machine. Fig. 15 represents the form of the tapering tongue cut by my machine. Fig. 16 represents the two positions of the pieces when suspended upon the swinging gate as the respective sides of the dovetailed groove are being cut.

Like parts are represented by the same reference-letters throughout the several views.

A represents the frame of the machine, which is constructed in a substantial manner. Motion is communicated from the motive power to my machine by band B, (shown in Fig. 1,) and from band B, through pulley C and shaft D, to pulleys E E and F F, and from thence, by bands G G and H H, to pulleys L L and M M.

I and J are revolving groove-cutters. They are respectively secured to the respective shafts K K, which are driven rapidly by bands G G. The groove-cutters consist respectively in two vertically-arranged angular knives, which project at right angles from the respective shafts K K. When the boards or blocks are being grooved their edges are also simultaneously dressed by knives M′ M′, which project from the same shafts, and are adapted to cut at the same angles respectively as the groove-cutters I J, whereby the groove is formed at a uniform depth from the edge. As the groove-cutting and the edge-dressing knives revolve in a true vertical position at right angles to their shafts, the blocks or pieces to be grooved must necessarily be held in an inclined position when the grooves are being cut. To accomplish this end a swinging gate, N, is suspended by a pivotal rod, O, from a reciprocating carriage, S, centrally between the groove and tongue cutters. To this gate the blocks to be grooved are rigidly attached between the dogs P P′, (shown in Figs. 7 and 9,) as hereinafter described.

The office of the swinging gate and the object attained by the peculiar relative arrangement of the groove-cutters thereto will be understood by reference to Fig. 16, in which Q Q′ represent the two positions of the blocks when supported upon the gate preparatory to being grooved. The position toward the right represents the block as the first half of the

dovetail groove is being cut. The dotted lines *a* represent the portion of the wood to be removed by the opposite cutter, I. The position toward the left represents the block as the remaining half of the groove is being cut. The dotted lines R represent the position of gate N when supporting the blocks to be grooved. The gate N is connected with and supported above the carriage S by standards U U, to which standards it is attached by hinge or pivotal rod O, as mentioned. The carriage S is provided with ways T T, in which it is adapted to reciprocate backward and forward as each groove or tongue is cut. The reciprocating movement is communicated to the carriage and the gate inclined from one angle to another by the operator, independently of the driving power of the machine. V is a handle, by which the gate is moved and adjusted and the carriage operated. The blocks are, preparatory to being grooved, secured between the stationary dog P and the movable dog P′, which are drawn toward each other against the end of the blocks by moving the lever W, which lever is connected at its short arm with the movable dog P′ by pivot *b*, and to the gate N by pivot *d*, which pivot *d* serves as the fulcrum to the lever W. Thus it is obvious that the jaws of the dogs are opened for the reception of the blocks by moving the lever W in one direction and closed upon the blocks by an inverse movement. The upper end of the lever W is provided with a pawl, X, which is adapted to engage in the circular ratchet Y, as shown in Fig. 2, whereby the dogs P P′ are held in contact with the block while they are being cut.

The required taper is given to the dovetail groove as it is being cut by causing the gate N, upon which the block is supported, to be gradually but slightly swung respectively toward the right and left as the respective sides of the groove are cut. When the first cut is formed, as shown in block Q, Fig. 16, the gate N is caused to move slightly toward the left simultaneously with its movement over the groove-cutter, whereby the cut is gradually tapered toward the right-hand side of the block. When the second or final cut is formed, as shown in block Q′, the gate is caused to move toward the right, whereby the groove is gradually tapered toward the left, thus producing the peculiar tapering dovetail groove shown in block A′, Fig. 14. The gate N is caused to swing toward the right and left in the manner described as the carriage S is moved backward by the inclined ways B′ and C′, which are rigidly secured to the frame A, and are connected with the gate by frame D′. The lower side of frame D′ is provided with lugs E′ and F. When cutting the first groove, as shown in block Q, Fig. 16, lug E′ is placed in way C′, whereby the gate is retained at the angle indicated by dotted lines G′, Fig. 4. The way C′ is slightly inclined toward the center of the carriage, whereby the gate is caused to swing gradually toward the center simultaneously with its backward movement, thus causing the revolving knife to cut a tapering groove toward the right. When cutting or completing the groove by the final cut, as shown in block Q, the lug F′ is placed in way B′, whereby the gate is thrown in position shown by dotted lines H′ in Fig. 4. The way B′ is inclined slightly away from the center of the carriage, whereby the gate is caused to swing toward the center simultaneously with its backward movement, when the cutting-tool cuts a tapering groove toward the left, whereby the tapering dovetail groove, as shown in block A′, is completed.

The tapering dovetail tongue shown in block I′ of Fig. 15 is formed by the cutters J′ J′ during a single movement of the carriage S upon its ways, while the gate N remains fixed to the carriage in a true vertical position, as shown in Figs. 3 and 7, the block I being first secured to the gate N in the manner described for cutting the grooves. The gate N is retained in its vertical position or prevented from swinging by the lug K′, which engages in the recess L′.

The required taper is given to the tongue M′, as shown in Fig. 15, by causing the cutters J′ J′ to be gradually thrown farther and farther apart as the tongue is being cut. To accomplish this end the driving-shafts E″ E, with their driving-pulleys M M and cutters J′ J′, are respectively supported by movable journal-boxes N′ N′ and M′ M′, which boxes are connected together, respectively, by the frames O′ and P′. The frames O′ and P′ are supported at their lower ends by bolt or pivot R′, which permits the upper ends of the frames to move toward and from each other, whereby the cutters J J are brought toward each other and separated as the tapering tongue is formed. The frames O′ and P′ are also partially supported and retained in a vertical position by bolts S′ S′ S′ S′, which are respectively inserted through slots T′ provided therefor in the frames, which slots permit of the required movement of the frames as they turn upon the pivot R′.

The cutters J J are drawn toward each other and retained at the proper distance apart to cut the narrow end of the tongue M by the levers U′ U′, which levers are supported by bolts V′ V′ and retained in contact with the sides of the supporting-frames O′ and P′ of the cutters by the springs W′ W′. The cutters J′ J′ are thrown apart as they cut the tapering tongue by the elliptically-shaped block T′, which block is gradually turned from the vertical position shown in Figs. 4 and 12 to the position indicated by the dotted lines against the inward sides of the respective frames O′ and P′ with each backward movement of the carriage S, whereby said frames and cutters are separated. The block T′ is rigidly attached to the front end of rod A″, and both are caused to turn slightly by the backward movement of the carriage as it passes over and presses downward upon the inclined bar C″.

(Shown in Fig. 2.) The bar C″ is connected with the rod A″ by levers B″ B″. When the carriage is drawn forward the levers B″ B″ and the bar C are inclined but slightly from a vertical position, that its front end may be brought beneath the rear end of the carriage S. As the carriage S is moved backward it forces the inclined bar C″ and the levers B″ B″ in a circular direction downward beneath it, thus turning the rod A″ and elliptical block T′, producing the result described. As the carriage is drawn backward the said parts and devices for separating the cutters J′ J′ are inversely moved by the contracting springs W′ W′, when the cutters are again drawn toward each other in position to begin upon the next tongue, and the inclined bar C″ is also again drawn upward beneath the carriage S by the spiral spring D′. (Shown in Figs. 3 and 4.) The two positions of the levers B″ and inclined bar C″ are shown in Fig. 12.

It is obvious that the inclination of the tapered groove may readily be increased or diminished by increasing or diminishing the inclination of the ways B′ C′, and also that the inclination of the taper of the tongue may be increased or diminished to conform thereto by increasing or diminishing the inclination of the inclined bar C″.

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

1. In machines for forming tapering dovetail joints, the devices with which the tapering groove is formed, consisting in one or more angular revolving cutters adapted to cut the groove, a swinging gate or frame adapted to support the block to be grooved at the required angles to the cutters, a reciprocating carriage adapted to convey the gate and block to and across the cutters as the groove is formed, and inclined way or ways adapted to move the gate and block laterally simultaneously with its backward movement, by which lateral movement the groove is cut at the required uniform taper, all substantially as and for the purpose specified.

2. In machines for forming tapering dovetail joints, the devices with which the tapering tongue is formed, consisting in pivoted movable frames adapted to support the revolving groove-cutters, shafts, and pulleys, a cam centrally arranged between and against the frames, adapted as it is turned to move the frames apart and separate the cutters, an inclined bar secured to or connected with the shaft of said cam, and a reciprocating carriage, said bar being adapted to be moved in a circular direction downward by the backward movement of the carriage, whereby the cam is turned and the cutters separated, and the tongue is cut at the required uniform taper, all substantially as set forth.

3. The combination of the movable frames O′ and P′, pivot R′, levers U′ U′, springs W W, and frame A, said springs being adapted to draw the long arms of the levers upward, whereby their short arms are retained in contact with the frames and the frames retained in a vertical position, substantially as and for the purpose specified.

4. In machines for forming tapering dovetail joints, the combination of movable frames O′ and P′, cam T′, rod or shaft A″, arms B″ B″, inclined bar C″, spring D″, and reciprocating carriage S, substantially as set forth.

5. The combination of the reciprocating carriage S, standards U U, gate N, hinge-rod O, frame D, provided with lugs E F, and inclined ways B′ and C′, for the reception of said lugs, said ways being adapted to communicate the required lateral movement to the gate as the carriage is moved backward, substantially as and for the purpose specified.

6. The combination of the inclined bar C″, spiral spring D″, and frame A, said spring being adapted to draw the bar C″ upward as the carriage S is drawn therefrom, whereby the cam T′ is thrown into a vertical position and the tongue-cutters permitted to be drawn toward each other, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANKLIN CHICHESTER.

Witnesses:
JAS. B. ERWIN,
H. E. SWAIN.