

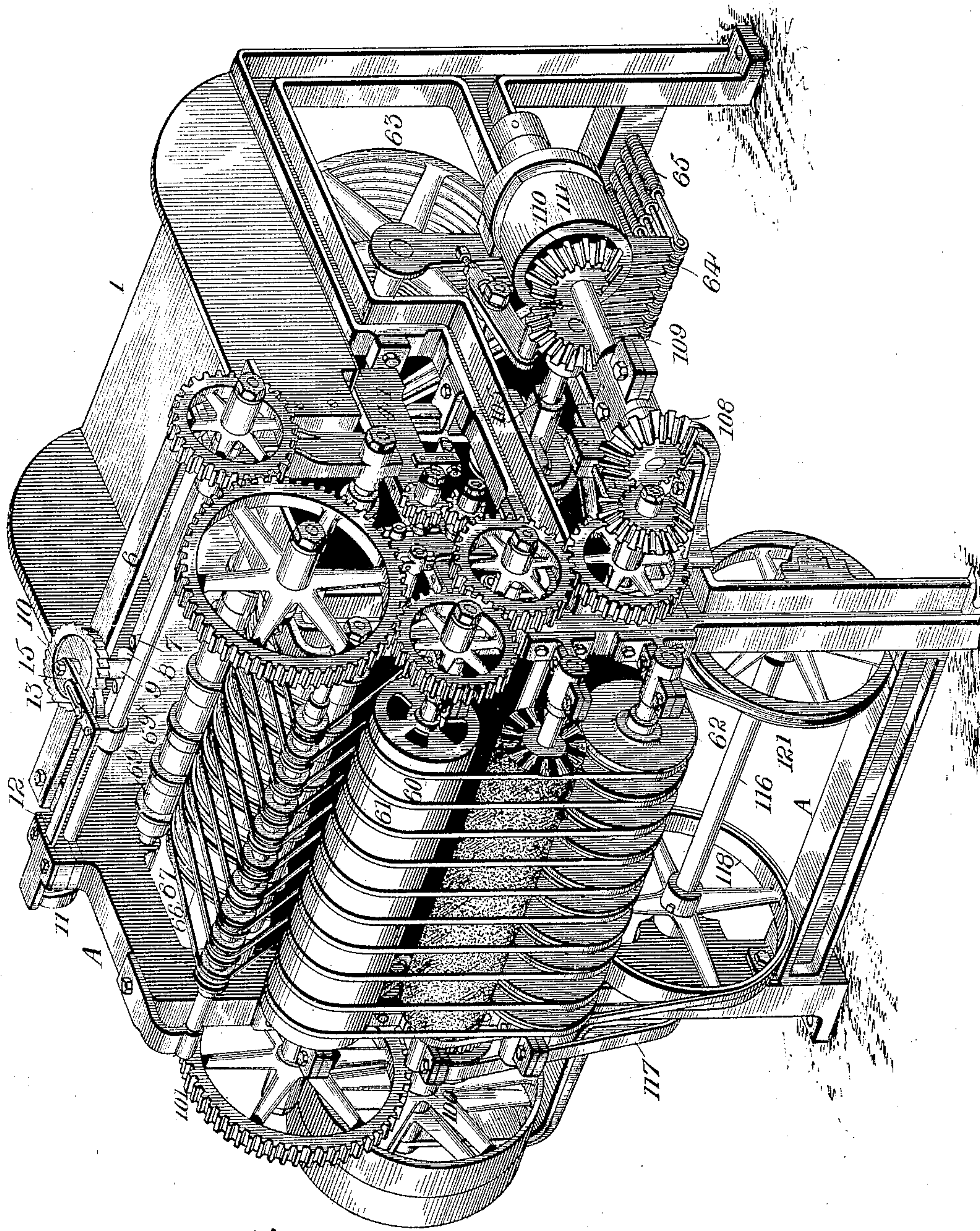
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15 Sheets—Sheet 1.

R. W. COFFEE.  
TOBACCO STEMMING MACHINE.

No. 599,309.

Patented Feb. 15, 1898.



Witnesses

*John Smith*  
*J. M. Brown*

*Fig. 1.*

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*By* *Phelan & Cleaveland*  
his Attorneys.



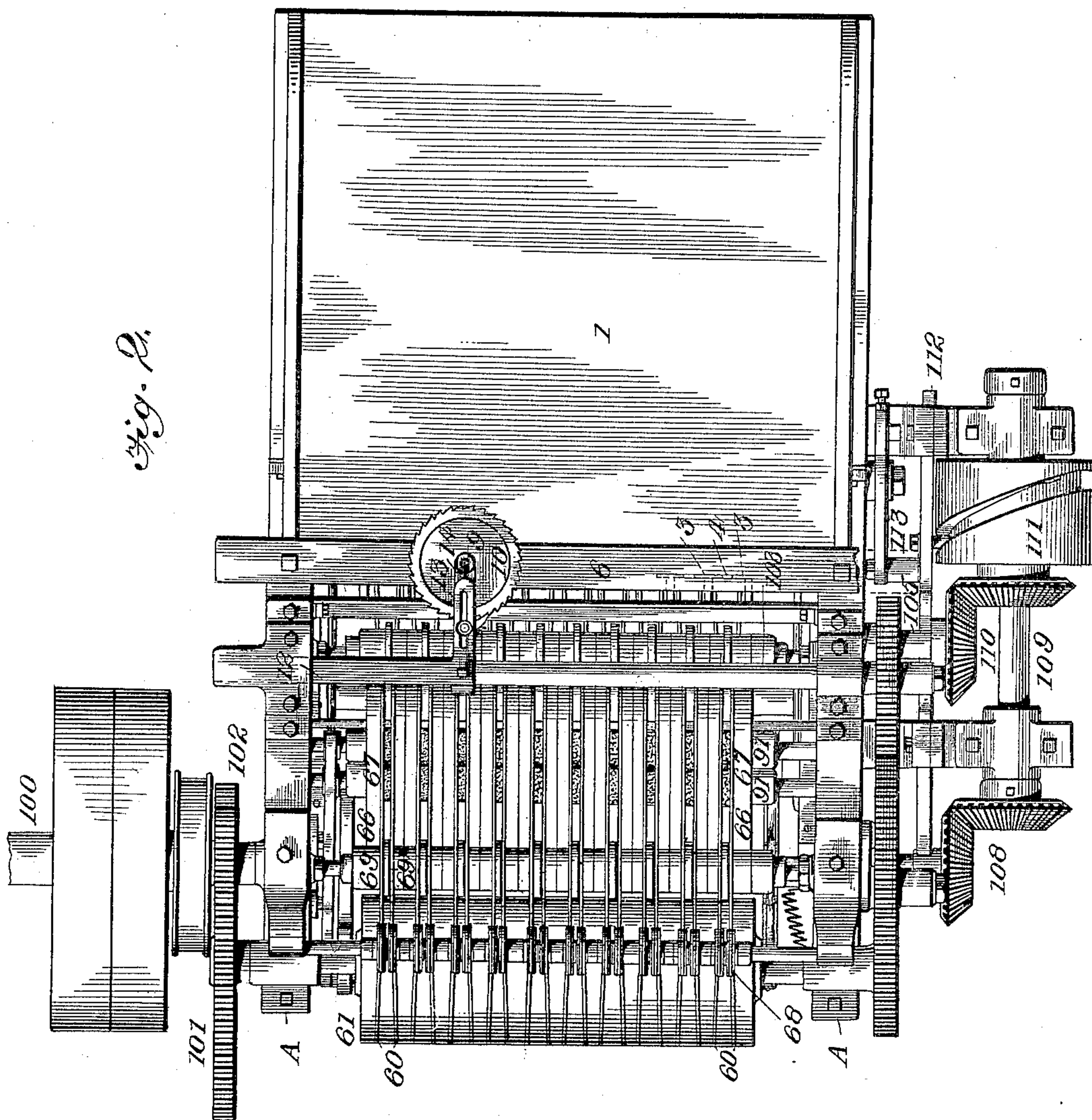
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## Witnesses

Witnesses  
 Lucienne  
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Robert W. Coffey.

by  
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his Attorneys

(No Model.)

15 Sheets—Sheet 3.

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Fig. 3.

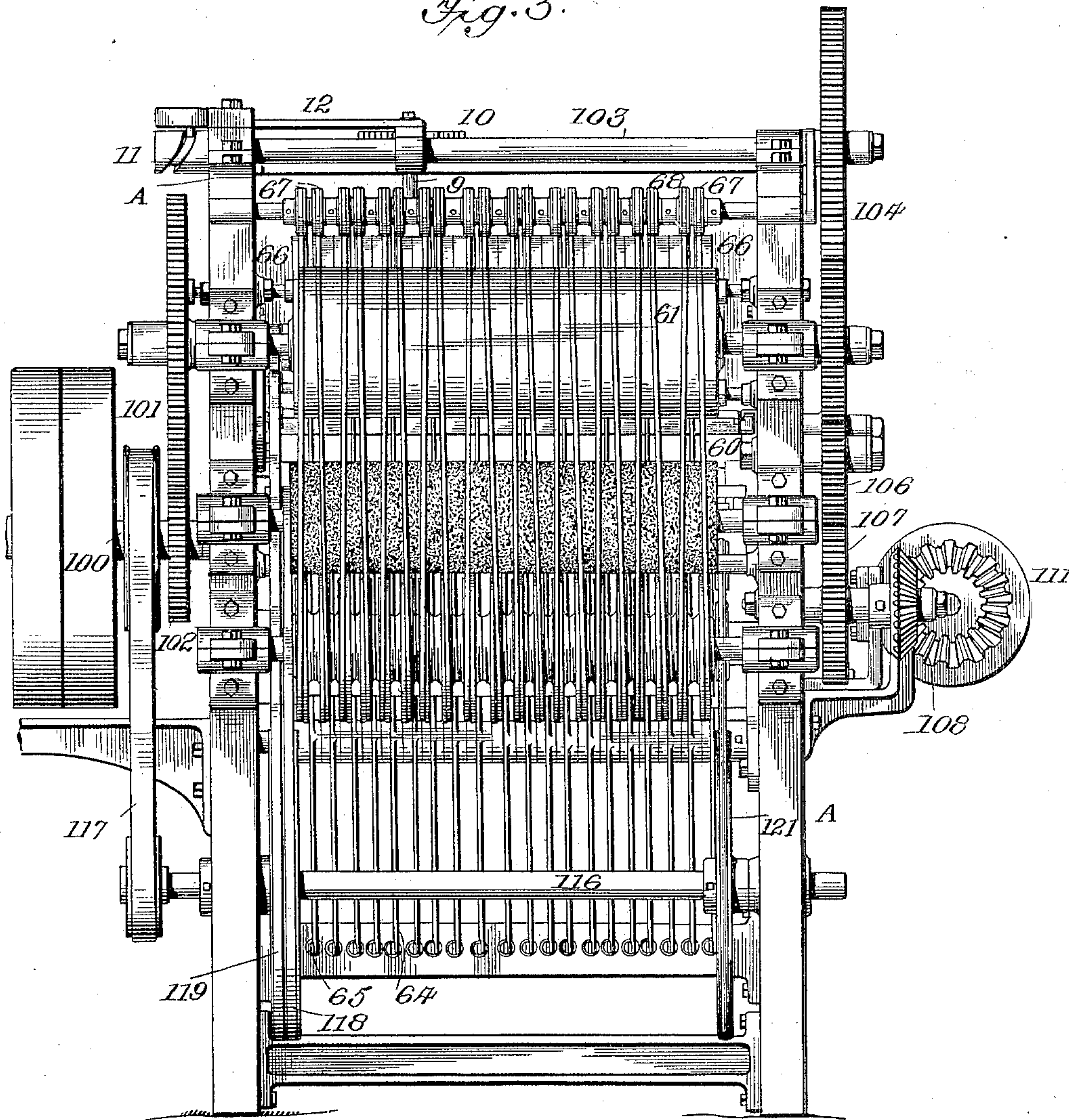
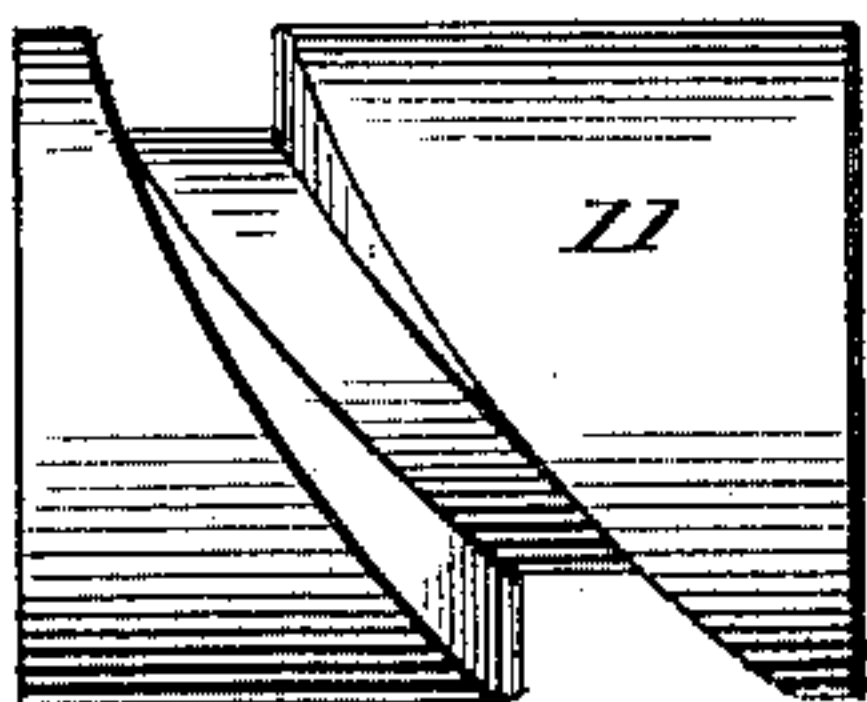


Fig. 8.



Witnesses

*John Smith*  
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(No Model.)

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Fig. 4.

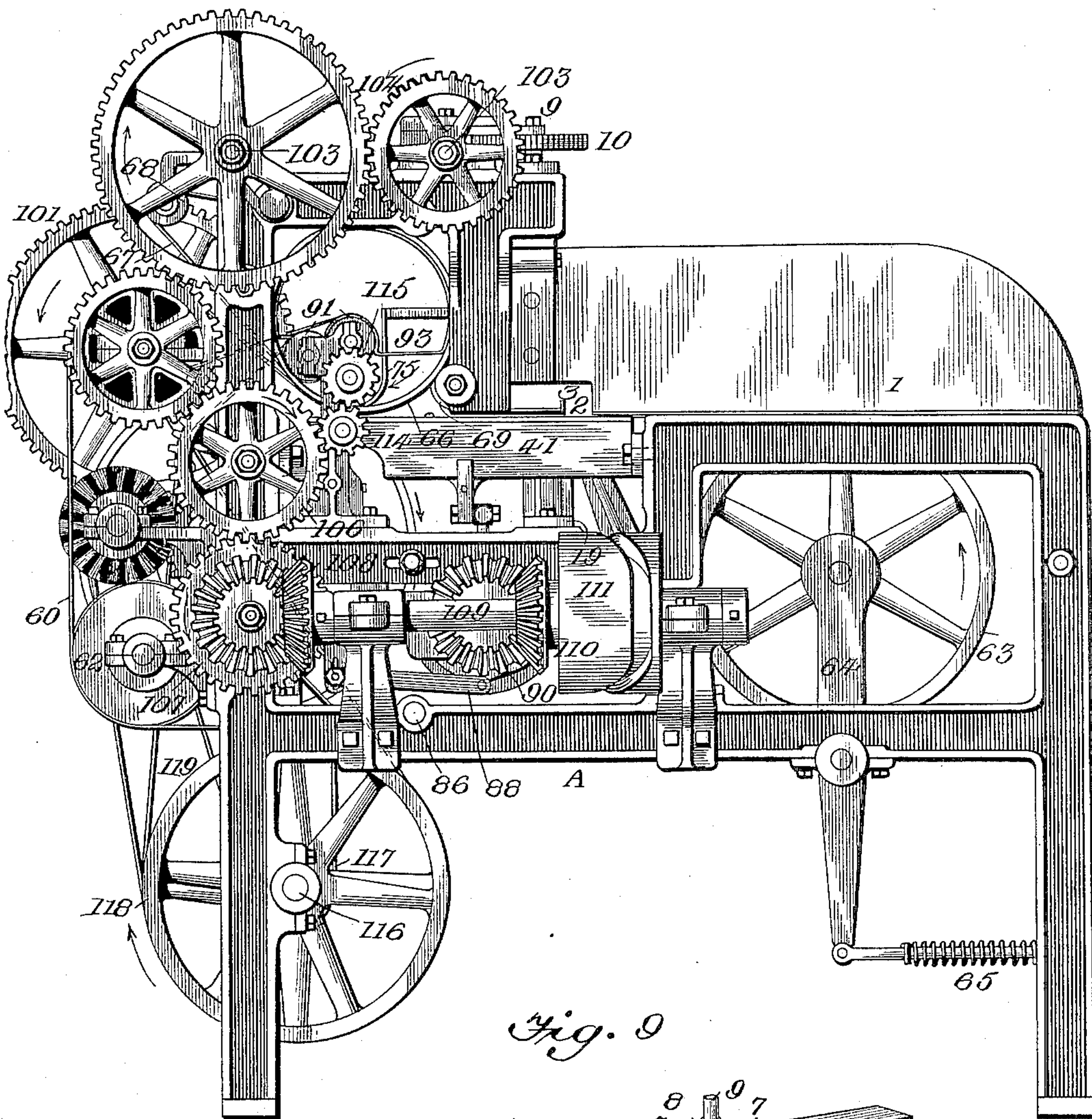
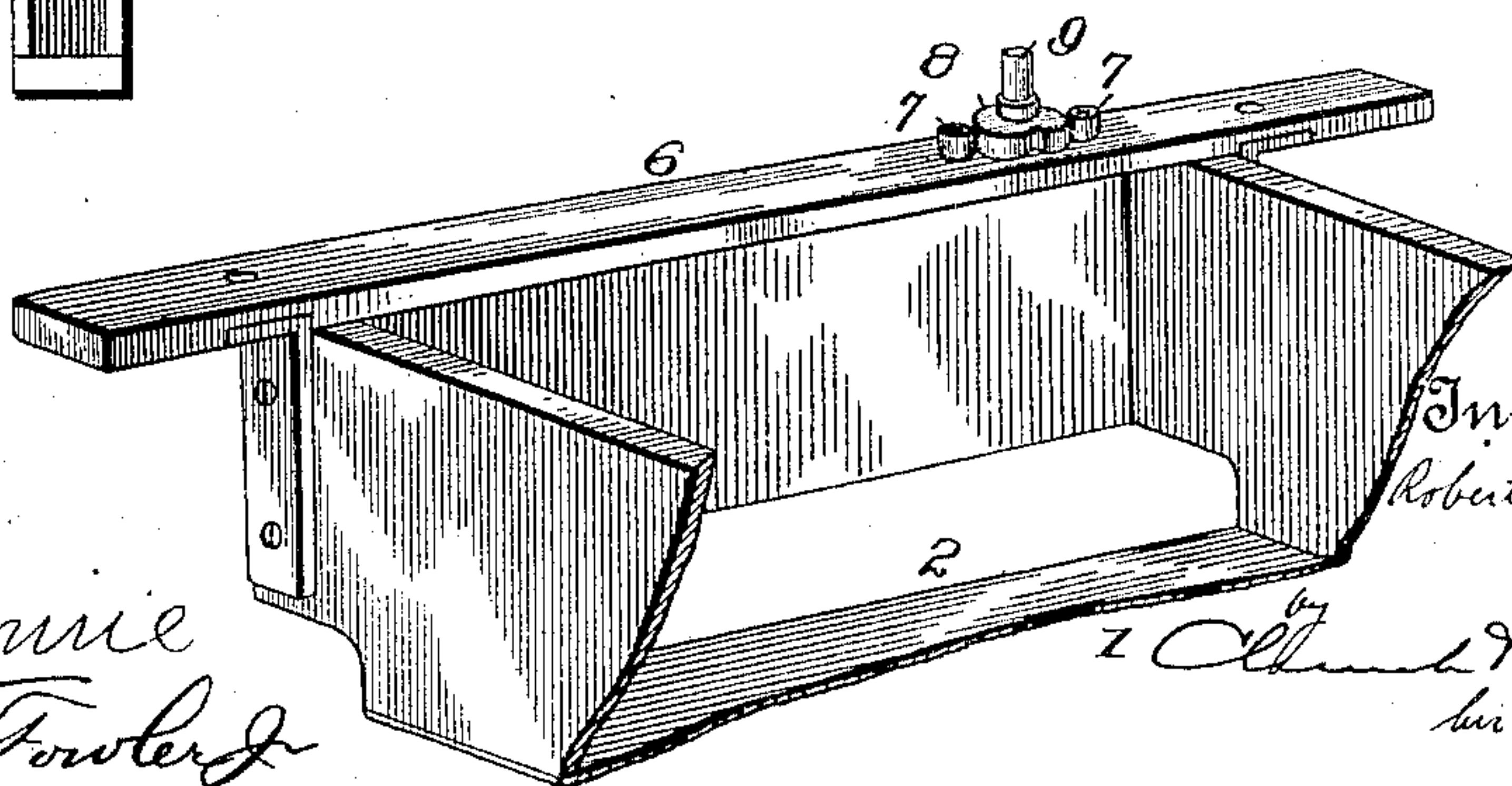


Fig. 5.



Witnesses

*John Smith*  
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(No Model.)

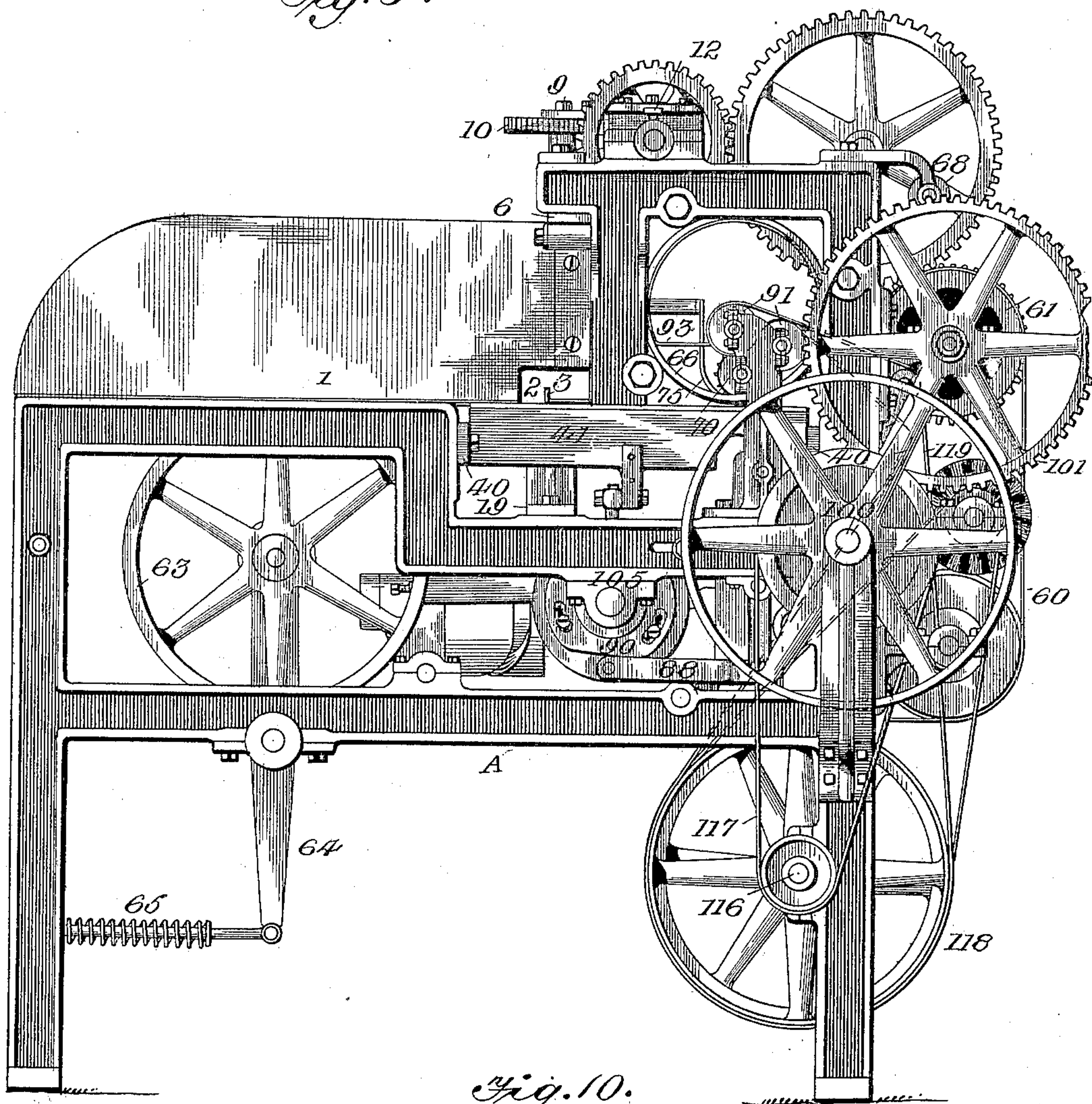
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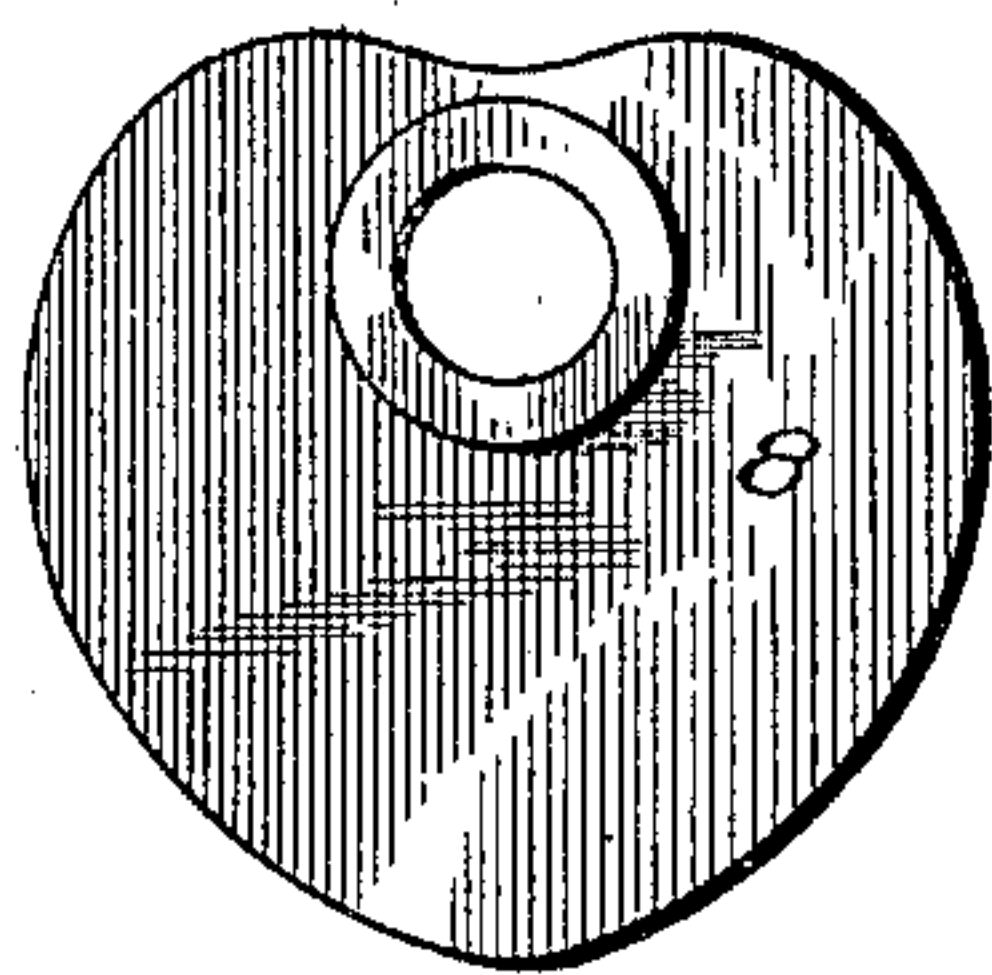
No. 599,309.

Patented Feb. 15, 1898.

Fig. 5.



*Fig. 10.*



Witnesses

Witnesses  
John Emrie  
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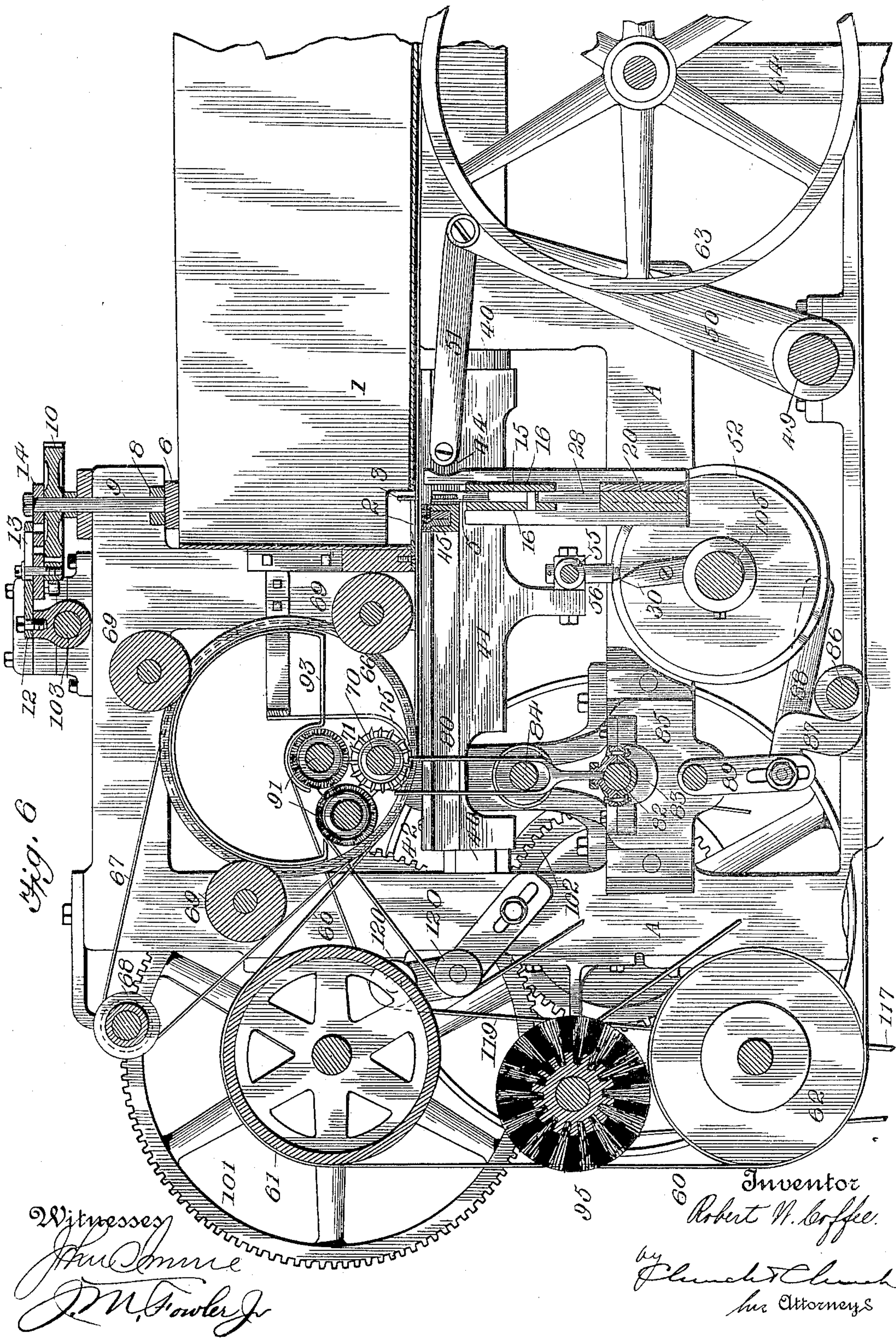
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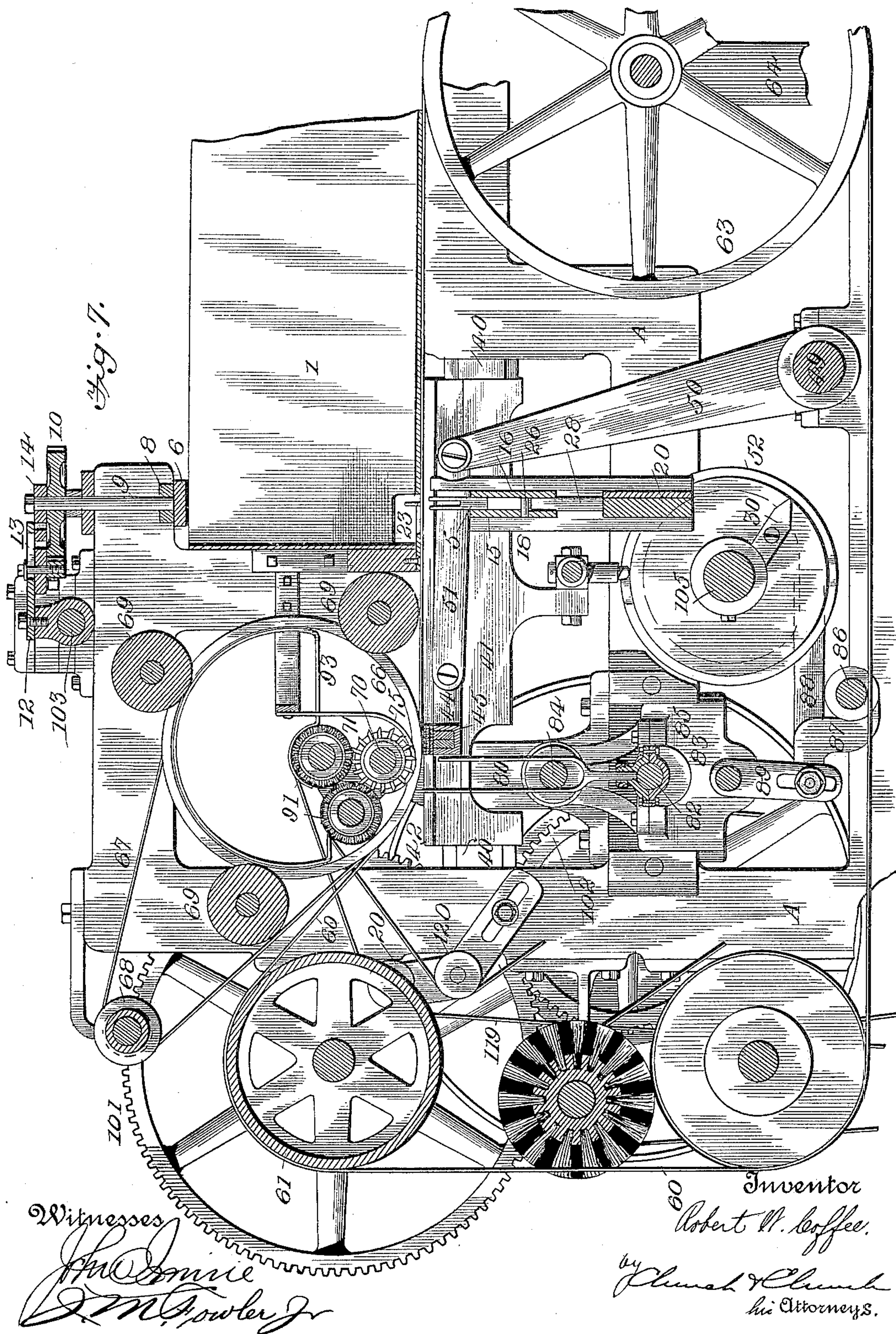
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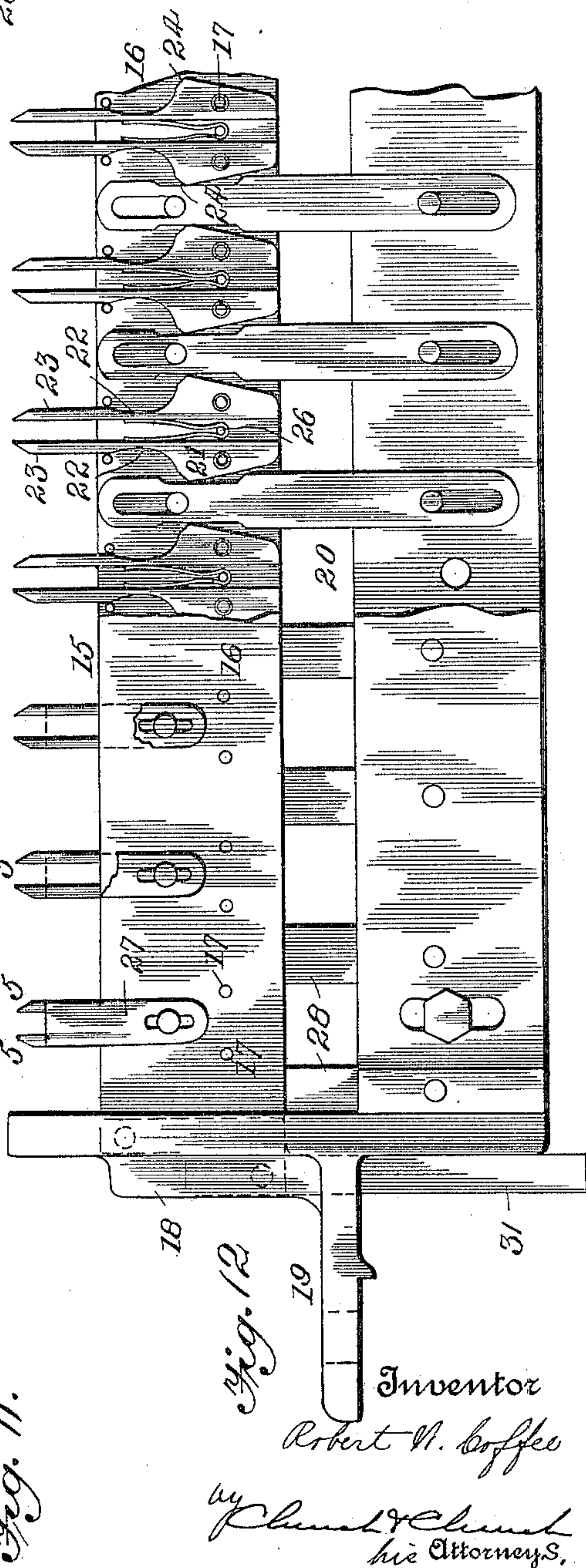
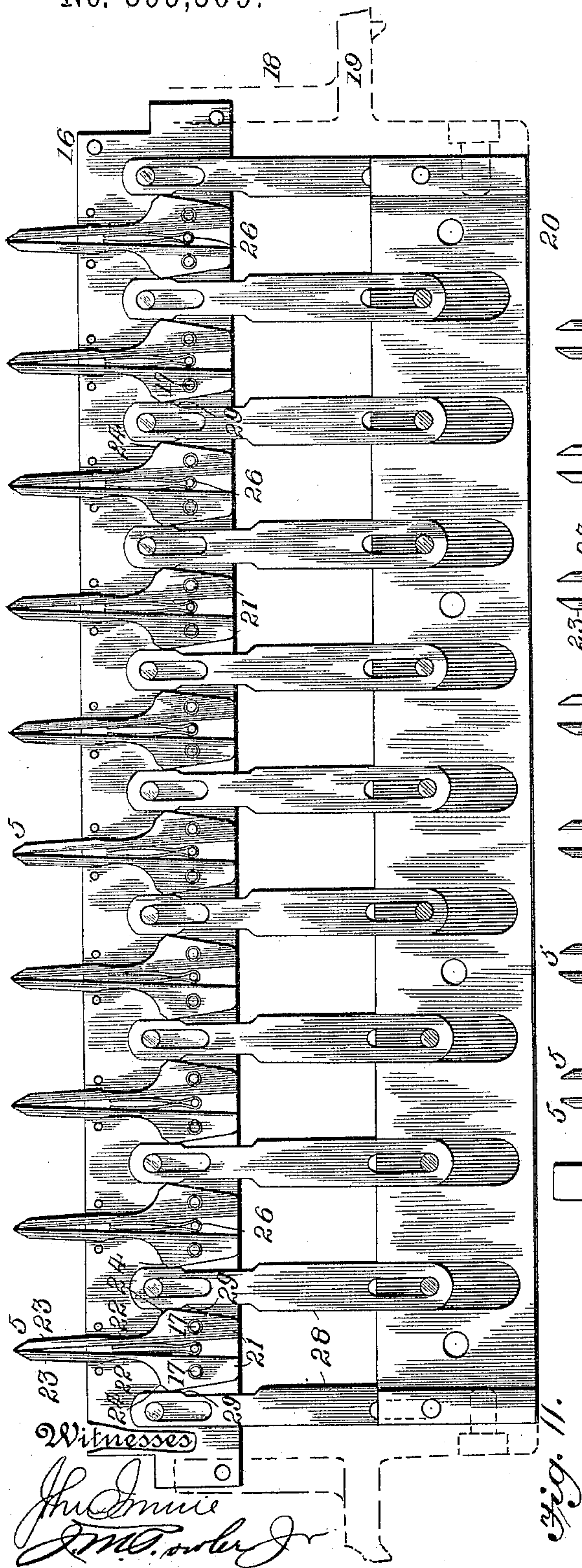




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Fig. 13.

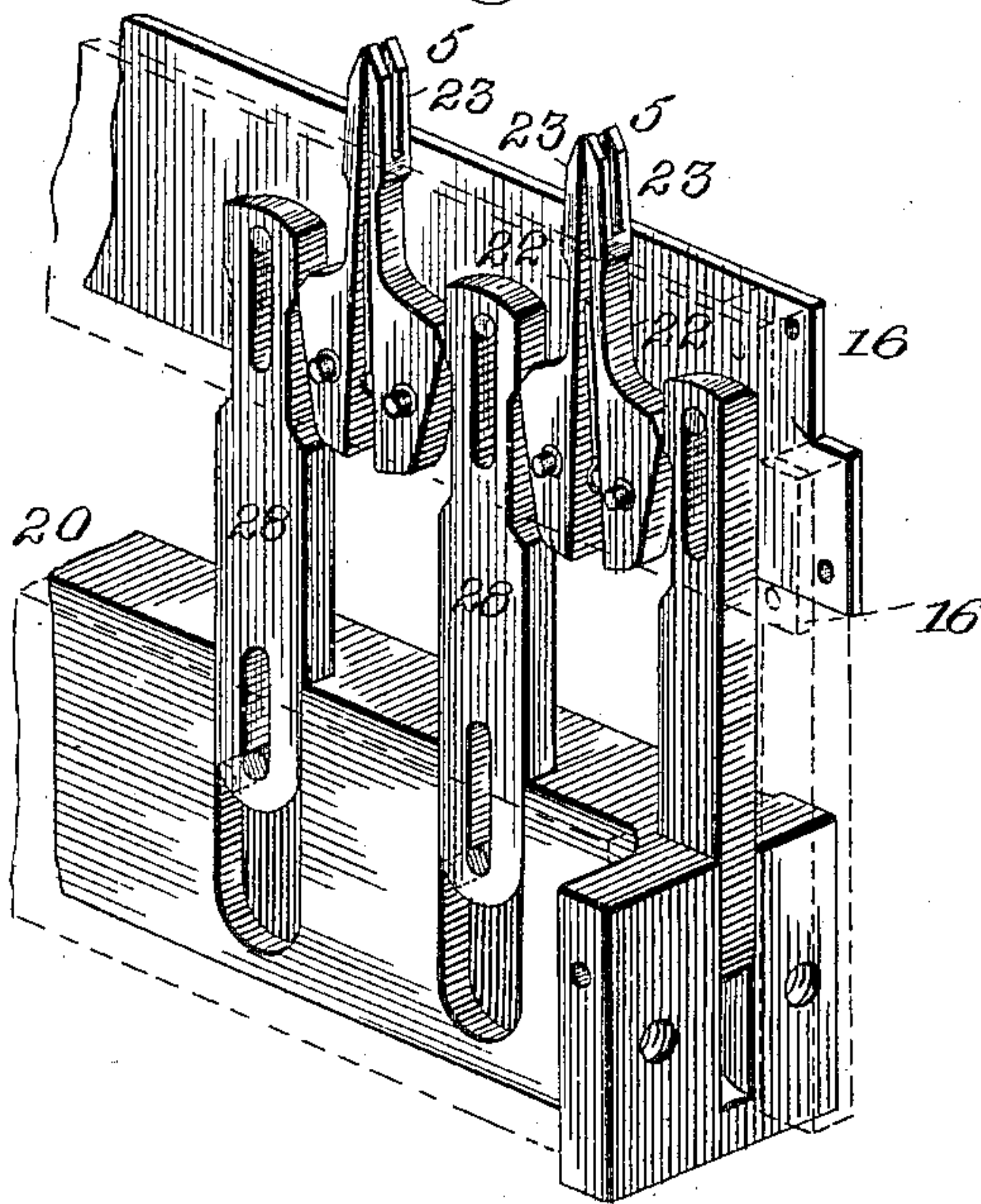


Fig. 14.

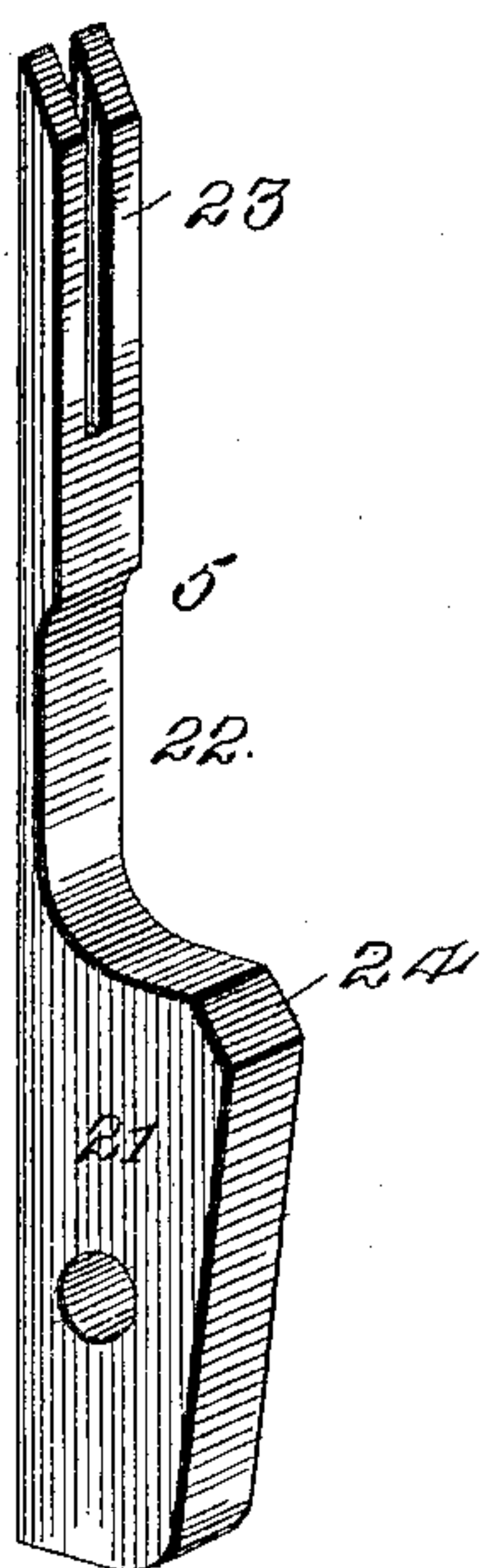


Fig. 30.

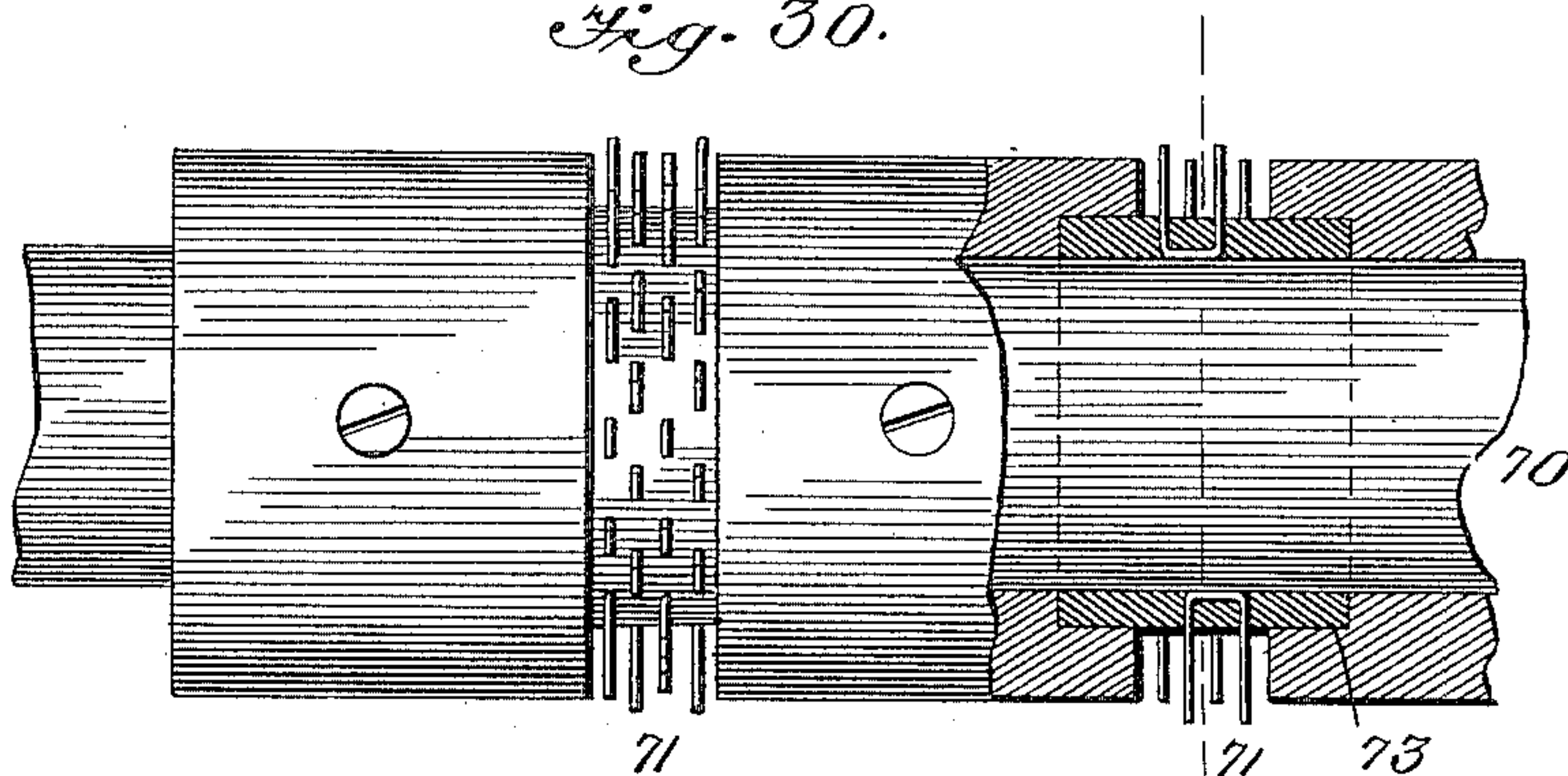
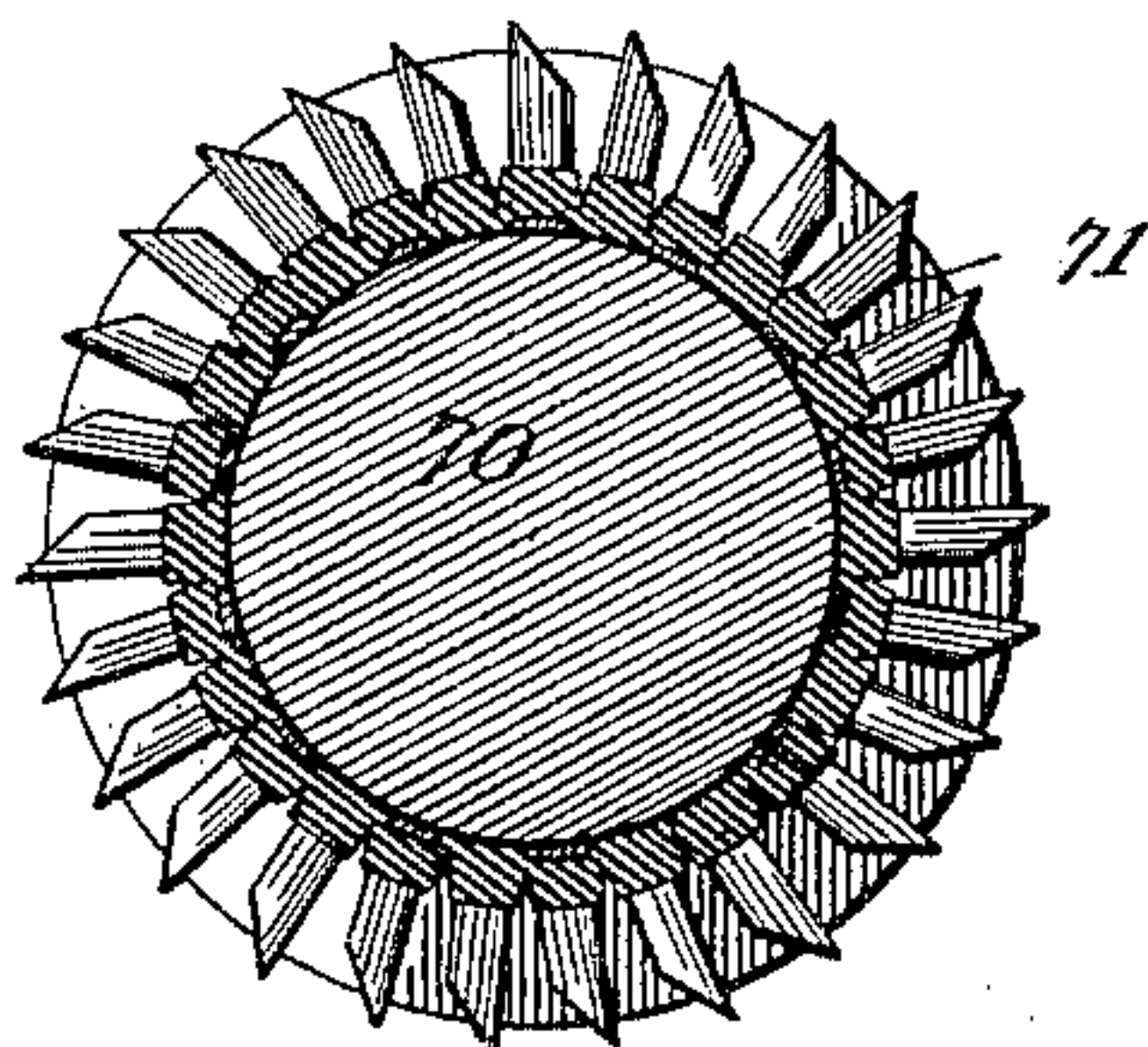


Fig. 31.



Witnesses

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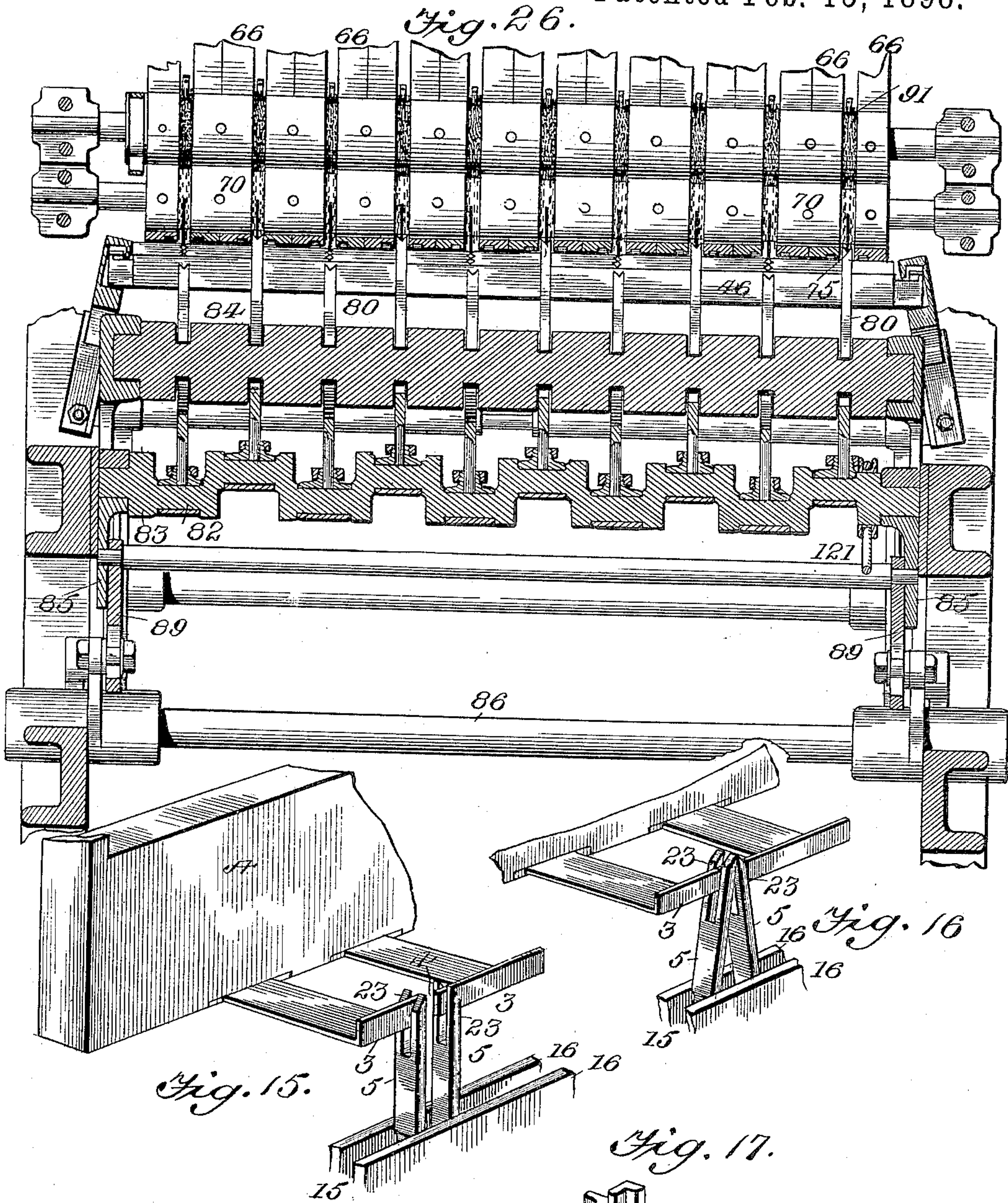
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(No Model.)

15 Sheets—Sheet 11.

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Fig. 19

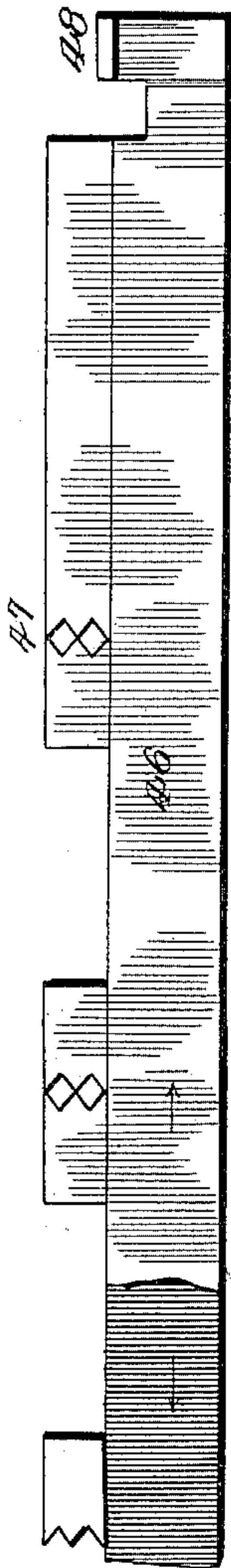


Fig. 18.

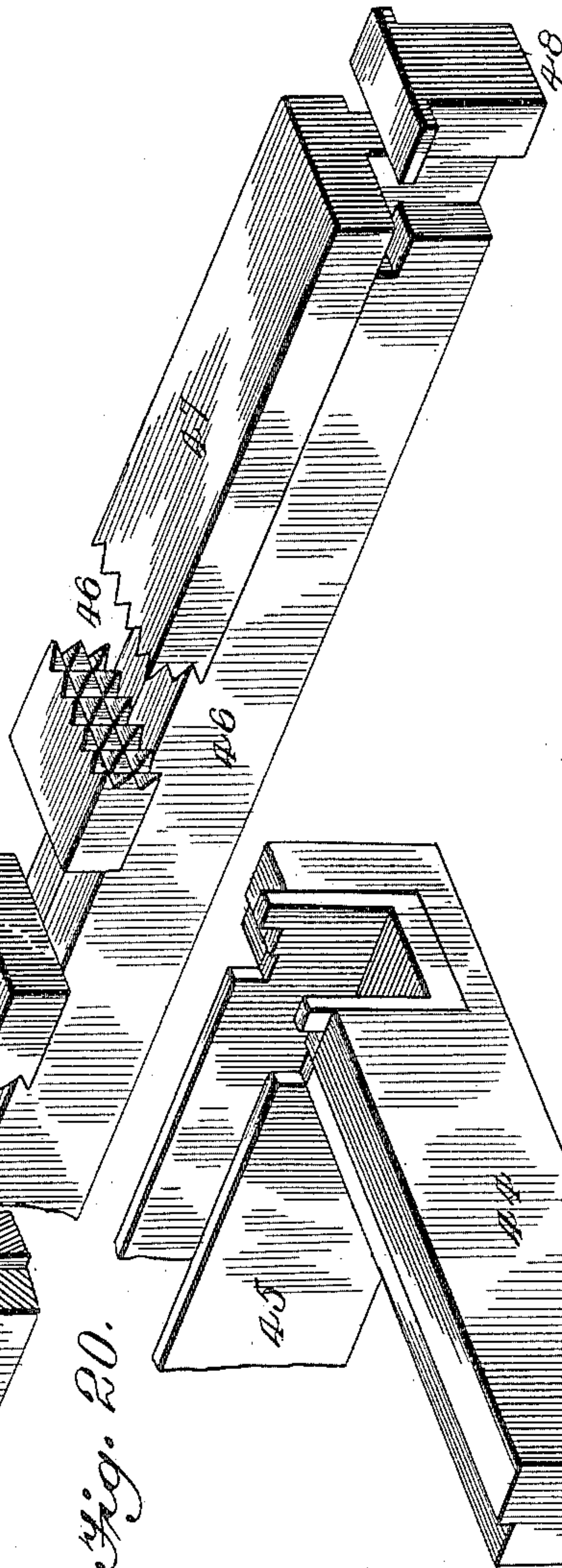


Fig. 20.

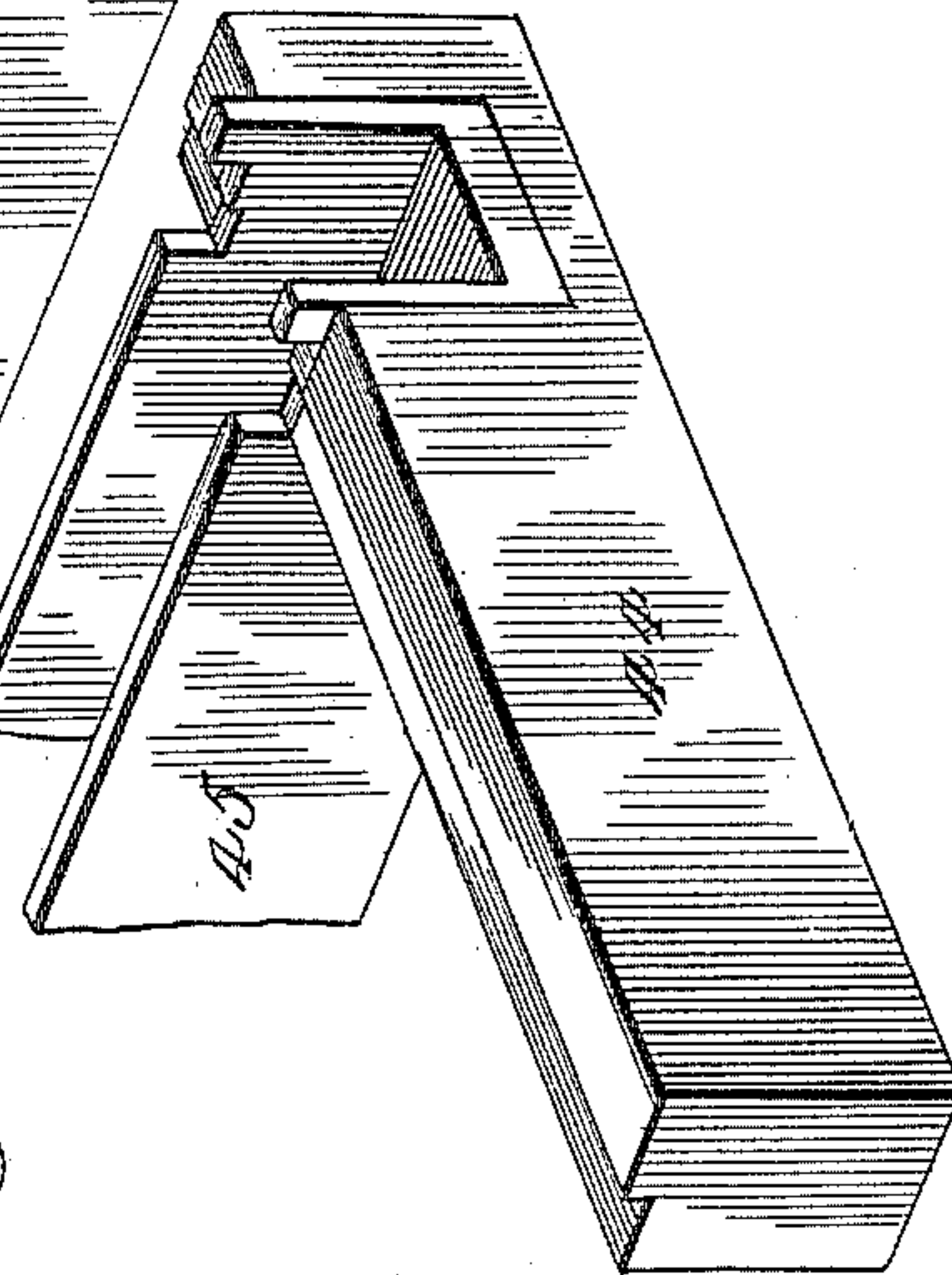
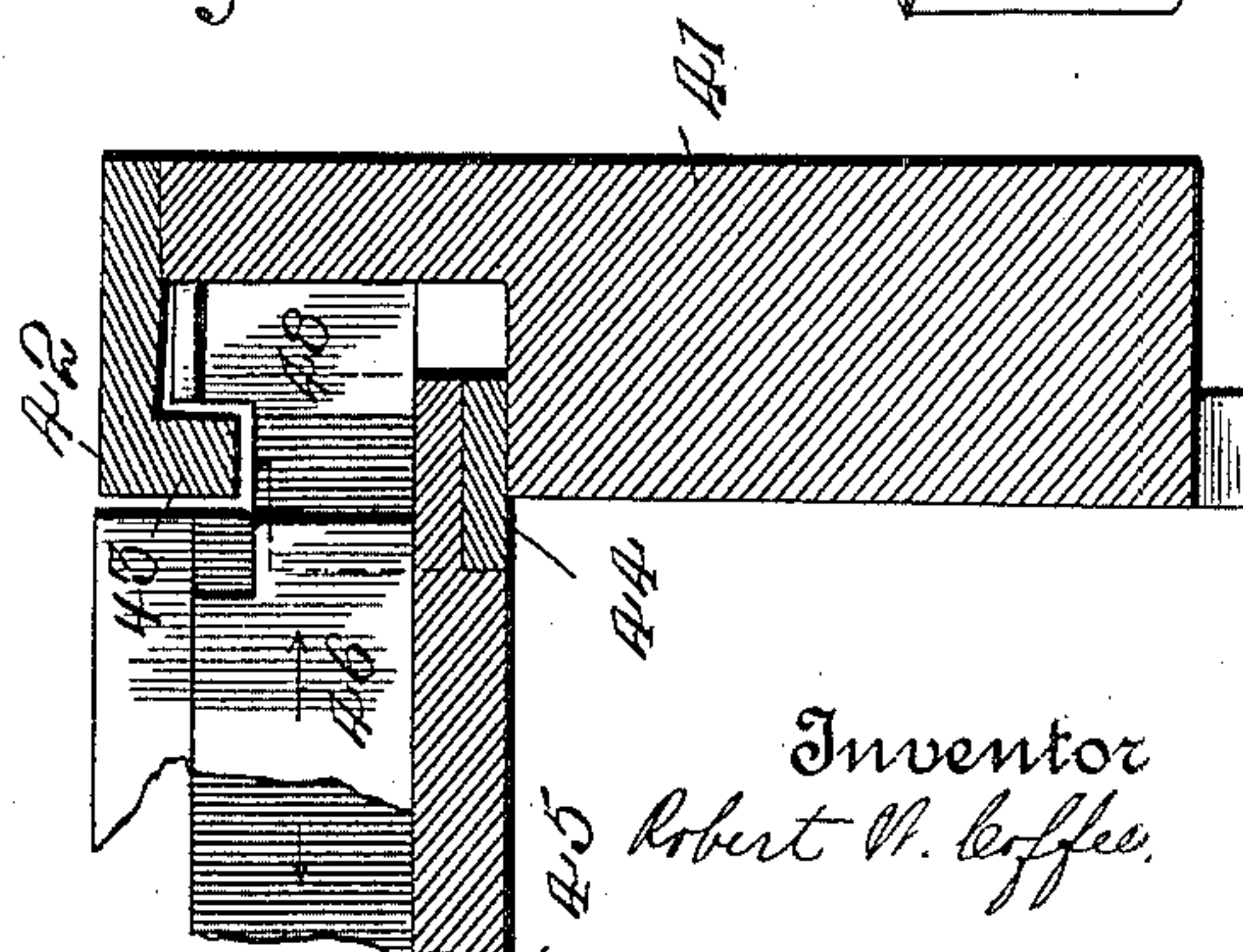


Fig. 21.



Witnesses

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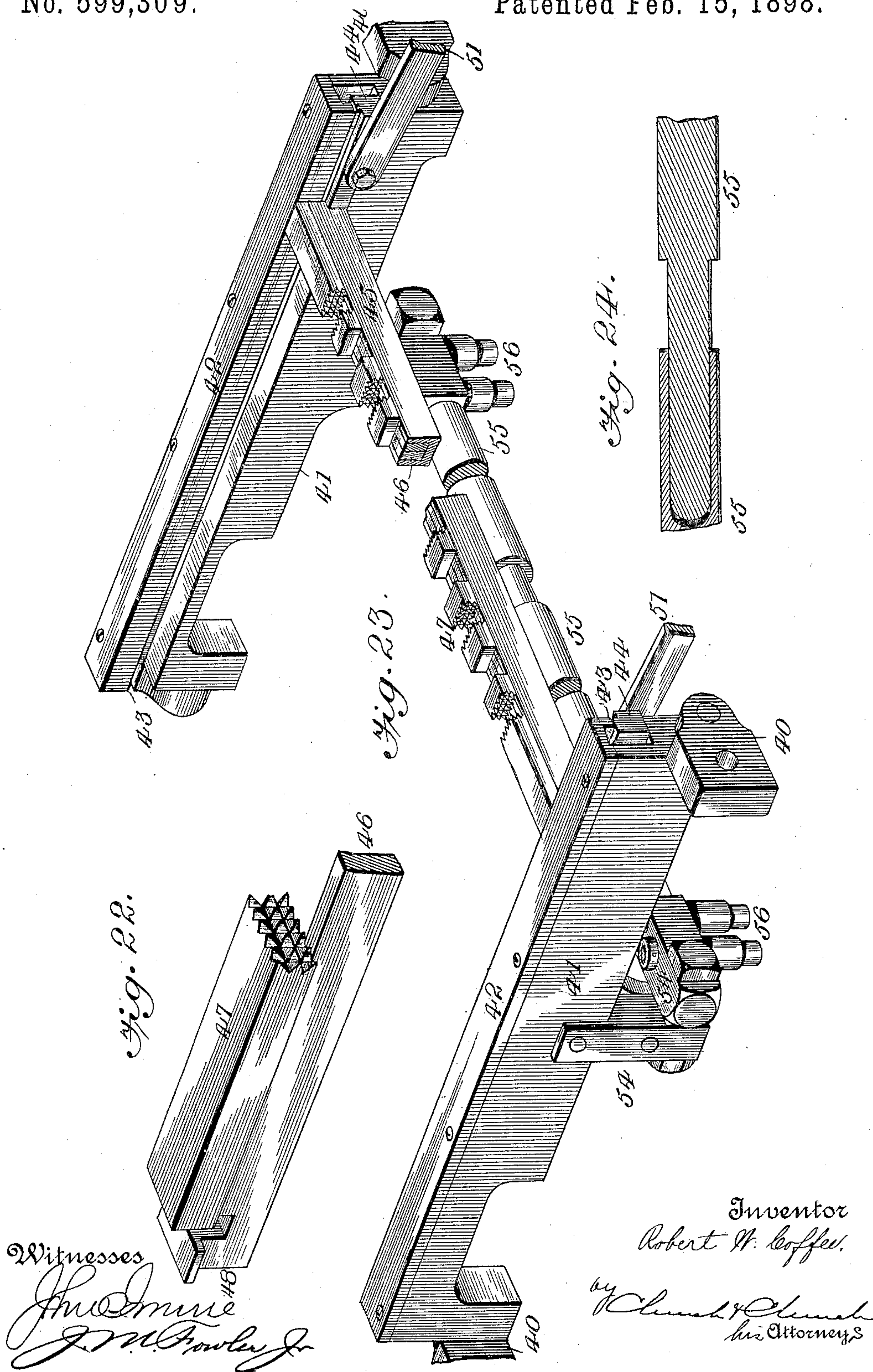
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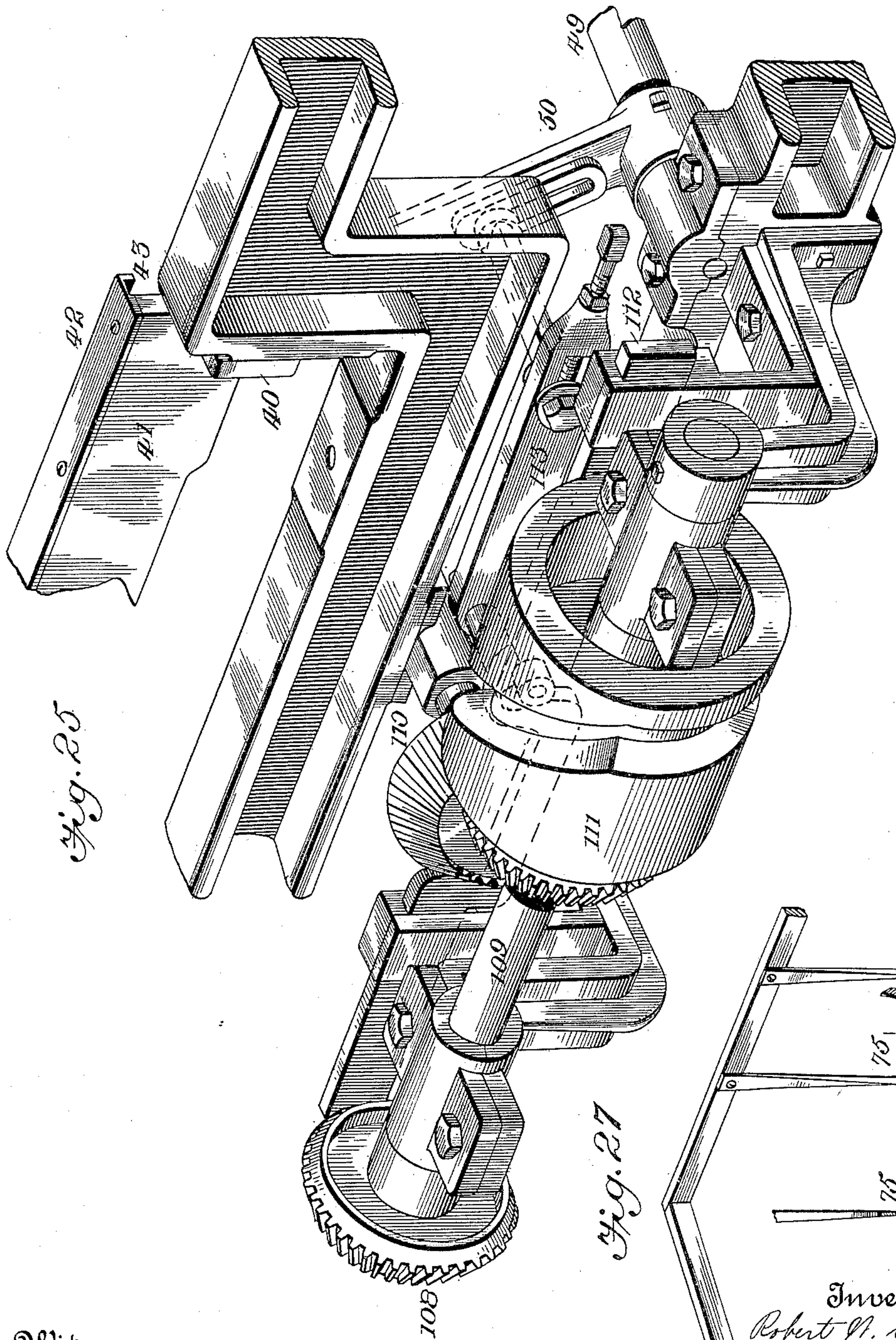
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Patented Feb. 15, 1898.



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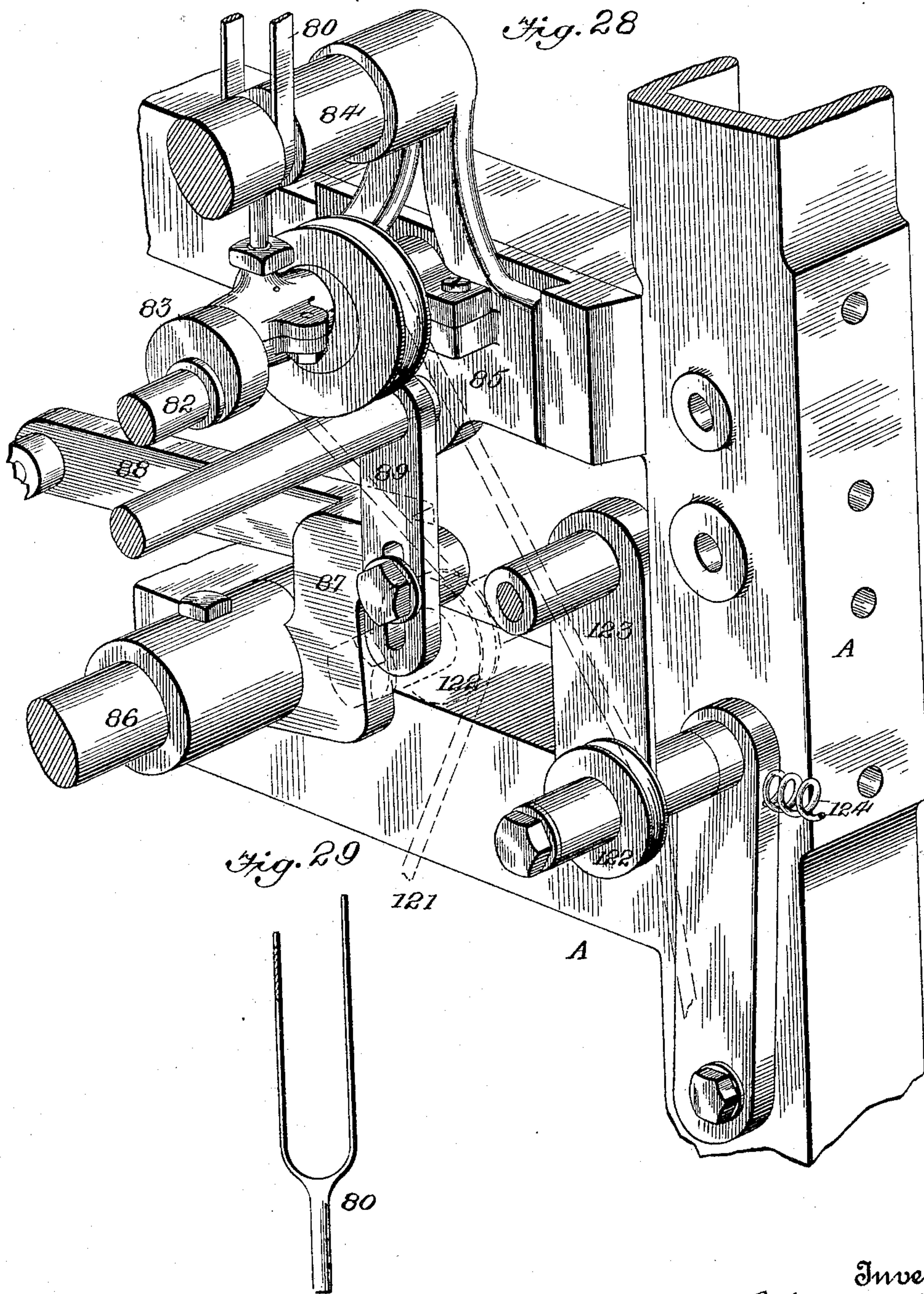
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R. W. COFFEE.  
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No. 599,309.

Patented Feb. 15, 1898.



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(No Model.)

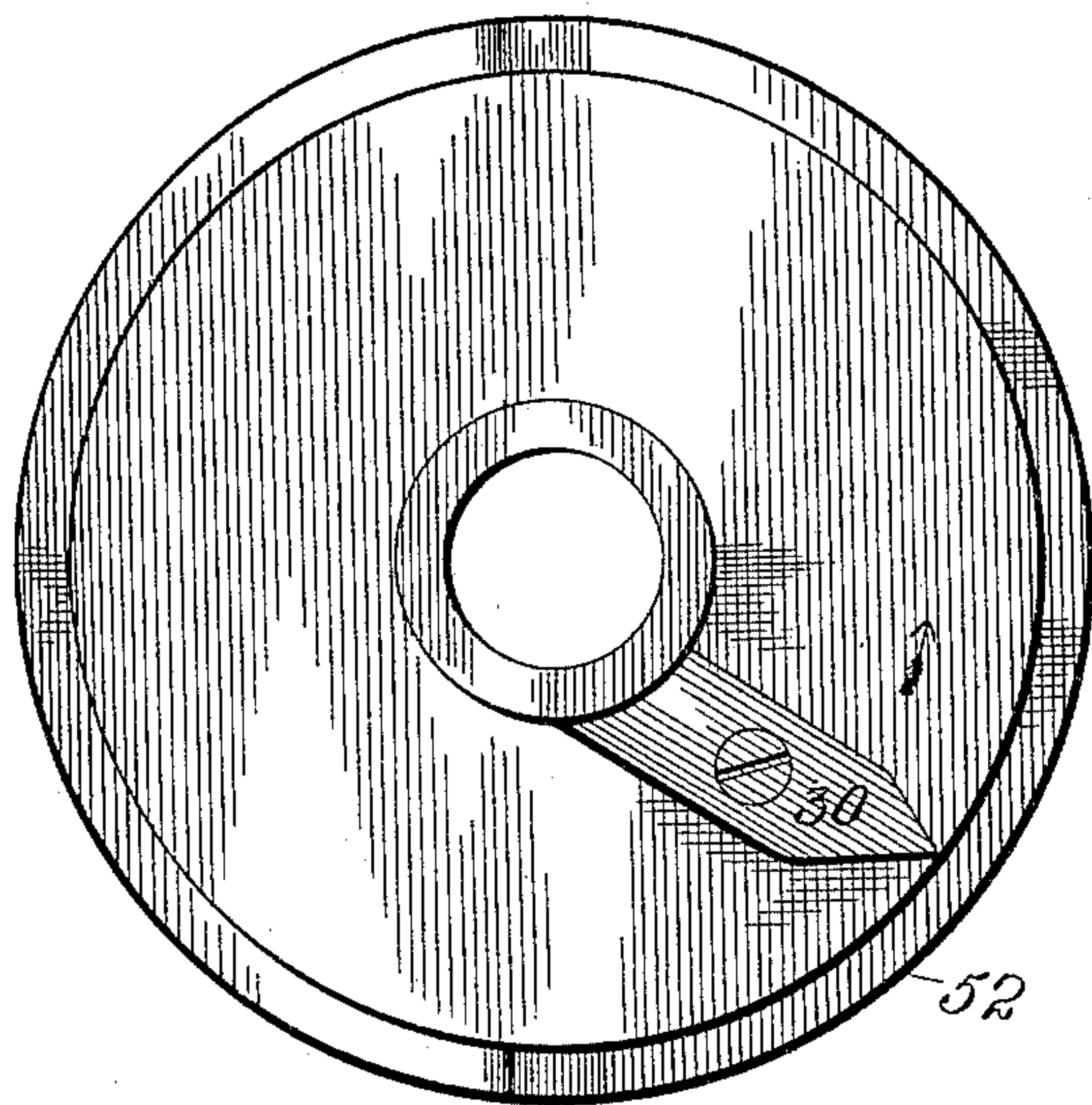
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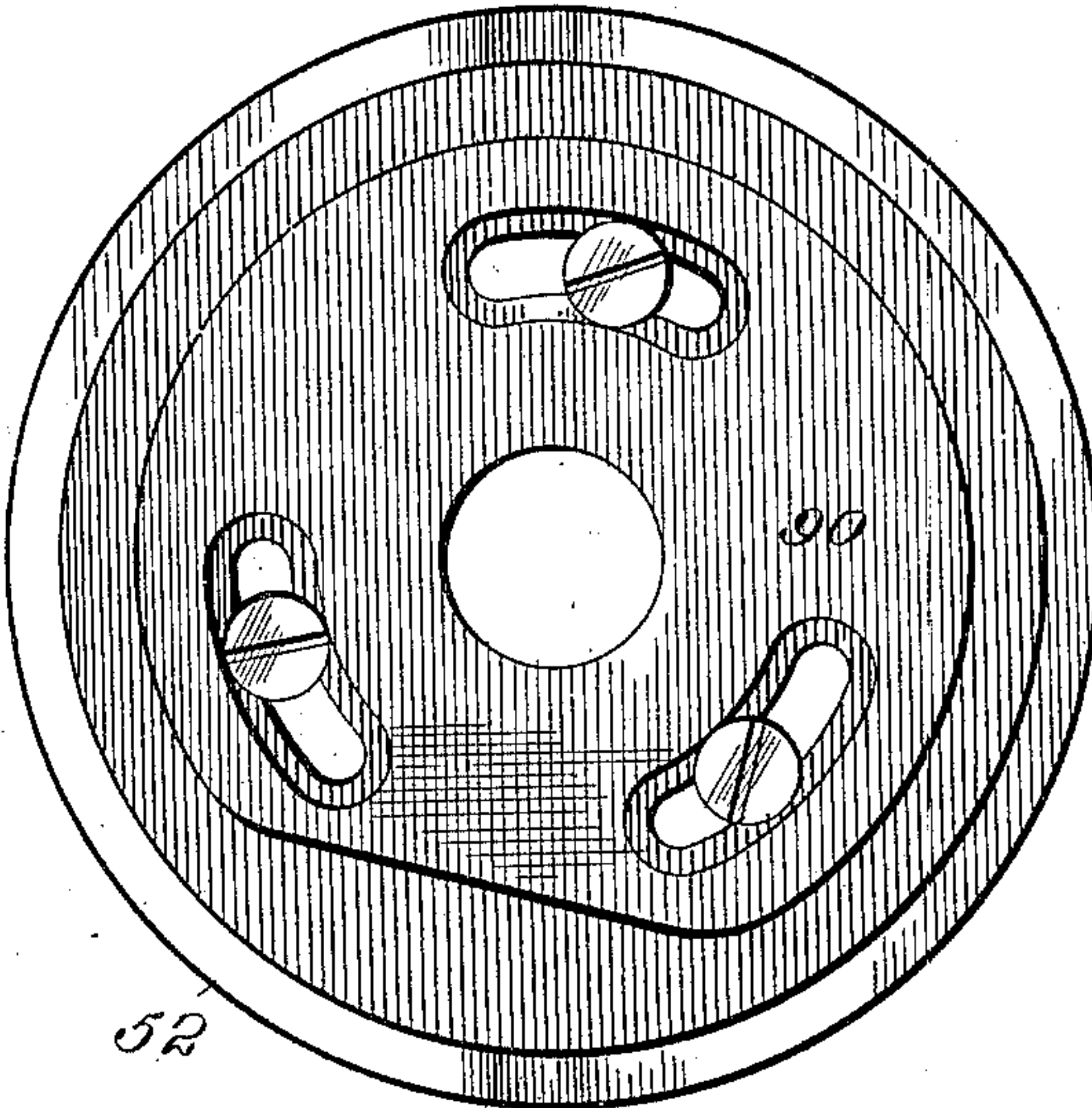
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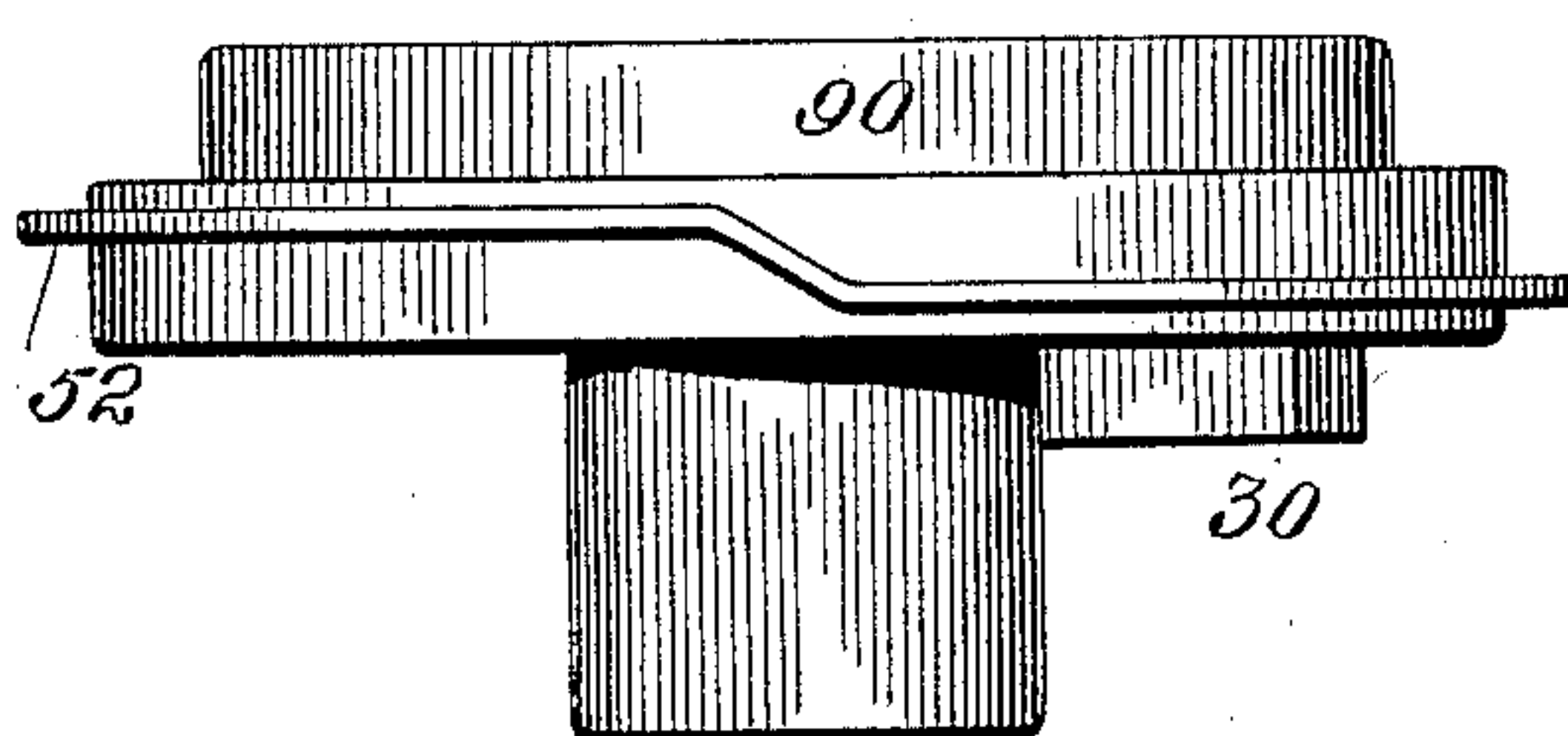
*Fig. 32.*



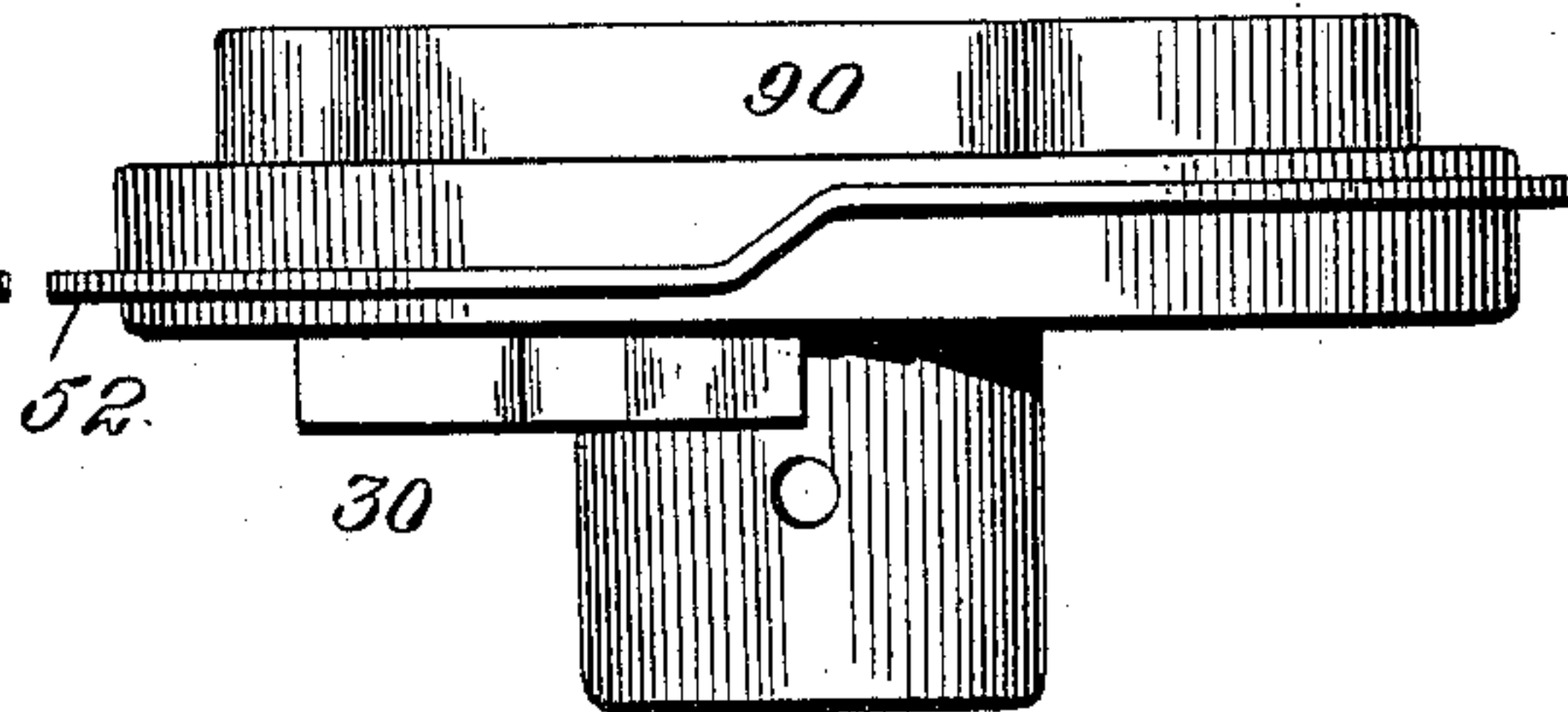
*Fig. 34.*



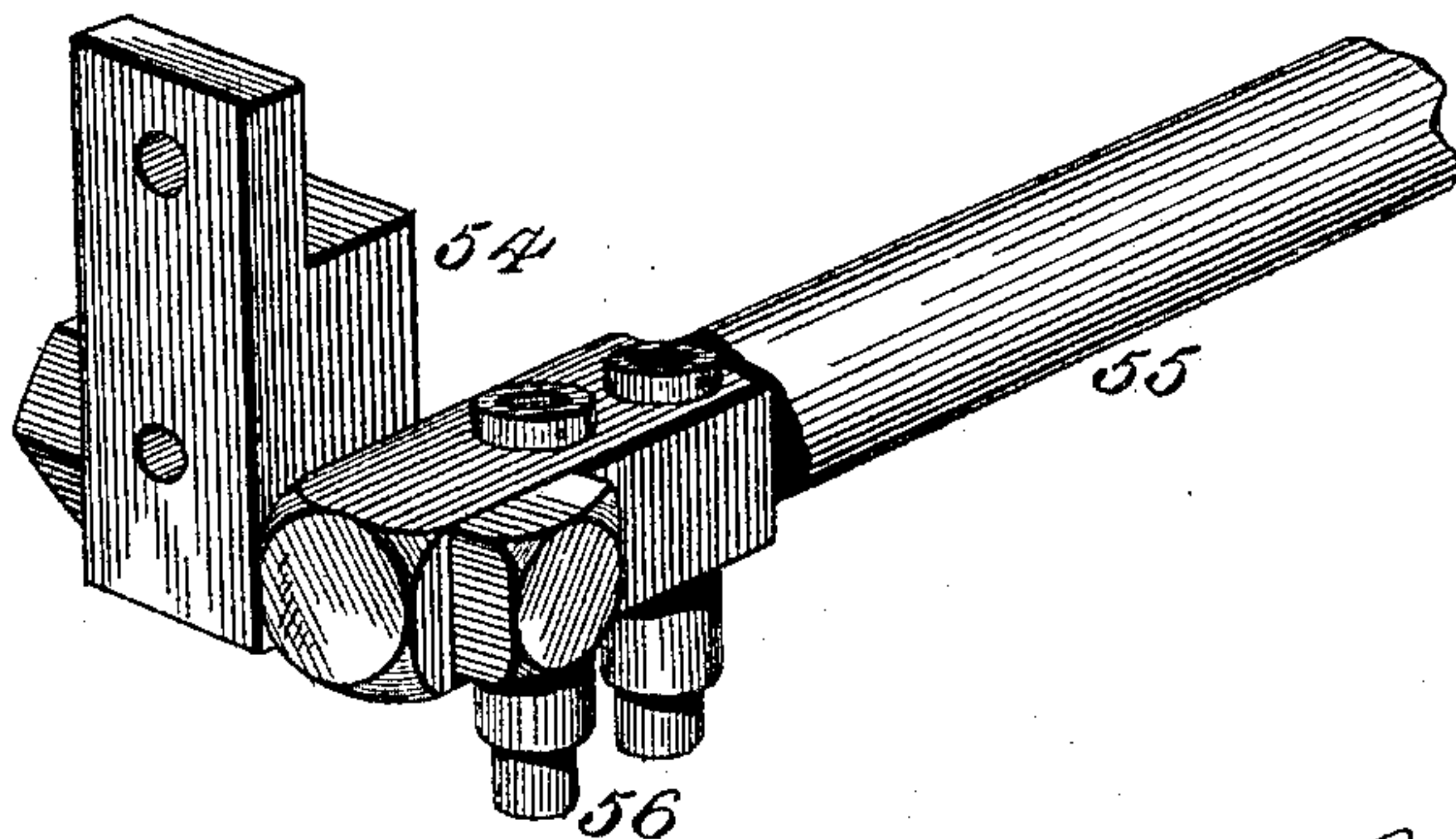
*Fig. 33.*



*Fig. 35.*



*Fig. 36.*



Witnesses

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*J. M. Fowler Jr.*

Inventor

*Robert W. Coffee,*

by *Charles & Charles*  
his Attorneys.



# UNITED STATES PATENT OFFICE.

ROBERT W. COFFEE, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE STANDARD TOBACCO STEMMER COMPANY, OF SAME PLACE.

## TOBACCO-STEMMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 599,309, dated February 15, 1898.

Application filed October 15, 1895. Renewed August 6, 1897. Serial No. 647,359. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT W. COFFEE, of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Tobacco-Stemming Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to a new and improved machine for automatically stemming leaves of tobacco and removing adhering leaf fragments from the stems, said machine being in the nature of an improvement upon that of my prior application, Serial No. 519,169, and embodying the following elemental parts or substructures, each possessing new features and all being combined to form a complete organization.

The several elemental parts are, first, the leaf selecting or feeding mechanism; second, the carrying or translating devices; third, the stemming mechanism, and, fourth, the stem clearing and delivering mechanism. To these are added the actuating mechanism by which the several devices are made to operate in unison and at the proper intervals to constitute an automatic self-feeding stemming-machine wherein tobacco-leaves deposited in or upon a proper receptacle are removed one at a time by the selecting or feeding mechanism and delivered to the translating devices, which latter transfer the leaf to the stemming mechanism when the leaf is separated from the stem and the latter passed to the clearing devices by means of which adhering leaf particles are removed.

The individual elements of the complete machine will be described in detail and their connection explained, after which the novel features will be pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of the machine, looking toward the rear left-hand corner. Fig. 2 is a top plan view. Fig. 3 is a rear elevation. Fig. 4 is a side elevation, left hand. Fig. 5 is a side elevation, right hand. Figs. 6 and 7 are longitudinal vertical sections showing parts in two different phases. Fig. 8 is a de-

tail of the ratchet-actuating cam for the hopper. Fig. 9 is a detail of a portion of the hopper. Fig. 10 is a detail of the heart-cam for actuating the hopper. Fig. 11 is a front elevation of the selecting or feeding devices with front plates removed and fingers in closed position. Fig. 12 is a front elevation, partly in section, of a portion of the feeding devices with the fingers in open position. Fig. 13 is a detail sectional view in perspective of a portion of the feeding devices. Fig. 14 is a detail showing one of the feeding-fingers in perspective. Figs. 15 and 16 are details showing feeding-fingers and supporting-plates in perspective in two positions. Fig. 17 is a detail of the feeding mechanism. Fig. 18 is a view in perspective of the clamp or grasping member of the translating device. Fig. 19 is a side elevation showing the clamping-jaws closed. Fig. 20 is a detail view showing one end of the guide for supporting the clamping-bars. Fig. 21 is a sectional view of the rocking guide or support for the clamping-bars. Fig. 22 is a detail showing a portion of one of the clamping-jaws and its bar. Fig. 23 is a perspective view of the translating devices. Fig. 24 is a detail of the actuating mechanism for the translating device. Fig. 25 is a view in perspective of the actuating mechanism for reciprocating the translating devices. Fig. 26 is a transverse sectional view, partly in elevation, of the stemming mechanism. Fig. 27 is a detail view showing the leaf-dividers in perspective and in elevation. Fig. 28 is a detail view showing the actuating mechanism for the stem pushers or displacers of the stemming mechanism. Fig. 29 is a side elevation of one of the pushers with the side of one branch broken away to show stem-recess. Fig. 30 is a detail view of the stem-carrying roll, also showing a modified construction of the stem-receiving device. Fig. 31 is a sectional view of the stem receiver and carrier of the stemming mechanism. Figs. 32 and 33 are detail views (side and edge) of one of the cams for actuating the feeding mechanism and controlling the opening and closing of the jaws of the translating devices. Figs. 34 and 35 are corresponding views of the opposite jaw-closing cam and the cam for elevating the pushers of



the stemming mechanism. Fig. 36 is a detail of actuating mechanism for the translating device.

Similar letters and figures of reference in the several views indicate the same parts.

In the present instance the several individual mechanisms which go to make up the complete machine are associated together and supported upon a frame A of suitable dimensions and form to accommodate and sustain the various working parts, and inasmuch as each of said individual mechanisms contains and embodies novel and valuable features, rendering the same susceptible of use separately or in connection with other mechanisms for the performance of the same or analogous functions, they will first be explained separately and subsequently in combination.

The drawings illustrate a multiple machine wherein the feeding, translating, stemming, and stem-cleaning devices are duplicated nine times, there being ten sets in all; but as the duplicates are similar in all material respects a description of one series or sets will suffice for all.

*The leaf feeding or selecting mechanism.*—

The principal elements of this mechanism are a laterally-reciprocating support or hopper 1, provided with opening 2 at the bottom for the withdrawal of the leaves, butt-supports 3, with intermediate passage 4, the former projecting above the level of the leaf-support or hopper-bottom and forming a support along which the butt-ends of the stems are caused to travel, while the passage 4 is of a size adapted to receive and hold a single stem, and a pair of reciprocating and alternately opening and closing fingers 5, movable in such relation to the slot or passage 4 as to engage the stem lying therein and withdraw or deflect the latter and bring it into position to be engaged by the translating or other devices. The travel of the support 1, aided by gravity, causes the stem of one of the lower leaves to be deposited within the passage 4, thereby designating and selecting the leaf to be withdrawn, and the fingers 5, being moved in proper relation to the said passage, advance and seize the designated stem, withdraw the latter, open to release the stem, and again advance to engage the next stem which has in the interval been deposited in passage 4. The several elements referred to should be properly constructed and supplied with actuating devices competent to effect the desired movements at the proper times, and although a preferred form of embodiment is shown and will now be described it is obvious that other forms might readily be substituted without thereby involving a departure from the main idea of the invention as expressed in the general combination apart from details of construction.

The support for the stock of tobacco is preferably in the form of a hopper 1, open at the front and top and having a portion of the bottom cut away at the rear to form the open-

ing or passage 2, through which the leaves may be withdrawn. The hopper is guided to move laterally upon the frame A and is provided with a cross-bar 6 at the top, bearing rollers 7, (see Fig. 9,) between which rotates a heart-shaped cam 8, secured to a vertical shaft 9, the latter carrying a ratchet-wheel 10 and being supported in bearings on the main frame, Figs. 6 and 7. The cam-shaft 9 is driven from a cam 11, Figs. 3 and 8, acting on a roller attached to a reciprocating bar 12, whose slotted portion 13 engages a pin on pawl-arm 14, the latter pivotally supported on shaft 9 and provided with a pawl-engaging ratchet-wheel 10. At each revolution of cam 11 the ratchet-bar 12 is reciprocated and ratchet-wheel 10 and its shaft 9 advanced a portion of a revolution, causing the hopper to traverse intermittently in one direction the full throw of cam 8 and then reversing the motion to travel intermittently in the opposite direction. One purpose of the intermittent motion communicated to the hopper is to provide an interval of rest while the fingers are acting to remove a stem deposited in the opening or passage 4 between the butt-supports 3. The leaves are placed upon the floor or bottom of the hopper 1 with their butt-ends above the opening 2, and they are sustained in part upon the upper edges of the butt-supports 3, which latter are in the form of narrow vertical plates separately supported from the rear. In the multiple arrangements shown each plate is attached to an arm secured to a cross-piece of the frame in rear of the hopper and projecting under the latter, (see Figs. 2, 4, 6, 7, 15, and 16,) a wider space being provided between said arms than between the adjacent ends of the plates forming passage 4, as indicated in Figs. 15 and 16. The lateral movement of the hopper carrying the supply of leaves with the stems resting upon the butt-supports operates to shift the position of the stems with reference to the opening or passage 4, thus insuring the filling of said passage after the withdrawal of the stem occupying said passage, and by giving an intermittent feed movement to the hopper an interval of rest is provided for the withdrawal of the stem by the fingers.

The construction and arrangement of the fingers 5 is illustrated in detail in Figs. 11 to 17, inclusive. The fingers 5 are mounted in pairs upon a reciprocating bar or frame 15, the latter constructed of front and rear plates 16 with spacing-blocks at the ends, forming an open frame for the accommodation of the fingers and their pivots 17. In the present instance frame 15 is guided at the ends to reciprocate vertically, the guides 18 being formed on brackets 19, attached to the main frame A and supporting a cross-bar 20, located beneath frame 15. This arrangement is adapted to facilitate the application and removal of the finger mechanism. Each finger 5 is provided with a shank 21, a spring-neck 22, and a furcated or slotted upper end or grasping por-



tion 23. The outer edge of the shank at a point 24 above the pivot 17 is provided with an inclined or rounded shoulder, and is narrowed below that point for a purpose to be explained. The object in slotting the upper end of the finger is to enable it to pass on opposite sides of the vertical butt-supports 3, as illustrated in Figs. 15 and 16; otherwise the grasping ends might be of any desired form. A spring 26, interposed between and bearing against the fingers constituting a pair, serves to normally separate the upper ends—that is, hold them in open position—cross-pins or other suitable devices being provided to limit the outward movement. Upon the front plate of frame 15, opposite the space between the jaws or fingers, is secured a vertically-adjustable gage-plate 27 for determining the depth of the opening for the reception of the stem.

It is the design that the fingers shall remain open during the major portion of the upward movement of frame 15, closing quickly at or near the termination of said movement to grasp the stem lying within passage 4, descend while still closed on the stem to draw the latter down, and open quickly at or near the limit of the downward movement. A convenient and effective arrangement of mechanism for producing the alternate closing and opening of the fingers or jaws consists of a pair of bars or links 28, guided at their upper ends so as to be permitted a limited vertical movement independent of frame 15, as by slotting the end of the link and causing it to ride upon a pin fixed to the frame, said pin serving both as a guide and a stop to limit the independent movement of the link and frame. The lower ends of the links 28 are similarly guided and the independent motion limited with reference to the fixed cross-bar 20, the latter being adjustably attached at the ends to the supporting-brackets 19 for determining and adjusting the point at which the jaws or fingers will be opened and closed. Each link is provided with a shoulder 29 for cooperating with shoulder 24 of its finger 5, and below shoulder 29 the side of the link is cut away or retracted to permit shoulder 24 to move laterally under shoulder 29 and thus tilt on its pivot in a direction to cause the upper ends of the fingers to separate and the jaw to open.

By reference to Fig. 12, which shows the frame 15 and the fingers carried thereby in their lowest position, it will be observed that the links 28 are at the limit of their downward movement in cross-bar 20, that frame 15 is at the limit of its downward movement with reference to said links, and that shoulders 24 on the fingers stand below the shoulders 29 on the links and opposite the recessed portion of the links. As a consequence the fingers stand open. If now frame 15 is elevated to the position illustrated in Figs. 11 and 13, bringing the extremities of the fingers on opposite sides of the passage

4 or with their pointed ends even with or slightly above the upper edge or face of the butt-supports, as in Fig. 16, the first effect of such movement will be to raise the links the full extent of their independent movement with reference to bar 20 or until the lower wall of the slot contacts with the pin, while the frame 15 will have been moved with reference to the upper ends of the links until shoulders 29 contact with shoulders 24 on the fingers. When this takes place, the frame 15 will have arrived near the upper extreme of its movement and the grasping ends of the fingers will have been brought opposite the passage 4, as represented in Fig. 15, in position to engage the stem located therein. The further final upward movement of frame 15 will carry the shoulders 24 above shoulders 29 on the links, the latter remaining stationary, thus tilting the fingers on their pivots and closing their upper ends upon the stem to firmly grasp the latter. As the frame 15 descends again the fingers will be maintained in closed position by reason of the engagement of the links with the shoulders on the fingers until during the continued downward movement the upper walls of the slots engage the pins in cross-bar 20 and the links are brought to a standstill and so held until the shoulders 24 on the fingers pass below the cooperating shoulders on the links, at which time the frame 15 will have completed its downward movement and the fingers will be opened by the spring to release the stem.

In order to effect the separation of contiguous stems and prevent obstruction to the lateral movement of the stems resting upon the butt-supports, the upper ends of the fingers are beveled or inclined, as shown. When the parts are duplicated to form a multiple machine, the links 28 may be interposed between adjacent fingers of contiguous pairs of jaws or fingers, so that each link may be made to operate upon two fingers. The vertical movements of the frame 15, carrying the fingers, are produced and controlled by lifting-cams 30, carried by a rotating shaft and arranged to engage suitable bars 31, attached to the ends of frame 15, with their lower ends or engaging portions lying in the paths of said cams, which latter operate to quickly raise and release frame 15. As arranged in the machine illustrated, the fingers are held normally retracted—that is, in their lowermost position and with their engaging ends or jaws open—such arrangement being specially adapted for use in connection with the translating devices about to be described.

*The carrying or translating devices.*—It is obvious that the selected leaf whose stem is grasped by the fingers could be withdrawn from the hopper while still in the grasp of the fingers and carried to a more or less remote point for delivery; but for the purposes of the complete machine described and illustrated herein this would require an unnecessary complication of machinery and would be ac-



accomplished at the expense of time, speed of  
 operation being a very desirable quality in a  
 machine of this kind. Hence it is preferred to  
 employ a separate mechanism, herein desig-  
 5 nated the "carrying" or "translating" de-  
 vices, to which the butt-end of the selected  
 stem is delivered by the fingers or jaws of the  
 feeding or selecting devices. The special  
 features of the translating devices are a pair  
 10 of jaws reciprocating horizontally or in the  
 direction in which the leaf is to be carried,  
 provided with actuating mechanism compe-  
 tent to place said jaws in position to receive  
 the stem carried by the feeding-fingers 5; to  
 15 automatically close said jaws and grasp the  
 stem; to maintain the jaws in closed position  
 while the leaf is being withdrawn from the  
 hopper and transported to the place of deliv-  
 ery, and to automatically open said jaws and  
 20 deliver the leaf. The details of the preferred  
 form of mechanism are shown in the draw-  
 ings, particularly in Figs. 6, 7, 18 to 25, and  
 32 to 36, inclusive. The side frames are each  
 provided with bearings 40 for the reception  
 25 of a pivotally-supported guide 41, whose guid-  
 ing portion is located to one side of or above  
 the plane of the pivots. The two guides oc-  
 cupy parallel planes and by virtue of their  
 pivotal arrangement are capable of swinging  
 30 in parallel arcs toward or from each other.  
 The guideway is formed by recessing the up-  
 per portion of the guides 41 and applying  
 thereto an L-shaped cap-plate 42, forming a  
 grooved way with an overhanging lip or ledge  
 35 43. Each guideway receives between the  
 floor of the recess and the edge of the lip or  
 ledge 43 of the cap a slide 44, the latter being  
 provided with a transverse mortise for the re-  
 ception of one end of a U-shaped guide-bar  
 40 45, spanning the interval between the two  
 swinging guides 41. Thus there is provided  
 a guide-bar 45, supported at the opposite ends  
 in pivoted guides, so that said guide-bar may  
 be reciprocated sidewise, while the pivoted  
 45 guides are free to oscillate in planes at right  
 angles to said guide-bar, for a purpose to be  
 described.

Upon or within the guide-bar 45 are mount-  
 ed, side by side, two longitudinally-recipro-  
 50 cating bars 46, each furnished with one or  
 more gripping-jaws 47, preferably furnished  
 with serrated or toothed gripping-faces to in-  
 crease the hold upon the stem or other article  
 introduced between them. One end of each  
 55 gripping-bar 46 is furnished with a head 48,  
 adapted to enter beneath the overhanging lip  
 or ledge 43 of one of the pivoted guides 41 in  
 such manner that when the two guides 41 are  
 oscillated in opposite directions and caused  
 60 to approach each other the bars 46 will be  
 forced in opposite directions and the jaws  
 closed by the pressure of the said swinging  
 guides against the ends of said bars, and when  
 the swinging guides are moved in the oppo-  
 65 site direction or away from each other the  
 bars 46 will be withdrawn and the jaws opened  
 by the engagement of the lip or ledge 43 with

the sides of the heads 48. These swinging  
 movements of the guides 41, while serving to  
 alternately open and close the gripping-jaws, 70  
 do not disturb the parallelism of the guides.  
 Hence the gripping-jaws, together with their  
 supporting-guide, are free to reciprocate lat-  
 erally of said supporting-guide and longitu-  
 75 dinally of the swinging guides, whether the  
 latter be at either extreme of their oscillation  
 or at any intermediate point. It follows,  
 therefore, that the gripping-jaws may be  
 closed or opened at any point while travers-  
 80 ing the swinging guides, that the opening and  
 closing of said jaws is controlled by the move-  
 ments of the swinging guides in which they  
 reciprocate, and that the movements of the  
 gripping-jaws are positive.

Inasmuch as the translating device is in 85  
 the present instance designed to receive the  
 stem as delivered by the feeder and transport  
 the leaf to the stemming mechanism, the  
 swinging guides 41 are so arranged relative to  
 the fingers 5 of the feeding mechanism that 90  
 when the latter are near the extreme of their  
 downward movements and the fingers are ac-  
 tuated to release the stem carried thereby the  
 gripping-jaws 47 of the translating device will  
 stand open in rear of the feeding-fingers in 95  
 position to receive the stem and engage the  
 latter, and after the gripping-jaws have firmly  
 grasped the stem they shall be moved hori-  
 zontally and rearwardly to draw the leaf from  
 the hopper and carry it to the stemming de- 100  
 vices or other point of delivery, where the  
 jaws will be opened to release the leaf and re-  
 turned again to position in rear of the feeder,  
 ready to receive the next stem delivered.  
 The requisite movements to effect these op- 105  
 erations are communicated and produced as  
 follows: The traverse of the gripping-jaws  
 toward and from the feeding devices is ef-  
 fected through the medium of a rock-shaft  
 49, provided with arms 50, which latter are 110  
 connected, as by links 51, to the slides 44, in  
 which the ends of the guide for the gripper-  
 bars are supported. The longitudinal move-  
 ments of the gripper-bars in their guide 45  
 are effected by cams 52, operating upon the 115  
 swinging guides 41. Each swinging guide 41  
 is provided with a detachable bearing 54, in  
 which is pivotally supported one end of a  
 shaft 55, bearing two rollers or pins 56, be-  
 120 tween which latter the cam 52 is received and  
 operates. The two shafts 55 are connected  
 at their inner ends by a telescopic or equiv-  
 alent joint, Fig. 24, permitting longitudinal  
 movement of the two shaft-sections in oppo-  
 125 site directions and tending to preserve par-  
 allelism between said shafts and the guide  
 45. The cams 52 are of a form suitable to pro-  
 duce a complete reciprocation of the swing-  
 ing guides at each revolution of said cams  
 and to hold them at each extreme of their os-  
 130 cillatory movement during approximately  
 a half-revolution of the cams, so that the  
 gripping-jaws will close and remain closed  
 during their movement from the feeding de-



vices to the point of delivery to the stemming mechanism and remain open during the return movement.

*The stemming mechanism.*—Next in sequence comes the stemming mechanism, by means of which the stem is separated and detached from the leaf portion. The principal elements are the leaf carrying and clamping devices engaging the leaf portion on opposite sides of the stem, a reciprocating plunger or pusher engaging the stem between the leaf clamping and carrying devices, and a rotating cylinder provided with flexible teeth, into or upon which the stem is thrust by the plunger as it is disengaged from the leaf portion. To the foregoing may be added a fixed cutter or divider for severing portions of leaf overlying the stem. The leaf carrying and clamping devices comprise in this instance two pairs of endless belts, preferably metallic, suitably guided, so that the belts of each pair shall be properly spaced to accommodate the stem lying longitudinally in the intervals between them, and the belts of one pair or set shall approach, travel a short distance with, and then diverge from the belts of the opposing set or pair, thus providing for the entrance of the leaf between opposing pairs of belts or traveling surfaces, the clamping of the leaf portion on opposite sides of the stem, and the presentation of the stem to the plunger. In the present instance the belts 60 of the lower set or pair extend around a smooth-faced driving-roller 61, independent collared rollers 62, and independent grooved pulleys 63, the latter being mounted in pivoted supports 64, acted upon by compression-springs 65 to maintain the proper degree of tension on the belts. In passing from the tension-pulleys 63 to the driving-roll 61 each belt 60 is conducted beneath and travels part way around a hollow support or rings 66, the latter being provided with a groove near one end of its periphery. The belts 67 of the upper set or pair partially encircle the rings 66, being secured in the grooves, and run thence to independent grooved pulleys 68, supported upon a shaft above the driving-roll of the lower belts. The grooved rings 66 are supported upon rollers 69, supported in triangular relation and each provided with a spacing-flange 69<sup>x</sup>, entering between said rings and serving to space and maintain them at the requisite distance apart. The rings, together with the upper set or pair of belts, are driven through the lower set of belts, although, if desired, power might be applied to one or more of the supporting-rollers 69 or to the rings as an aid in driving the upper belts. The rings being maintained at the proper distance apart, the position of the grooves in which the two pair of belts travel determines the space between the belts of each pair at the point where the belts of opposite pairs come together, and as the tension-pulleys 63 have their grooves at a somewhat greater distance apart than the grooves

in rings 66 it follows that the lower set or pair of belts 60 travel on slightly-converging lines from the tension-pulleys to the rings.

Within the rings 66, with its axis substantially parallel with the axis of said rings and near the inner periphery of the latter, is a rotating-cylinder 70, upon whose peripheries opposite the space between said rings is mounted a series of spring-teeth 71 for the reception and retention of the stems, and the latter are thrust through the space between the rings. The shaft of the cylinder 70 is mounted in bearings on the side frames, and the flexible teeth 71 may be attached to bars and secured to the cylinder by collars or otherwise, or a section of carding-cloth 73 may be employed for the purpose, (see Fig. 30,) the object being to provide a rotating cylinder with flexible teeth upon or between which the stems may be thrust and by their engagement with said teeth may be drawn and carried within the rings or away from the leaf portion clamped between the belts on the periphery of said rings. As an aid in effecting the separation of such portions of the leaf as may overlie the stem a curved knife 75, Figs. 27, 6, and 7, may advantageously be employed in connection with the spring-toothed roller, said knife being supported with the rings with its lower curved cutting portion lying between the pins and its cutting edge standing in substantially the plane of the points of said teeth.

The plunger 80 for operating upon the stem to force it laterally between the rings and upon or between the pins or blades of the cylinder 70 is preferably provided with two arms, (see Fig. 29,) the one shorter than the other and having a slight concavity in the end. A rapid reciprocating motion is communicated to the plunger, and it is so arranged relative to the belts, rings, and toothed cylinder that its two arms will pass between the belts and rings, forcing the stem laterally and tearing or breaking it loose from the leaf, which latter is firmly held between the belts on opposite sides of the stem, and forcing the stem below the surface of the toothed cylinder, so that it will become engaged and held thereby. The best results are obtained when the front or shorter arm of the plunger is arranged substantially in line with and radial to the axis of the toothed cylinder, with the longer arm in the rear, said longer arm merely supplementing the action of the shorter arm to insure the delivery of the stem to the toothed cylinder. The groove or recess in the shorter arm aids in centering the stem and preventing the arm from passing to one side of it. A convenient actuating mechanism for producing the rapid reciprocation of the plunger is formed by mounting the lower end upon a crank 82, secured to a rotating shaft 83, and causing the furcated portion to straddle a shaft or pin 84.

The multiple machine illustrated is pro-



vided with duplicate plungers, pairs of belts, rings, cutters, and toothed cylinders, as clearly appears in the drawings.

It will be evident that if a leaf of tobacco is introduced between the belts, with the stem lying in the space provided therefor, the leaf portion lying on opposite sides of the stem will be firmly clamped and the leaf, as a whole, will be carried forward around the rings. As the leaf is advanced with the stem lying opposite the space between adjacent rings the rapidly-reciprocating plunger will operate progressively to force the stem laterally and tear it from the leaf portion, which operation is materially aided by the toothed cylinder, upon which the stem is caused to adhere by being driven upon or between the teeth, so that the stem will be carried or drawn away upon said cylinder.

It not infrequently happens that the leaf portion is more or less wrapped around or folded over the stem, and when this occurs the knife assists in splitting the overlying leaf portion, so as not to interfere with the withdrawal of the stem.

In adapting this stemming mechanism for use in connection with the translating devices hereinbefore described, so that the latter will automatically deliver the leaves carried in the jaws in proper position between the belts, the following additions and arrangements of parts have all been devised: The lower belts 60 are arranged to pass beneath the hopper, the belts of each pair or set extending on opposite sides of the passage 4 in the feeder and at such distance apart as to admit the fingers 5 between them. The gripping-jaws of the translating device are arranged immediately below the belts 60, so that as the fingers descend with the butt-end of the leaf-stem between them they will draw the butt between the belts and deposit it in the jaws of the translating devices. As the gripping-jaws advance and draw the leaf from the hopper the leaf portion will be deposited upon and sustained by the belts while the butt-end of the stem is clamped below the belts. The forward movement of the translating device is arrested just in front of the plunger, (see Fig. 7,) at which point the leaf enters between and is grasped by the belts, the jaws open to release the stem, and the plunger is brought into action to force the butt-end of the stem upon the toothed cylinder within the rings.

In order to avoid the necessity for stopping and starting the plunger each time a leaf is introduced by the translating device, (it being desirable that the plunger should stand in position to engage the butt of the stem when released by the gripping-jaws, to which end the plunger should at the time be below the gripping-jaws,) the plunger is maintained continuously in motion, and, together with its actuating devices, is arranged to reciprocate vertically, so that at the time the leaf is delivered the operating end of the plunger shall be below the gripping-jaws, (see Fig. 7,) and

as soon as the said jaws open and the leaf is delivered between the belts the plunger shall be elevated and sustained in operative relation to the belts and rings while the leaf is passing through the stemming mechanism and the stem removed from the leaf portion. (See Fig. 6.) A mechanism competent to perform this operation is illustrated in the drawings. The crank-shaft and guiding pin or shaft are supported at their opposite ends in slides 85, guided to move vertically on the main frame. (See Fig. 28.) Mounted in bearings on the main frame is a shaft 86, carrying two crank-arms 87 and levers 88, one for each end of the plunger-frame, and to each of said crank-arms is adjustably connected one end of a link 89, the opposite end of said link being pivotally attached to one of the slides 85. The levers 88 carry rollers in engagement with cams 90, by means of which the rock-shaft 86 is oscillated at the proper times to elevate the plunger and hold it up while the stemming operation goes on and to allow the plunger to descend when the next leaf is delivered by the translating devices. The leaf portion, after the removal of the stem, is carried forward on the belts and delivered over the roller 61, those adhering to the belts being removed by a brush 95.

*The stem clearing or cleaning mechanism.*—When the stem is torn from the leaf portion by the action of the plunger, there is a liability that small portions of the leaf will remain attached to and be carried off with the stem, and as these fragments are of value it is desirable that they should be separated and removed from the stem portion, and to accomplish this automatically and expeditiously a stem clearing or cleaning attachment has been arranged within the rings in position to engage the stems as they are carried around by the toothed cylinder. This attachment is in the form of two rotating brushes 91, arranged in juxtaposition to each other and to the teeth of cylinder 70. These brushes are driven at a high rate of speed, much faster than the toothed cylinder 70, by which the stem is carried, and they operate to remove the end of the stem from said cylinder 70 and carry it between said brushes, and by virtue of the fact that they move faster than the stem is delivered they serve to brush loose the leaf fragments and discharge the latter, together with the cleaned stems, within a receptacle or chute formed by shield 93, Figs. 6 and 7. Besides clearing the stems from adhering fragments of leaf the brushes assist in drawing the stem from the leaf portions, an operation primarily performed by the plunger and toothed cylinder.

*The driving mechanism.*—To complete the organization, it is only necessary that the several mechanisms described should be connected up so that the parts will operate together in the proper sequence. Such an arrangement of connecting-gearing has been devised and is illustrated in the drawings.



Shaft 100, provided with fast and loose pulleys, is the prime mover from which all the parts derive their motions. Driving-roller 61, controlling the belt system of the stemming mechanism, is driven by a gear-wheel 101, meshing with a pinion 102 on shaft 100. Cam 11 of the hopper-reciprocating mechanism is attached to a shaft 103, deriving its motion from the shaft of roller 61 through an intermediate chain of gears 104. Cams 30, for reciprocating the fingers of the feeding mechanisms, cams 52, for closing and opening the jaws of the translating devices, and cams 90, controlling the vertical adjustment of the plunger forming part of the stemming mechanism, are all mounted upon a shaft 105, receiving motion from the gear on the shaft of roller 61 through intermediate gears 106 and 107, bevel-gears 108, counter-shaft 109, and bevel-gears 110. The reciprocating movements of the translating devices are produced by a cam 111 on counter-shaft 109, said cam 111 engaging a pin on slide 112, which is connected by a link 113 with one of the arms 50, secured to rock-shaft 49. The toothed cylinder 70 of the stemming mechanism receives motion from gear 106 and pinions 114 and 115, the last-named pinion being secured to one end of the shaft of said cylinder. Brushes 95 and 91, the former for clearing the belts of the stemming mechanism and the latter for clearing the stems as they are removed, are belted to pulleys on a counter-shaft 116, the latter deriving motion from shaft 100 through belt 117. Brush 95 is belted directly to its driving-pulley 118 on counter-shaft 116, while belt 119 for driving brushes 91 is conducted over adjustable guiding-pulleys 120, Figs. 6 and 7. The crank 82 on shaft 83, to which the plunger is attached, is driven from counter-shaft 116 through the medium of a belt 121, and in order to accommodate the vertical movements of said crank the belt 121 is conducted around guiding-pulleys 122, mounted upon a pivoted support 123 and held in working position by a spring 124.

Operation: Without undertaking to explain the operations of the various parts going to make up the several subcombinations or individual mechanisms which have already been described in detail, the general operation of the machine may be briefly summarized as follows: A quantity of tobacco-leaves are placed in the hopper, with the butt-ends of the stems resting upon the butt-supports. The machine having been started, the hopper or support for the leaves is moved laterally, causing the stems to enter the passages between the butt-supports. The fingers are elevated and closed upon the stem lying in said passage, and by the descent of said fingers the stem is drawn down between the belts and deposited between the jaws of the translating device. Said jaws close upon the stem and move rearwardly, drawing the leaf by its stem from the hopper and straighten-

ing it out by contact with the superposed leaves remaining in the hopper. The jaws open when the leaf enters between the belts in contact with the rings, and the reciprocating plungers are elevated and operate to force the butt-end of the stem between the belts and rings onto the rotating toothed cylinder. As the leaf is carried forward the belts clasping the leaf portions on opposite sides of the stem and the latter lying opposite the space between the belts and rings the rapidly-reciprocating plunger engages the stem and forces it from the leaf portion, pressing the stem upon or between the teeth of the rotating cylinder. The stem being thus separated and withdrawn from the leaf portion it is delivered between the rapidly-revolving brushes and the fragments of leaf removed. In the meantime the separated leaf portion is carried by the belts and delivered at the rear of the machine. After the jaws of the translating device are opened to deliver a leaf to the stemming devices they remain open during the return movement and until the stem of another leaf is inserted by the fingers.

Having thus described my invention, what I claim as new is—

1. In a stemming-machine, the combination of the following elements, to wit, a leaf feeding or selecting device provided with grasping-fingers operated to positively engage the leaf; and a translating device to which the leaf is delivered by said leaf feeding or selecting device; substantially as described.

2. In a stemming-machine, the combination of the following elements, to wit, a leaf feeding or selecting device provided with fingers for positively grasping one stem at a time; a translating device to which the leaf is delivered by the fingers of the selecting or feeding device; and a stemming mechanism to which the leaf is delivered by the translating device; substantially as described.

3. In a stemming-machine, the combination of the following elements, to wit; a leaf feeding or selecting device provided with a leaf-support, butt-support, stem-passage and reciprocating fingers operating to positively grasp a stem lying in said passage; a translating device; and a stemming mechanism; substantially as described.

4. In a stemming-machine, the combination of the following elements, to wit, a leaf feeding or selecting device provided with means for positively grasping the lowermost of a pile of leaves; and a translating device receiving the stem from the feeding or selecting device and drawing the leaf thereby from beneath the superimposed leaves; substantially as described.

5. In a leaf feeding or selecting device the combination of the following elements, to wit; a laterally-movable support for the leaves, a stationary butt-support with stem-passage and gripping-fingers movable with relation to the butt-support to grasp a stem lying in the said stem-passage; substantially as described.



6. In a leaf feeding or selecting device the combination of the following elements, to wit, a laterally-movable hopper or leaf-support; a butt-support with stem-passage; and grasping-fingers movable with relation to the stem-passage and provided with a gage for determining the position of the stem; substantially as described.

7. In a leaf feeding or selecting device the combination substantially as described of the following elements, to wit; a hopper provided with an opening for the withdrawal of the leaves; mechanism for intermittently moving the hopper laterally; stationary butt-supports contiguous to a stem-passage; reciprocating fingers; and mechanism for alternately opening and closing said fingers and reciprocating the latter.

8. In a leaf feeding or selecting device, the combination substantially as described of the following elements, to wit; a pair of belts; a hopper above said belts and provided with an opening adjacent the belts; butt-supports with stem-passage, and reciprocating fingers passing between the belts to engage a stem.

9. In a leaf feeding or selecting device, the combination substantially as described of the following elements, to wit; a laterally-reciprocating hopper or leaf-support; a series of butt-supports with intermediate stem-passages; and a series of pairs of grasping-fingers, each pair of the latter movable with reference to one of the stem-passages to grasp and withdraw a stem therefrom.

10. In a translating device for transferring leaves one at a time the combination, substantially as described, of the following elements, to wit; laterally-reciprocating frames provided with guides; a guide or way mounted to reciprocate laterally in said guides on the frames; and grasping-jaws mounted on said guide or way and operated by the movement of the laterally-reciprocating frames.

11. In a leaf-translating device the combination substantially as described of the following elements, to wit; a pair of frames provided with parallel guides and movable laterally to increase or diminish the interval between them; a frame or guide bar mounted to reciprocate longitudinally of said first-mentioned frames; and gripping-jaws supported on said reciprocating frame or guide, said gripping-jaws being moved longitudinally of the supporting frame or bar by the movement of the first-mentioned frames.

12. In a translating device for tobacco-leaves the combination substantially as described of the following elements, to wit; a laterally-reciprocating bar or guide; gripping-jaws reciprocating longitudinally of said bar or frame; and two pivoted frames each provided with a guide or way for supporting one end of the first-mentioned bar or way, and engaging the gripper-bars to open and close the jaws.

13. In a leaf feeding and translating mechanism the combination substantially as de-

scribed, of the following elements, to wit: stem selecting and carrying fingers; and reciprocating gripping-jaws to which the stems are delivered by the fingers.

14. In a leaf feeding and translating mechanism, the combination substantially as described of the following elements, to wit; a leaf feeding or selecting mechanism provided with leaf-support, butt-supports and reciprocating stem-grasping fingers, and a translating device provided with gripping-jaws between which the stem is deposited by the fingers, said gripping-jaws reciprocating in a plane transverse to the fingers, and operating to engage the stem and draw the leaf from the leaf-support and carry it to a remote point and then release it.

15. The combination substantially as described of the following elements, to wit: a pair of traveling belts; a leaf feeding or selecting device provided with stem-engaging fingers reciprocating between said belts; and a translating mechanism reciprocating below the plane of the belts and provided with gripping-jaws to receive and hold the stem delivered by the fingers, to advance the leaf while supported above the belts.

16. In a translating device for tobacco-leaves, the combination substantially as described of the following elements, to wit: two laterally-reciprocating frames provided with parallel guides or ways, a laterally-reciprocating guide-bar supported at its ends in said first-mentioned frames; gripper-bars provided with jaws mounted to reciprocate longitudinally of said guide-bar; and bearings on said gripper-bars engaging said first-mentioned laterally-reciprocating frames; whereby the gripping-jaws are adapted to be reciprocated bodily upon and opened or closed by the lateral movement of their reciprocating supporting-frames.

17. In a tobacco-stemming machine, the combination substantially as described, of the following elements, to wit: a leaf feeding or selecting mechanism provided with a leaf-support, butt-supports with stem-passage, and reciprocating stem-grasping fingers; a translating device receiving and grasping the stem delivered by said fingers, the same comprising a pair of jaws mounted upon a laterally-reciprocating support; and a stemming mechanism to which the leaf is delivered by the translating devices.

18. In a tobacco-stemming mechanism, the combination of the following elements, to wit, a leaf clamping and carrying device engaging the leaf portion on opposite sides of the stem; a reciprocating plunger engaging the stem to force it laterally from the clamped leaf portion; and a revolving toothed cylinder for receiving the stem as it is deflected by the plunger.

19. In a stemming mechanism, the combination of the following elements, to wit: clamping and carrying devices engaging the leaf on opposite sides of the stem; a plunger re-



5 ciproating in the interval between the clamp-  
ing and carrying devices; and a rotating  
toothed cylinder opposite the plunger for re-  
ceiving the stem as detached from the leaf

20. In a stemming mechanism the combina-  
tion of the following elements, to wit: clamp-  
ing devices engaging the leaf portion on oppo-  
site sides of the stem; a plunger reciprocating  
10 between said clamping devices; a leaf-cutter  
opposite the plunger, and a rotating toothed  
stem-carrier.

21. In a stemming mechanism, the combi-  
nation of the following elements, to wit: a  
15 leaf clamping and carrying device composed  
of two sets or pairs of endless belts with an  
interval between the belts of each pair for  
the accommodation of the stem; a reciprocating  
plunger operating transversely of the  
20 belts in the said intervening space; and a  
toothed cylinder rotating in proximity to the  
belts opposite the plunger.

22. In a stemming mechanism, the combi-  
nation substantially as described of the fol-  
25 lowing elements, to wit: leaf clamping and  
carrying devices engaging the leaf portion on  
opposite sides of the stem; a translating de-  
vice delivering the leaves, one at a time, to  
said clamping and carrying devices; a recip-  
30 rocating plunger operating in conjunction  
with the leaf clamping and carrying devices  
to remove the stem from the leaf held there-  
by; and mechanism for moving the plunger  
into and out of operative relation with the  
35 leaf-clamping devices.

23. In a stemming mechanism the combi-  
nation substantially as described, of the fol-  
lowing elements, to wit: leaf clamping and  
carrying mechanism including two pairs of  
40 endless belts and two supporting-rings; a reciprocating  
plunger operating between the  
belts and rings; and a rotating cylinder pro-  
vided with flexible teeth located opposite the  
plunger.

45 24. In a stemming mechanism, the combi-  
nation, substantially as described, of the fol-  
lowing elements, to wit: leaf clamping and  
carrying mechanism including two sets of  
endless belts working in conjunction with two  
50 rings; a reciprocating plunger supported  
upon a frame movable toward and from said  
leaf clamping and carrying devices; and a  
toothed cylinder located within the belt-sup-  
porting rings opposite the plunger.

55 25. In a stemming mechanism, the combi-  
nation, substantially as described of the fol-  
lowing elements, to wit, leaf clamping and  
carrying devices engaging the leaf on opposite  
sides of the stem; a plunger reciprocating  
60 transversely of the leaf-clamping devices; a  
toothed stem-receiving cylinder opposite the  
plunger; and stem-clearing devices adjacent  
said toothed cylinder for receiving and act-  
ing upon the stems as delivered by said cyl-  
65 inder.

26. In a stemming-machine, the combina-  
tion of the following elements, to wit: leaf

feeding or selecting devices; a stemming  
mechanism provided with leaf clamping and  
carrying devices, a reciprocating plunger, and 70  
a cylinder with flexible teeth to receive the  
stem as it is removed by the plunger; and a  
translating device intermediate the leaf feed-  
ing or selecting devices and the leaf clamping  
and carrying devices of the stemming mech- 75  
anism.

27. In a stemming-machine the combina-  
tion substantially as described of the follow-  
ing elements, to wit: a translating device  
provided with gripping-jaws reciprocating in 80  
a horizontal plane; a stemming mechanism  
provided with leaf clamping and carrying de-  
vices and a cooperating plunger, said trans-  
lating device delivering the leaf to the clamp-  
ing and carrying devices of the stemming 85  
mechanism in proximity to the plunger; and  
mechanism for reciprocating the plunger and  
for moving it alternately above and below  
the plane of the gripping-jaws.

28. In a stemming mechanism, the combi- 90  
nation of the following elements, to wit: a  
plunger and its actuating and guiding de-  
vices mounted upon a movable frame; and  
mechanism for moving said frame to shift the  
plunger. 95

29. In a stemming-machine, as a means for  
clamping and carrying the leaves, the combi-  
nation substantially as described, of the fol-  
lowing elements, to wit; two rings supported  
to rotate side by side in substantially parallel 100  
planes with an interval between their prox-  
imate ends; a belt partially surrounding each  
ring; and a second pair of belts properly sup-  
ported and held in contact with the first-men-  
tioned belts, the leaf being introduced and 105  
clamped between the two pairs of belts to pre-  
sent the stem opposite the space between the  
rings.

30. In a stemming mechanism the combi- 110  
nation substantially as described of the fol-  
lowing elements, to wit; a revolving cylinder  
provided with flexible teeth for the reception  
and carrying of stems; and a rapidly-revolv-  
ing brush cooperating with a supporting-sur-  
face arranged in proximity to the toothed cyl- 115  
inder and operating to remove the leaf frag-  
ments from the stems.

31. In a stem-cleaning mechanism, the com-  
bination substantially as described, of the  
following elements, to wit: a revolving cylinder 120  
bearing flexible teeth for the reception  
and carrying of stems; and a pair of rapidly-  
revolving brushes located in proximity to said  
toothed cylinder and receiving the stems car-  
ried thereby. 125

32. The combination to form an automat-  
ically-operating stemming-machine, such as  
described, of the following elements, to wit:  
a leaf feeding or selecting mechanism pro-  
vided with fingers for positively grasping the 130  
stem; a reciprocating translating device pro-  
vided with jaws between which the stem is  
delivered by the fingers; a stemming mech-  
anism provided with carrying-belts to which



the leaf is delivered by the translating devices, supporting-rings, a reciprocating plunger, and a toothed cylinder; stem-cleaning mechanism to which the stem is delivered by  
5 the toothed cylinder; and actuating mechanism connecting and driving said parts.

33. In a stemming-machine, the combination substantially as described of the following elements, to wit, a pair of peripherally-

supported rings arranged side by side in different planes; belts cooperating with the said rings and serving to clamp and carry the leaf; and stem-removing devices operating in the interval or space between the rings and belts.

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Witnesses:

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