

(No Model.)

3 Sheets—Sheet 1.

M. E. KNIGHT.
SOLE CUTTING MACHINE.

No. 436,358.

Patented Sept. 16, 1890.

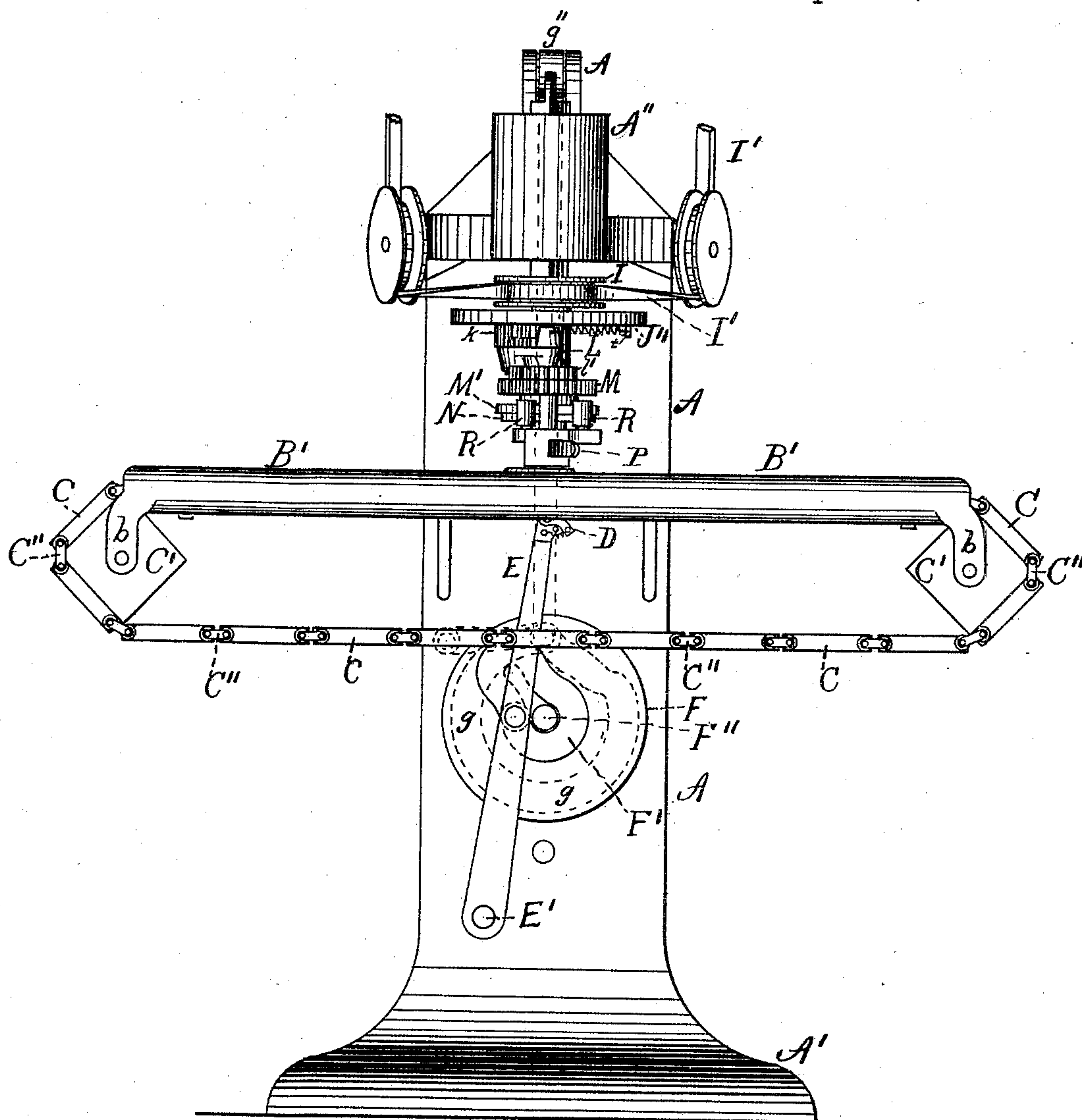


FIG. 1.

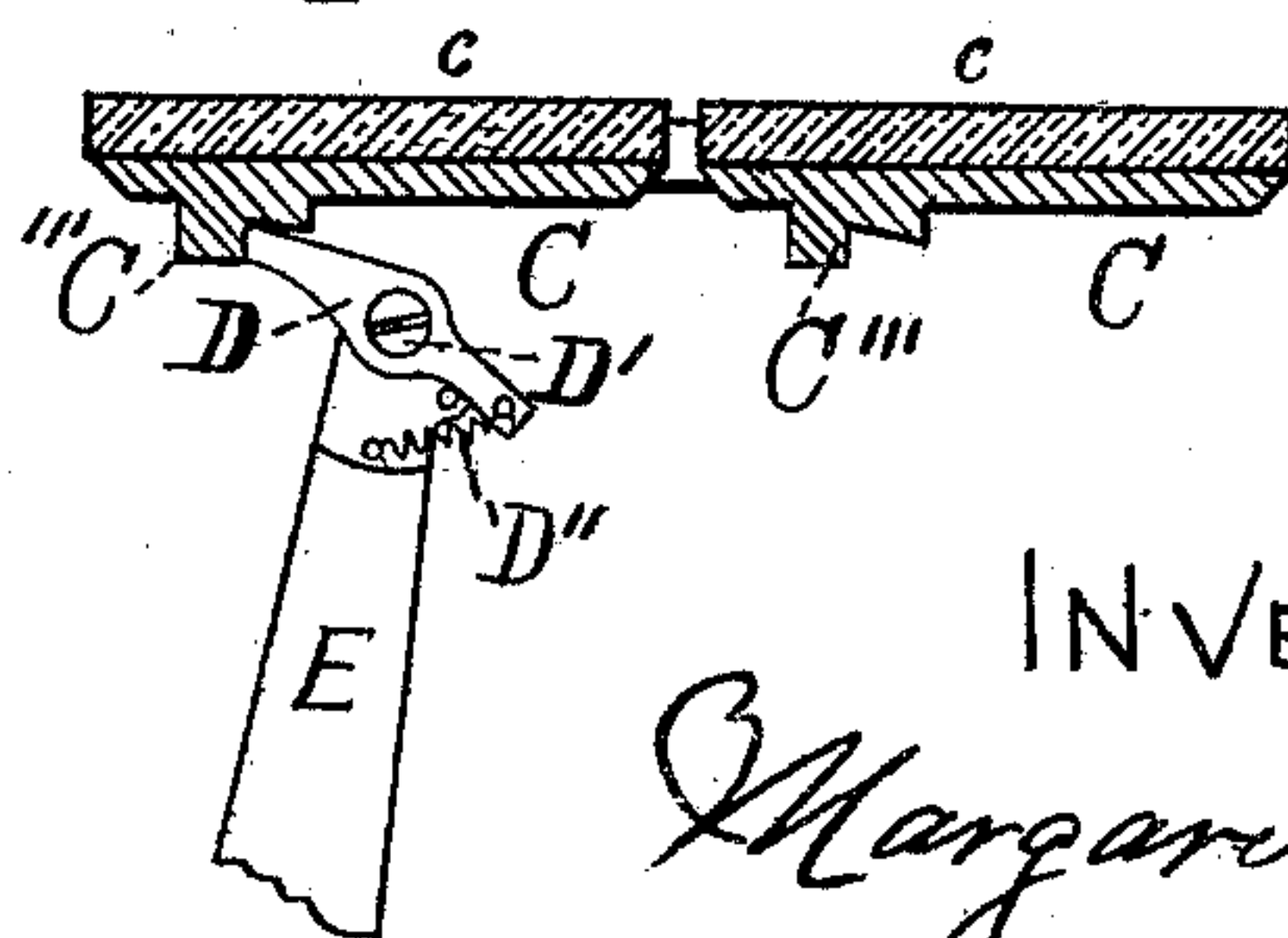


FIG. 6.

WITNESSES

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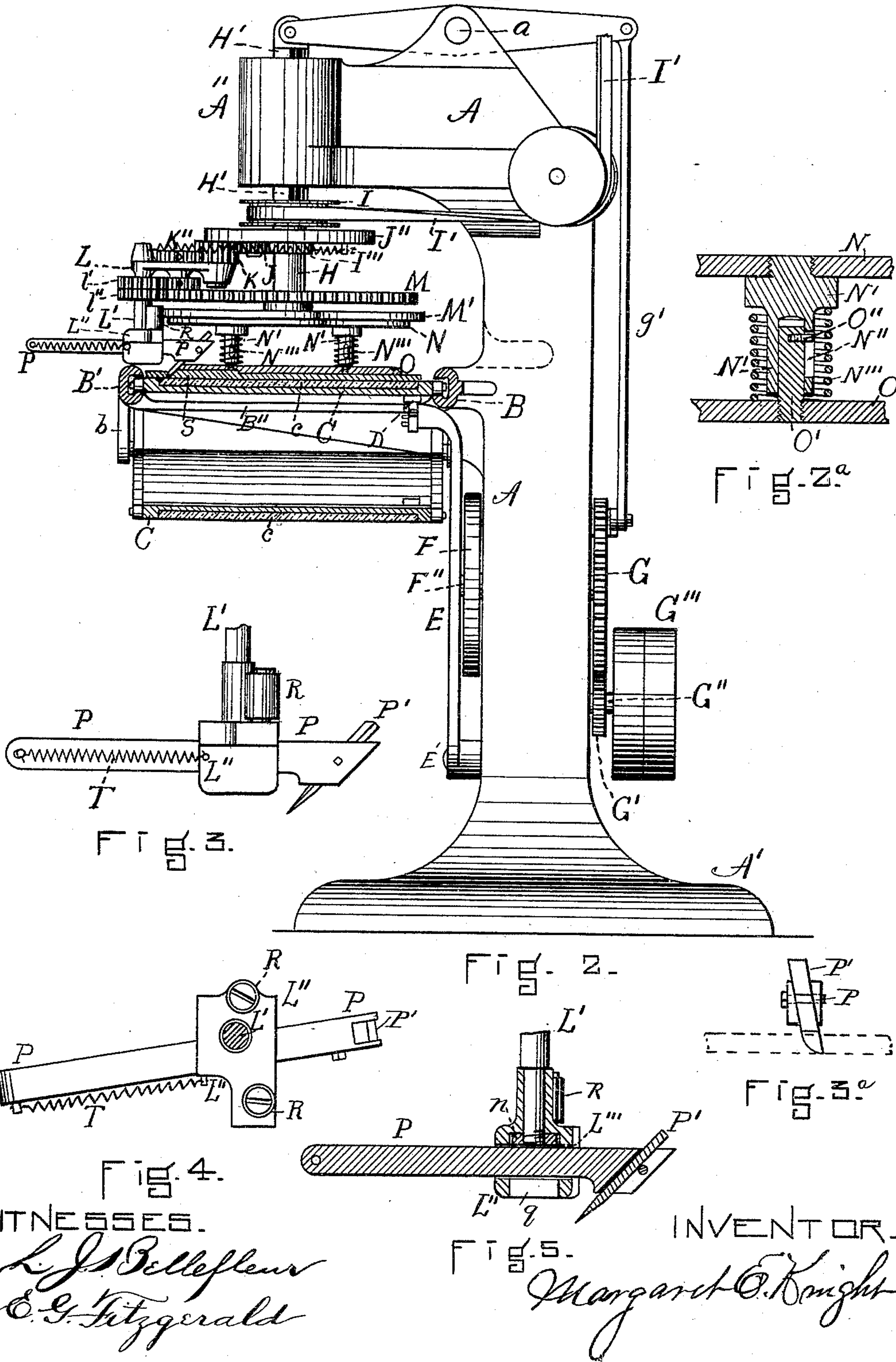
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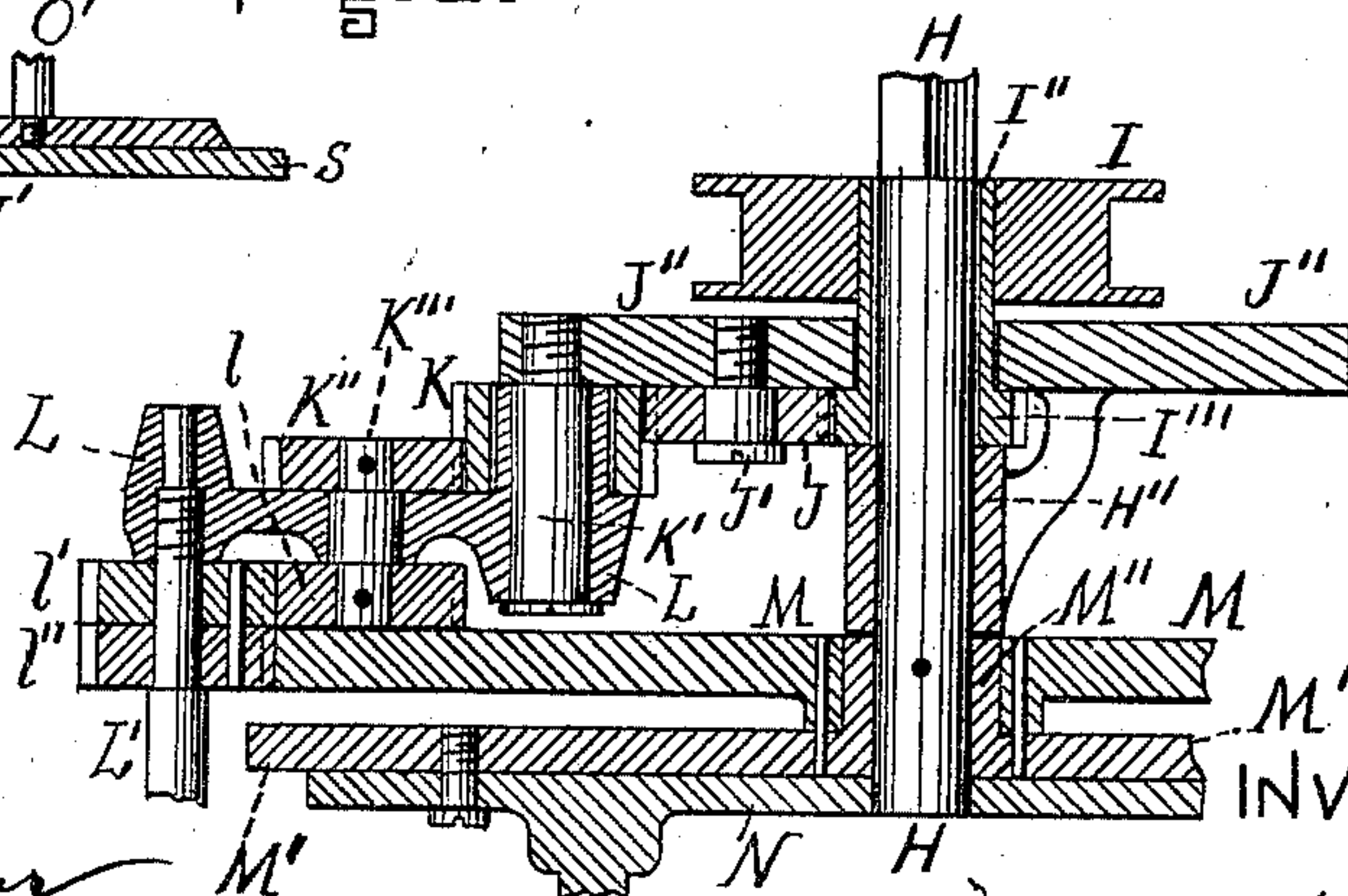
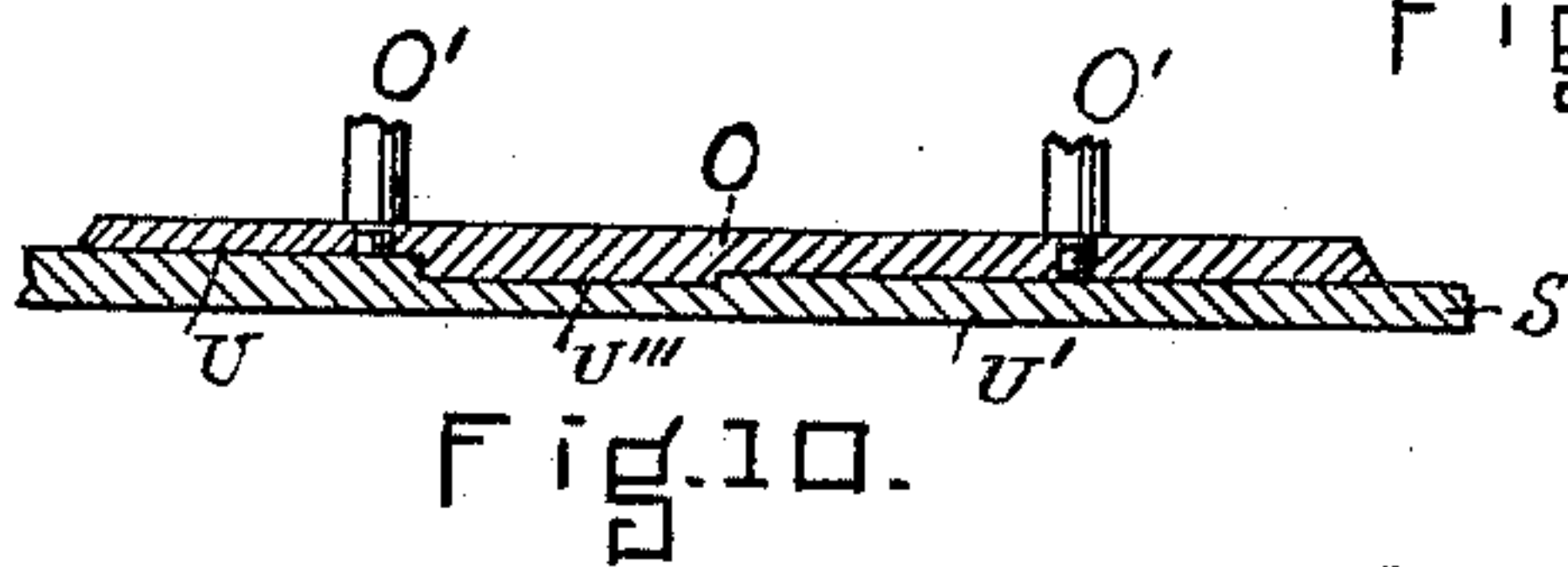
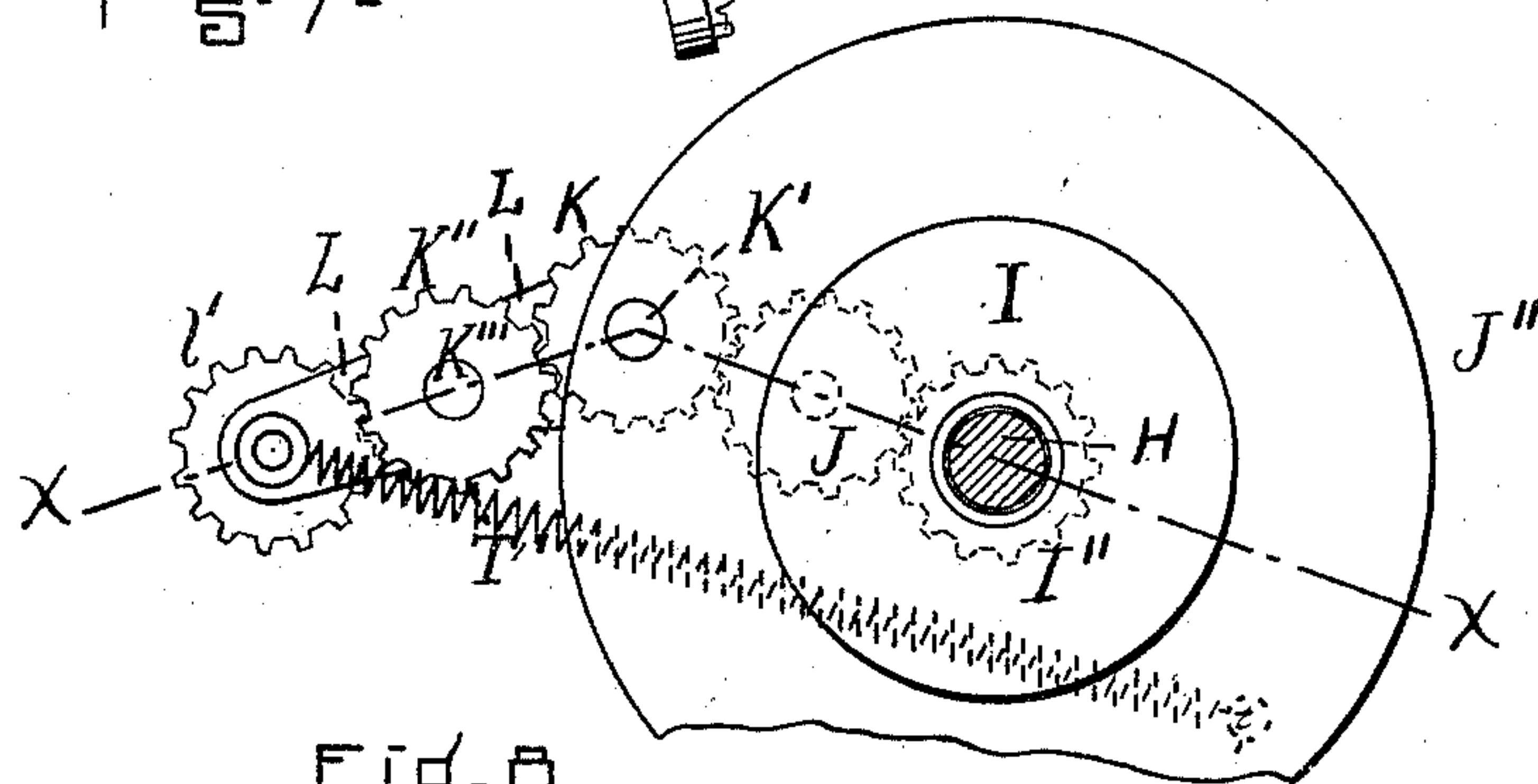
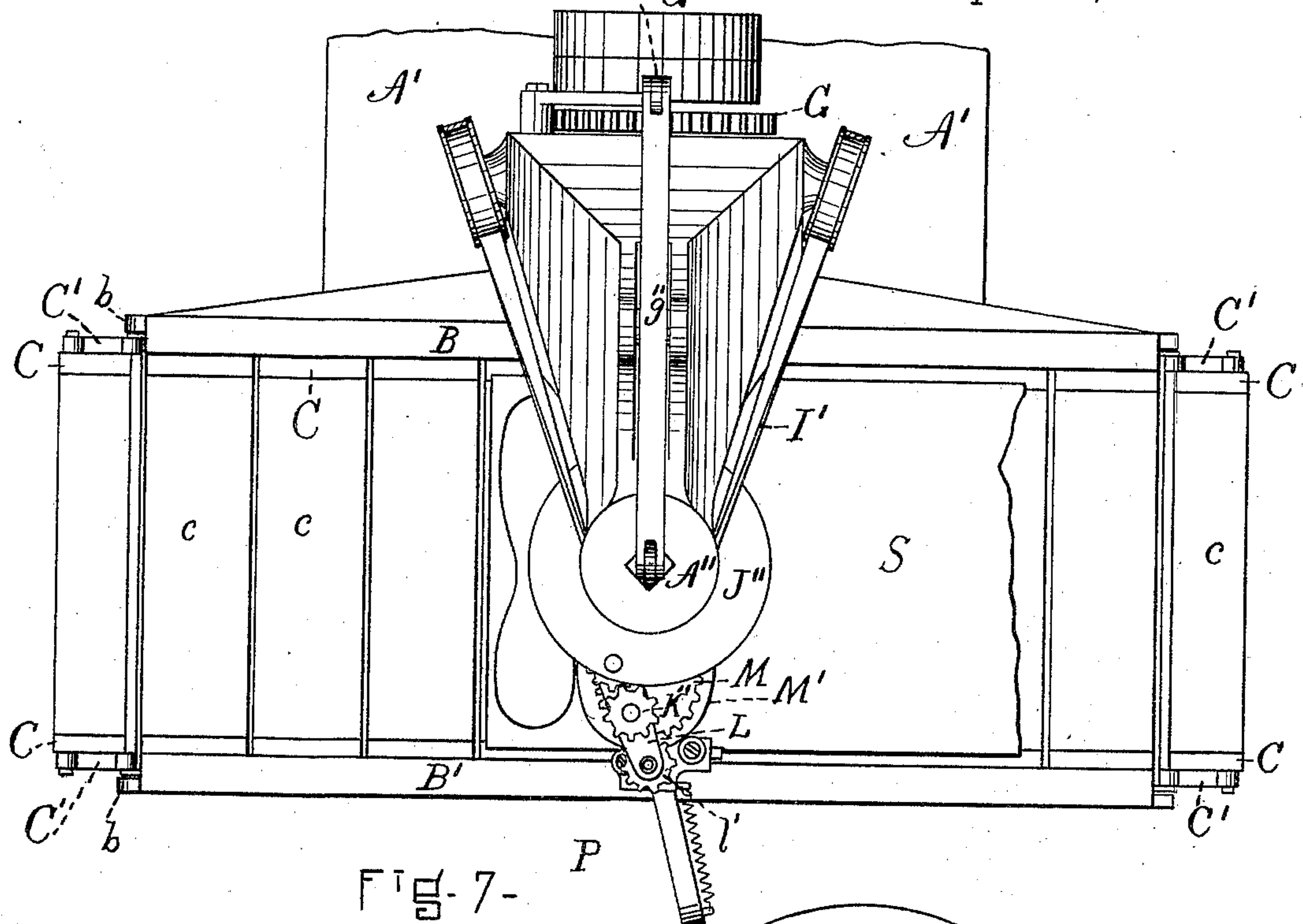
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Fig. 9-

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MARGARET E. KNIGHT, OF SOUTH FRAMINGHAM, MASSACHUSETTS.

SOLE-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 436,358, dated September 16, 1890.

Application filed November 16, 1889. Serial No. 330,567. (No model.)

To all whom it may concern:

Be it known that I, MARGARET E. KNIGHT, of South Framingham, in the county of Middlesex and State of Massachusetts, have invented a new and useful Machine for Cutting India-Rubber and other Soles for Boots or Shoes, of which the following is a specification.

This machine is particularly adapted for cutting india-rubber soles from a suitably-prepared strip or sheet of rubber for use upon boots or shoes of all kinds. In this machine the sheet of rubber or other material from which the soles are to be cut is supported upon an endless apron or belt, which consists of a series of tablets or beds flexibly connected together and intermittently moves horizontally beneath a pattern and cutting device, which have a vertical reciprocating movement and intermittently descend, clamp the material upon the apron, and cut out a complete sole upon each of the tablets or beds while it is at rest. The apron also carries the completed soles and the waste out of the machine, where they can be removed as desired.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a front elevation of my machine. Fig. 2 is a view partly in side elevation and partly in vertical section. Fig. 2^a is a sectional detail of a portion of the divided foot below described. Fig. 3 is an elevation of the knife and its holder and carrier. Fig. 3^a is an end view of the knife-bar with the knife. Fig. 4 is a plan view of the same. Fig. 5 is a longitudinal vertical section of the same. Fig. 6 is a detail of the feeding mechanism. Fig. 7 is a plan view of the machine. Fig. 8 is a detail plan of the mechanism by means of which power is transmitted to the knife. Fig. 9 is a vertical section on line *x x*, Fig. 8. Fig. 10 is a sectional detail of the pattern and strip of material thereunder.

The frame of the machine consists substantially of the column A, provided with an ordinary base A', constructed of suitable size, shape, and weight to support properly the operating mechanism of the machine. Rigidly secured to or integral with this frame or column is a horizontal internally-grooved supporting bar or guide B, Figs. 1, 2, and 7,

which, by means of suitable cross-pieces B'', supports a similar parallel grooved bar or guide B'. These guide-bars are provided at their opposite ends with brackets b, which support and form bearings for the rolls C', made rectangular or polygonal in cross-section, which in turn support an endless apron or belt consisting of a series of flat tablets or supports C, connected together by pivots or by links C'', substantially as shown. These tablets may be constructed of any suitable material, but are preferably of metal, and I have found it advantageous to cover their upper sides or working-surfaces c with glass or analogous material cemented or otherwise secured thereto. It is found in practice that the employment of a glass surface in the manner above mentioned provides an exceedingly smooth and hard bed and one having peculiar adhesive qualities in connection with the rubber strip which is fed in on the apron.

The apron is moved forward intermittently between the guide-bars B B', and with its edges in the grooves thereof, by means of a pawl D, which engages lugs C''' on the under sides of the tablets C, said pawl being pivotally secured at B' to the upper end of a lever E, the lower end of which is pivoted at E' to the frame of the machine. This pawl is held up to its work by means of a spring D''. The upper end of the lever E is vibrated by means of a roller secured thereto and engaged by the cam-groove F' in the cam F which is fast on the shaft F'', supported by the frame. To this shaft F'' is also secured the gear-wheel G, actuated by a pinion G', fast on the shaft G'', which supports pulleys G''', through which power is applied to the machine.

On the rear side of the gear G is a cam-groove g, (the shape of which is shown in dotted lines in Fig. 1,) which engages a roll on the lower end of the connecting bar or link g'. The upper end of this bar is pivotally secured to the lever g'', which is fulcrumed at a to the frame. To the opposite end of this lever g'' is pivotally secured a reciprocating rod having its lower portion H cylindrical and its upper portion H' square or otherwise rectilinear, so as to prevent any rotation as it reciprocates vertically in the portion A'' of the frame.

I is a pulley, to which motion is imparted by means of the belt I', said pulley being fast on the sleeve I'', (see Fig. 9,) which is loose on the cylindrical portion of the rod or shaft H. This sleeve I'' is supported by a collar H'', secured on the shaft H, and is provided at its lower end with a gear-wheel I''', engaging the gear J, which is supported by means of the stud J' in the disk J'', which is loose on said sleeve. This gear J engages a gear K on the shaft K', also supported by the disk J'', and said gear K engages the gear K'' on the shaft K'''. This shaft K''' is supported centrally in the arm L, which swings on the stud K'.

L is a gear-wheel fast on the lower end of the shaft K''' and engages a gear l', loose on the shaft L', which is rigidly secured in the outer end of the arm L. l' is another gear, also loose on the shaft L', and is keyed to the gear l' and engages with a rack or stationary gear M, keyed to a form M', the hub M'' of which is rigidly secured to the rod or shaft H. This rack and form are similar in shape and approximately the same as that of the pattern below described.

Rigidly secured to the under side of the form M' is a pattern-support consisting of the plate N and legs or posts N'. (See Figs. 2 and 2^a.) These posts are hollow, slotted at N'', and surrounded by the springs N'''.

O is the pattern, of the exact shape of the sole or other article to be cut, and is provided with stems O', extending up into the tubular posts N', and are provided with pins O'', which project through the slots therein and limit the relative motion of the stems and posts. By removing the pins O'' patterns of different size may be readily interchanged.

S is the rubber sheet clamped in the machine ready to be cut to form the sole.

The shaft L' has pivoted at its lower end a knife-carrier L'', as shown in Figs. 2, 3, 4, and 5, and this carrier is provided with a slot L''', of rectilinear or other form in cross-section, which is not circular, in which moves horizontally the knife-bar P, carrying the knife P', which is set at the desired angle and has its cutting-edge beveled, as shown in Fig. 3^a, to produce a drawing cut in its operation. Furthermore, the carrier L'' is provided with friction-rolls R, which bear against the periphery of the form M' as the knife travels around the pattern in the operation of cutting out the sole.

T is a spring having one end secured to the knife-bar P and the other end to the carrier L'', whereby the knife is held up to its work against the edge of the pattern, and T' is a spring the opposite ends of which are respectively secured to the shaft L' and to a pin t projecting from the disk J''. A nut n upon the lower end of the shaft L' holds the carrier L'' thereon, the nut being applied through an opening q in the bottom of the carrier, Fig. 5.

It will readily be seen that the motion

imparted by the pulley I is communicated through the train of gears to the last gear-wheel l'', which, engaging in the rack M, travels rapidly around it, being held to its work by the spring T', thus carrying the knife P', by means of the carrier L'' and bar P, around the form M' and cutting out a completed sole, the cutting-edge of the knife being held constantly close to the periphery of the pattern. By means of the cam on the face of the gear-wheel G the rod g' and lever g'' raise and lower the pattern and cutting mechanism, so that as the apron is fed along by the pawl D each tablet or bed C will be brought under the pattern and cutting mechanism and will be at rest while the pattern is down and the knife is in operation. One sole, therefore, will be cut out on each tablet. After the soles are cut out the apron carries the soles and the waste out of the machine, where they may be removed in any practical manner. While the sole is being cut the pattern is held tightly down upon the material, clamping it in every part by means of the springs between it and the form.

The shape of an india-rubber strip or sheet in cross-section is shown in Fig. 10, the heel and sole portions being made thicker than the shank portion. To accommodate this difference in thickness of the sheet the pattern upon its lower side is formed in planes, which are the counterpart of the upper surface of the sheet, U being the heel portion, U' the sole portion, and U''' the shank portion. This construction is requisite when cutting rubber sheets of varying thickness, in order that the sheet may be held firmly at all points against the action of the knife.

What I claim, and desire to secure by Letters Patent, is—

1. In a sole-cutting machine, the combination of a lower stock-support, an intermittently vertically-moving upper pattern which automatically clamps the stock thereon during the cutting operation, a knife-carrier sustained above the pattern and held in juxtaposition thereto by a spring, a knife which has an automatic adjustment radial to the curves of the pattern and independent of its carrier, and a train of gears through which motion is given to the knife-carrier, whereby it is revolved around the pattern and the knife is adapted to follow the contour of the periphery thereof, substantially as described.

2. In a sole-cutting machine having a support for the material to be cut, the combination of a knife adapted to move in a path corresponding to the outline of a shoe-sole and which has an automatic adjustment radial to the curves of its path and independent of its carrier, and an intermittently vertically-moving clamping-pattern sustained by yielding connections attached thereto at points out of its shank portion, whereby the knife will be unobstructed in the operation of cutting the shank portion and the pressure upon the stock will be equalized throughout its surface dur-

ing the cutting operation, substantially as described.

3. In a machine for cutting boot or shoe soles, the combination of a support for the material to be cut, a vertically-moving pattern which determines the path of the cut of the knife and intermittently clamps the material upon the support, a knife automatically adjustable with relation to the periphery of the pattern, a pivoted knife-carrier supported upon a spring-controlled arm which carries the mechanism for communicating motion to a pinion upon the carrier-pivot, an independent rack which guides and causes the pinion to travel around its periphery, and a form to guide the knife-carrier, substantially as described.

4. In a machine for cutting articles according to a desired pattern and from sheet material, the combination of a horizontally-moving support for sustaining and intermittently feeding the material, a vertically-moving pattern for clamping the material thereon while it is being cut, and a knife which is moved automatically around the pattern and has a radial adjustment with relation to the curves thereof, substantially as described.

5. In a machine for cutting articles by pattern from sheet material, having a knife adapted to move automatically around the pattern, an intermittently vertically-moving clamping-pattern in combination with a stock-support consisting of a series of tablets flexibly joined together in an endless belt, and a cam and lever to intermittently move the tablets beneath the clamping-pattern, substantially as described.

6. In a machine for cutting articles by pattern from sheet material, having a knife adapted to move in a path corresponding to the outline of the pattern, the combination of a stock-supporting table, a cam and lever to intermittently move it beneath the pattern, a pattern which intermittently clamps the material upon the table, and a cam connected with the pattern-support by intermediate levers to give it reciprocating vertical movement, substantially as described.

MARGARET E. KNIGHT.

Witnesses:

L. J. BELLEFLEUR,
EDWARD G. FITZGERALD.