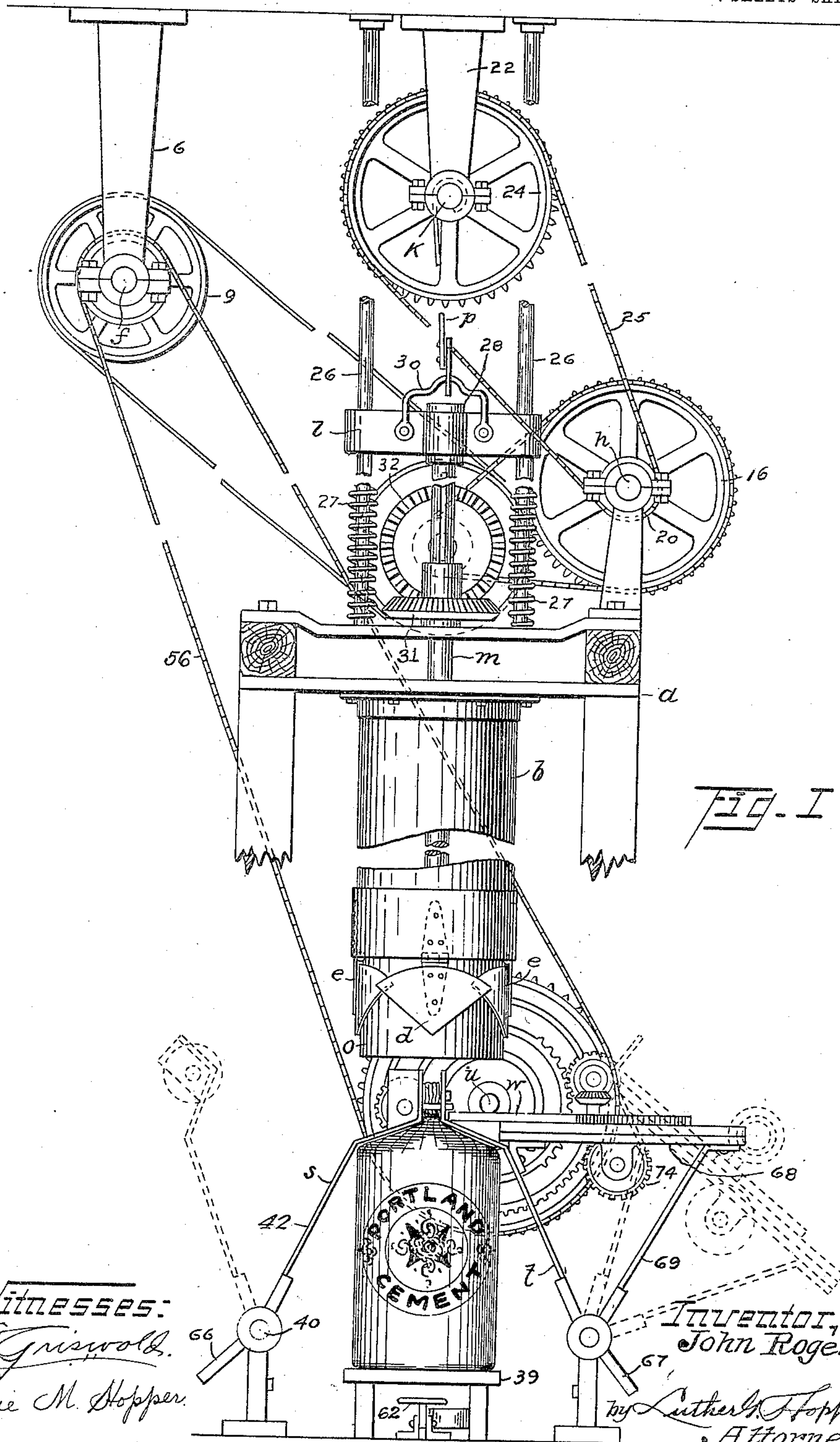


J. ROGERS.
BAG FILLING AND TYING MACHINE.
APPLICATION FILED JUNE 20, 1907.

899,764.

Patented Sept. 29, 1908.

7 SHEETS—SHEET 1.



Witnesses:

H. Griswold.

Elsie M. Hopper.

Inventor,
John Rogers,

by *Luther M. Hopper,*
Attorney.

J. ROGERS.

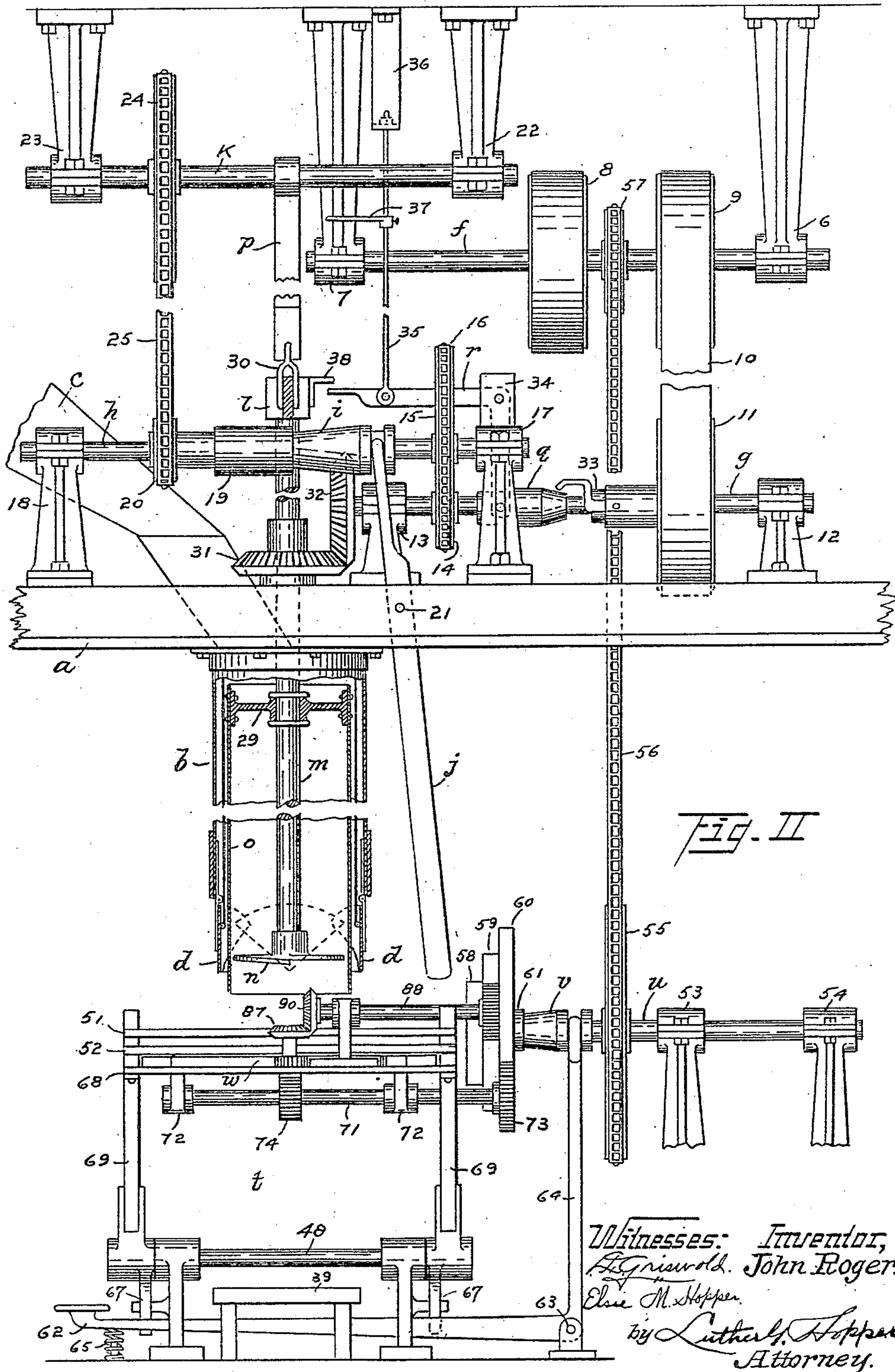
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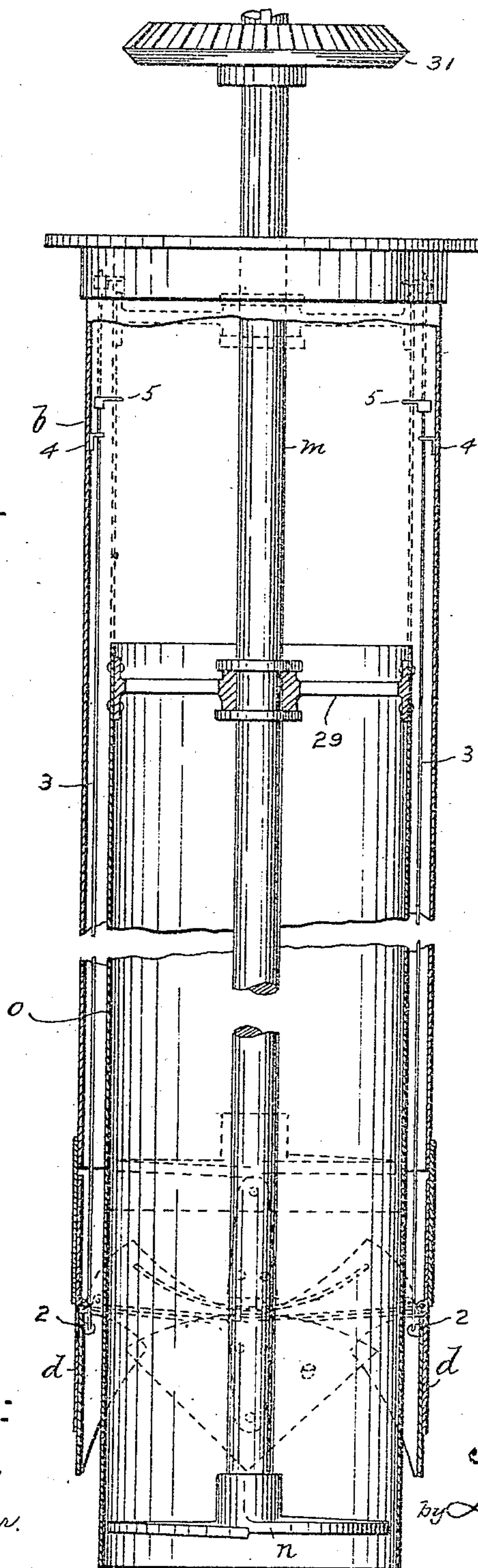
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7 SHEETS—SHEET 3.

Fig. III



Witnesses:
L. F. Griswold
Elsie M. Hopper.

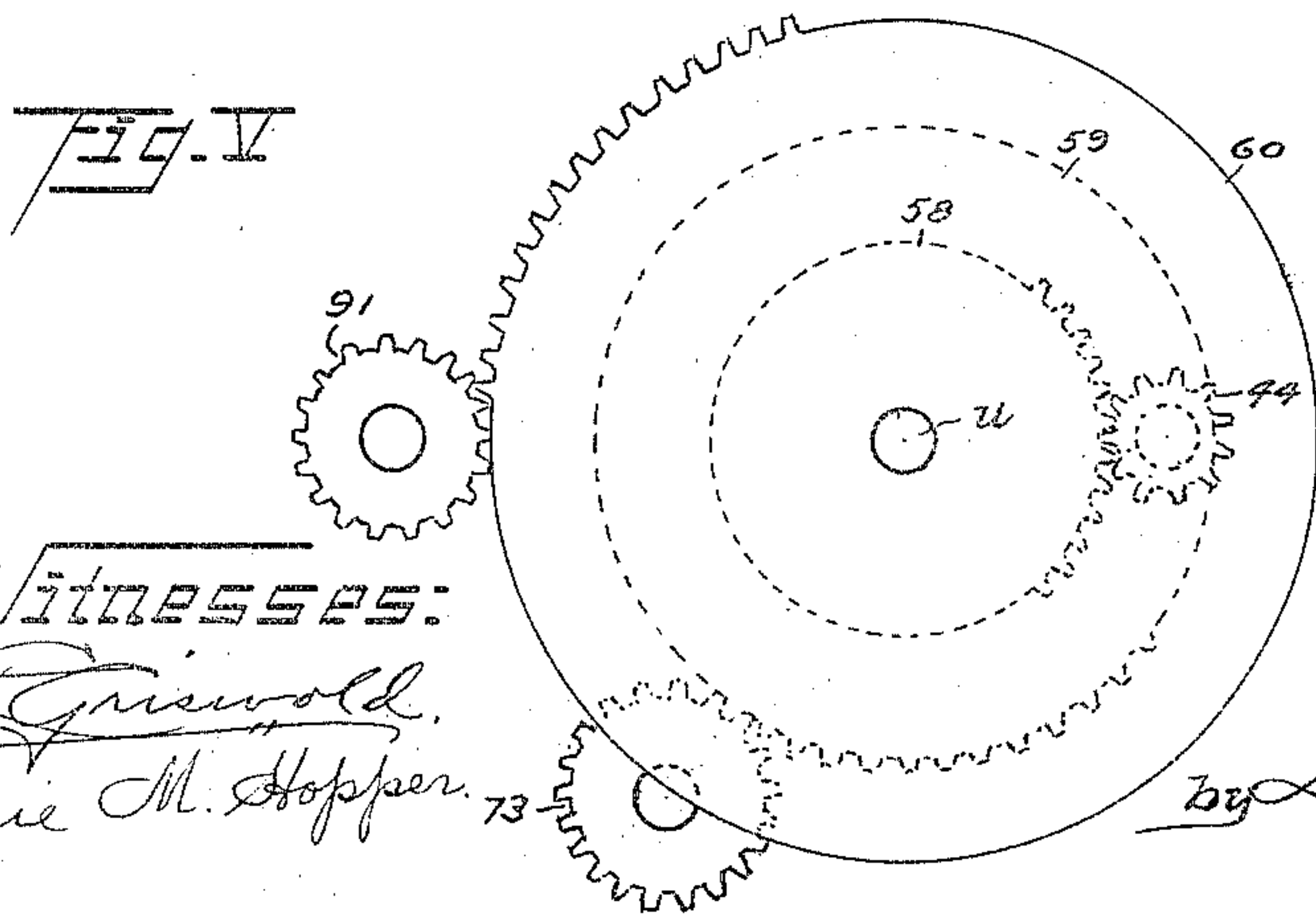
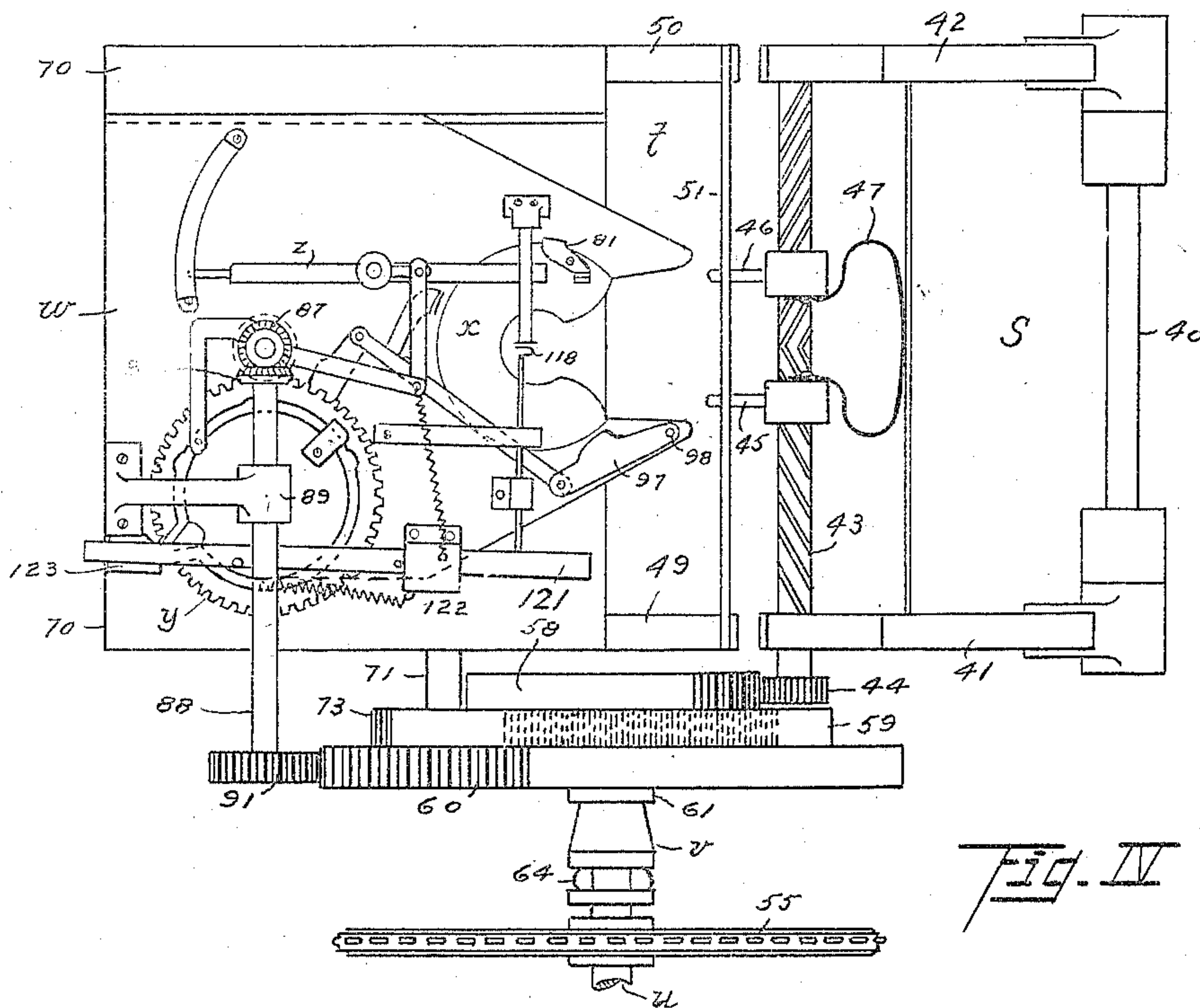
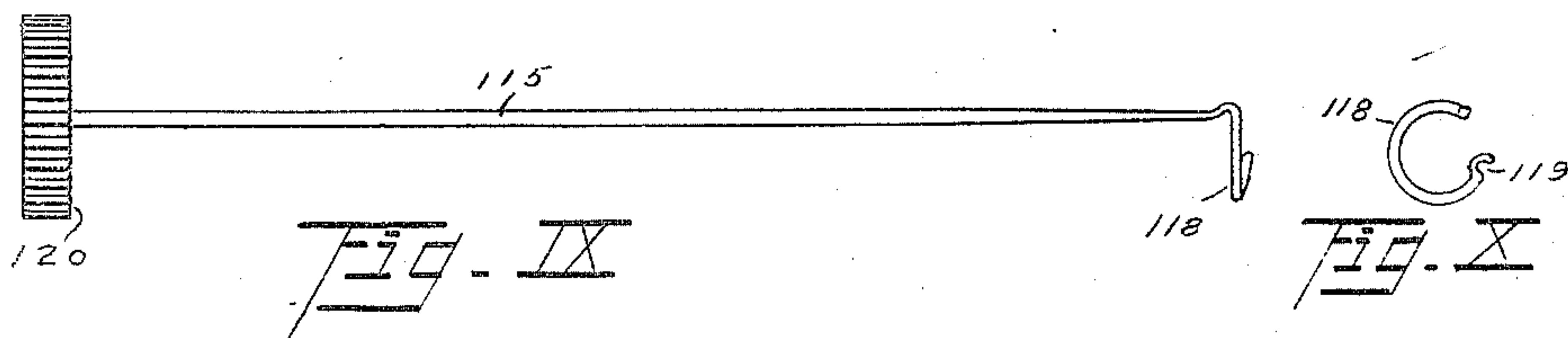
Inventor,
John Rogers,
by Luther G. Hopper,
Attorney.

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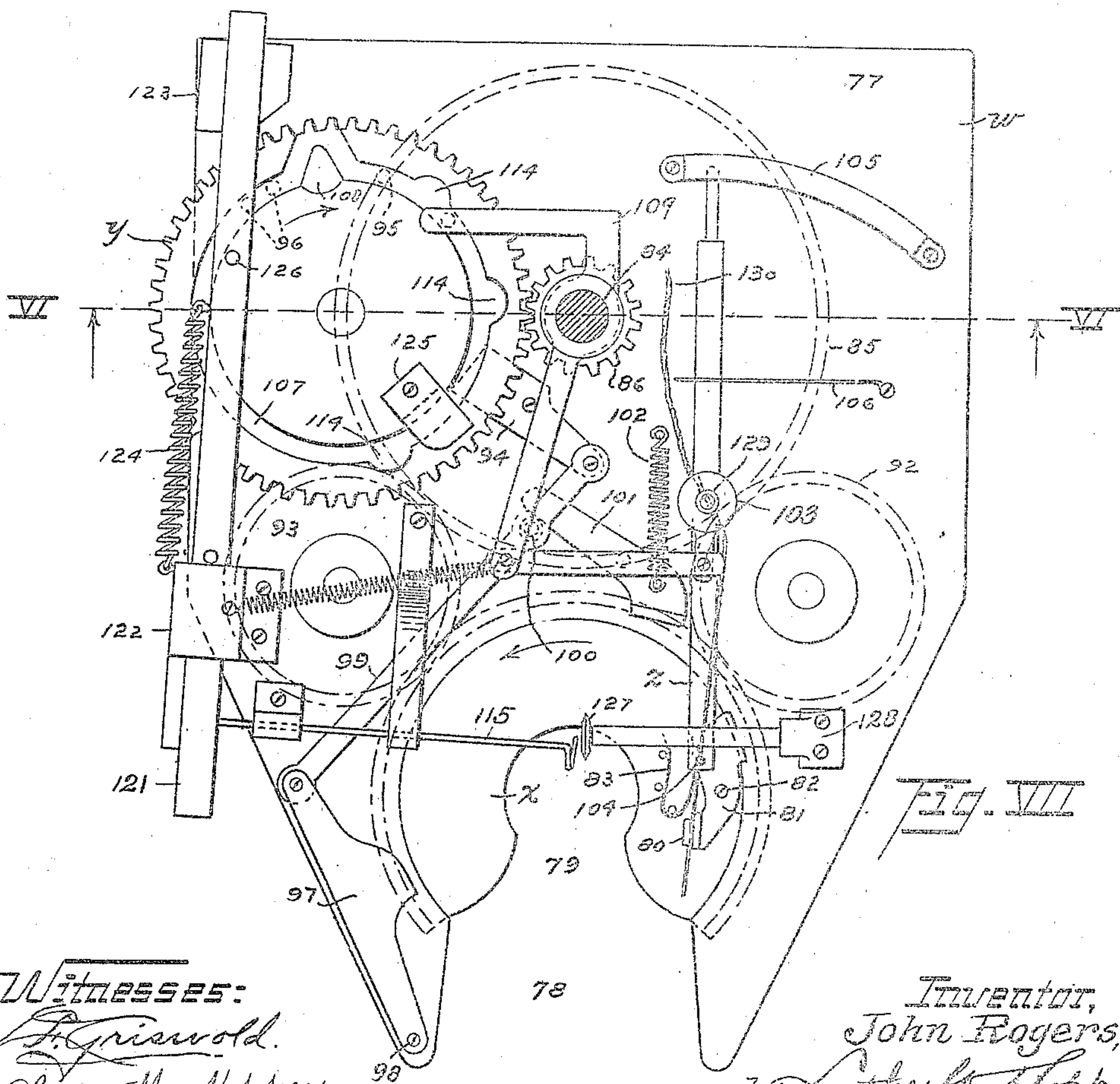
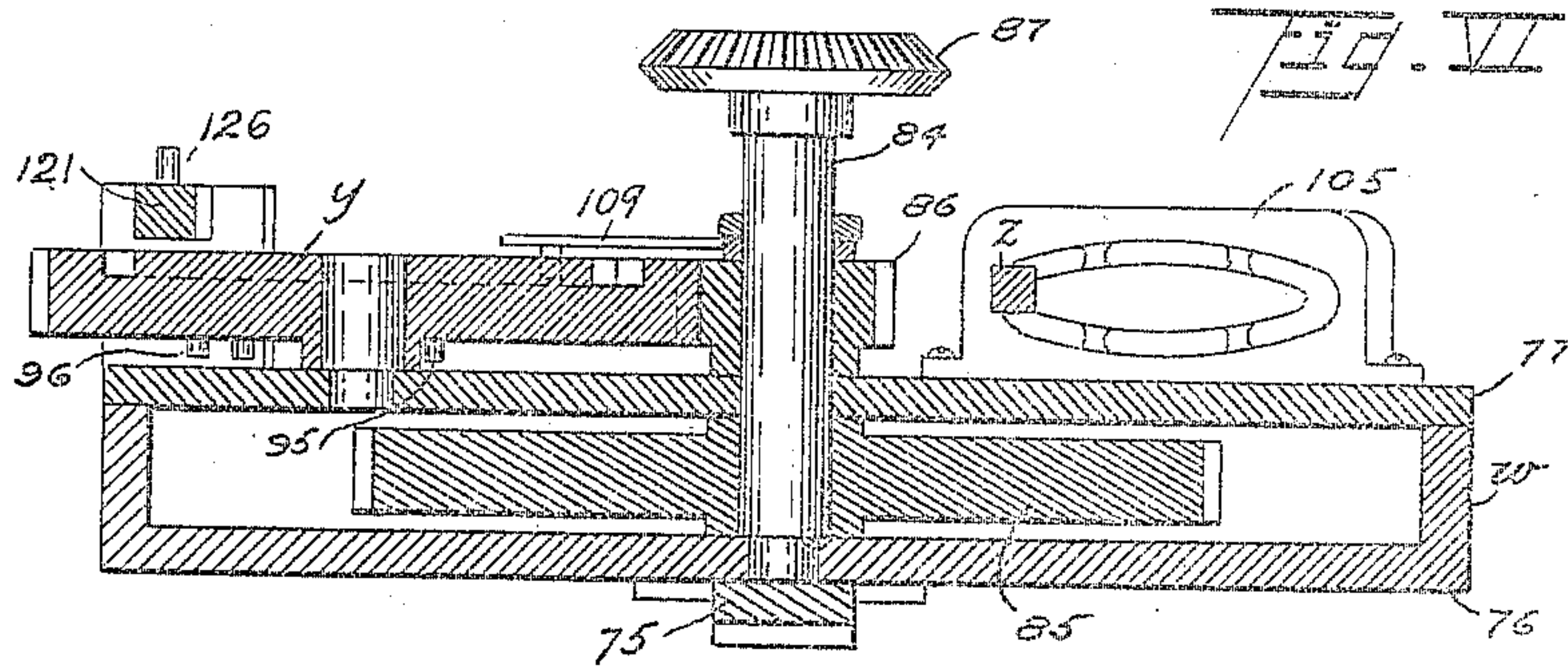
Witnesses:
L. Griswold.
Elsie M. Hopper.

Inventor,
John Rogers,
by *Luther G. Hopper,*
Attorney.

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7 SHEETS—SHEET 5.



Witnesses:
L. Griswold.
Elsie M. Hopper.

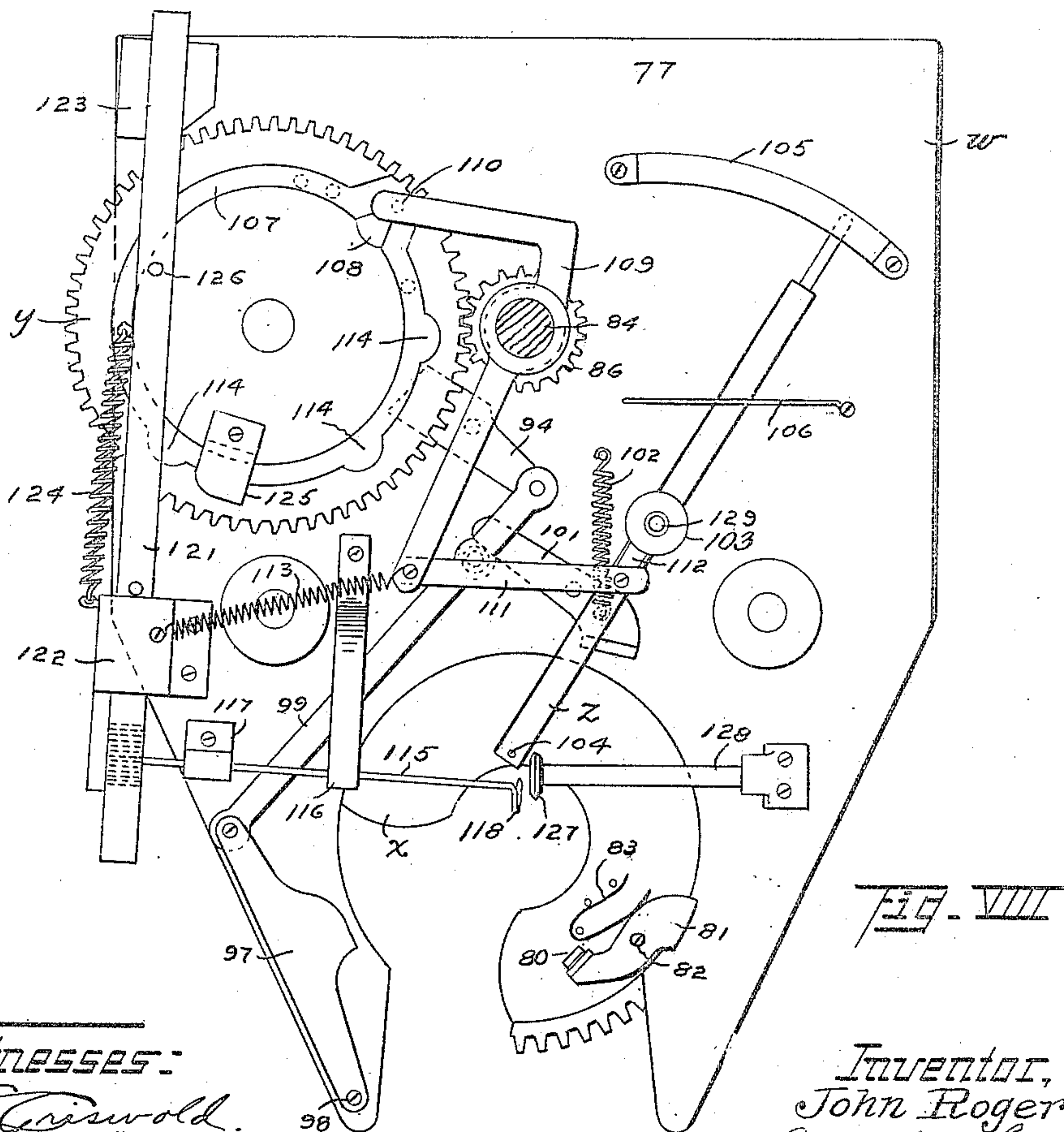
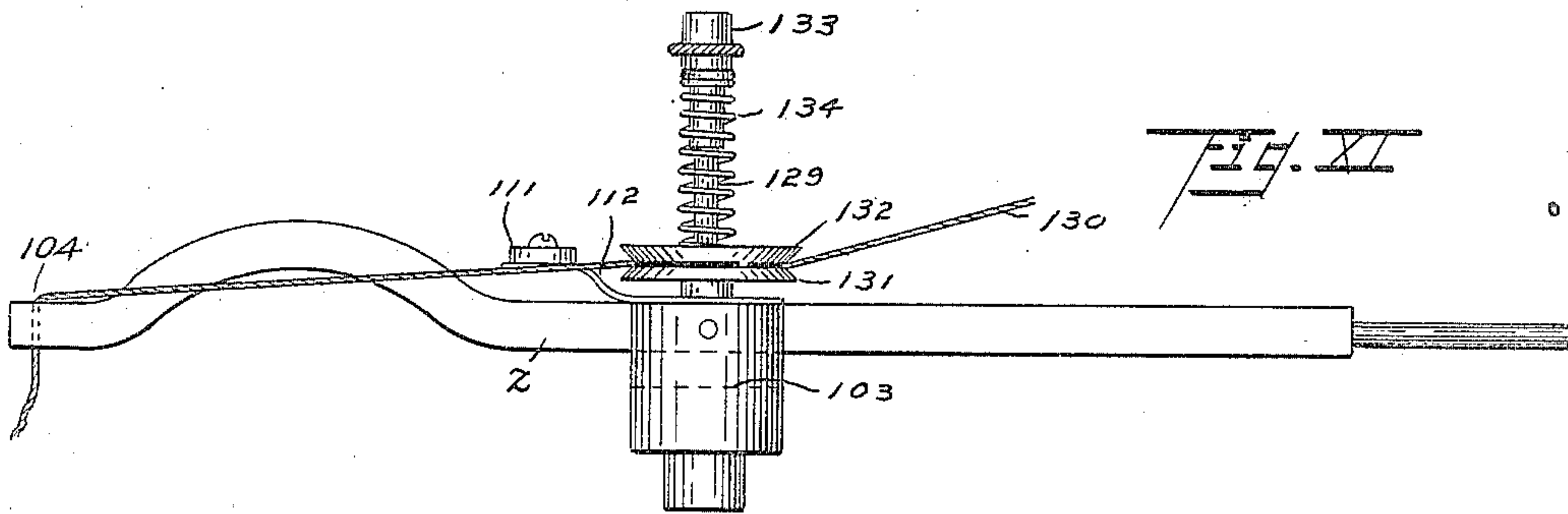
Inventor,
John Rogers,
by *Luther L. Hopper,*
Attorney.

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7 SHEETS—SHEET 6.



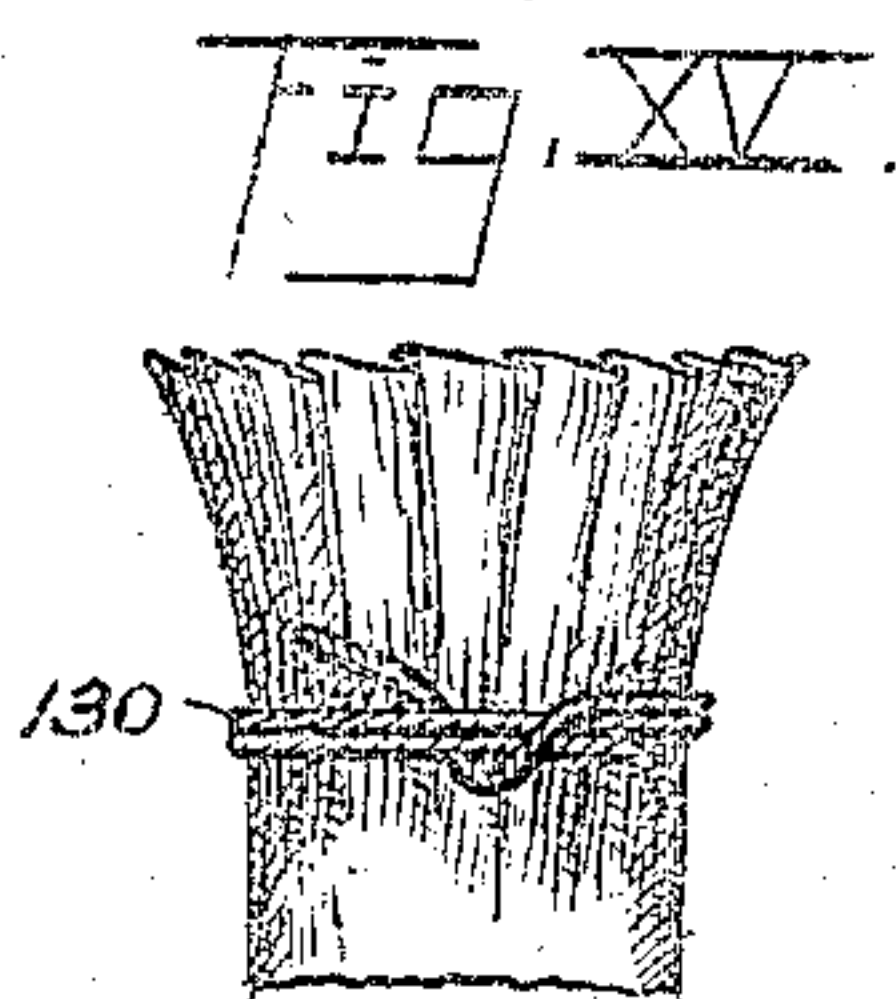
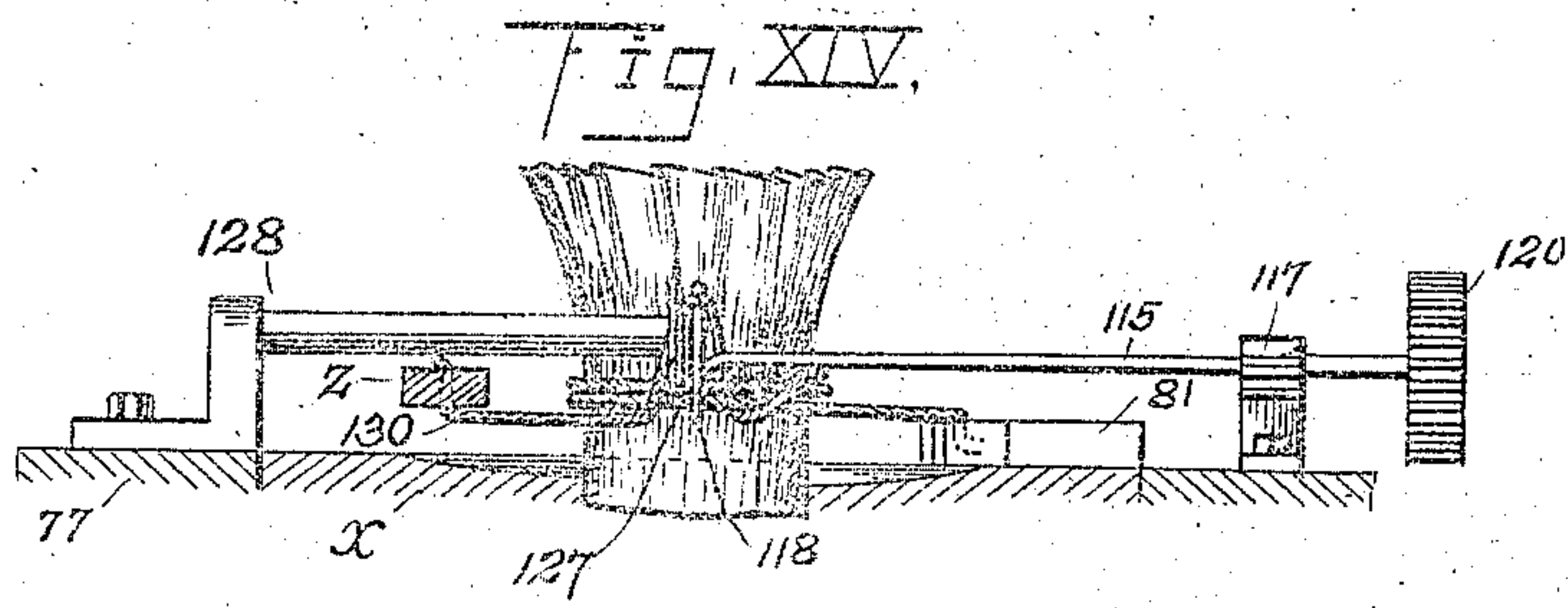
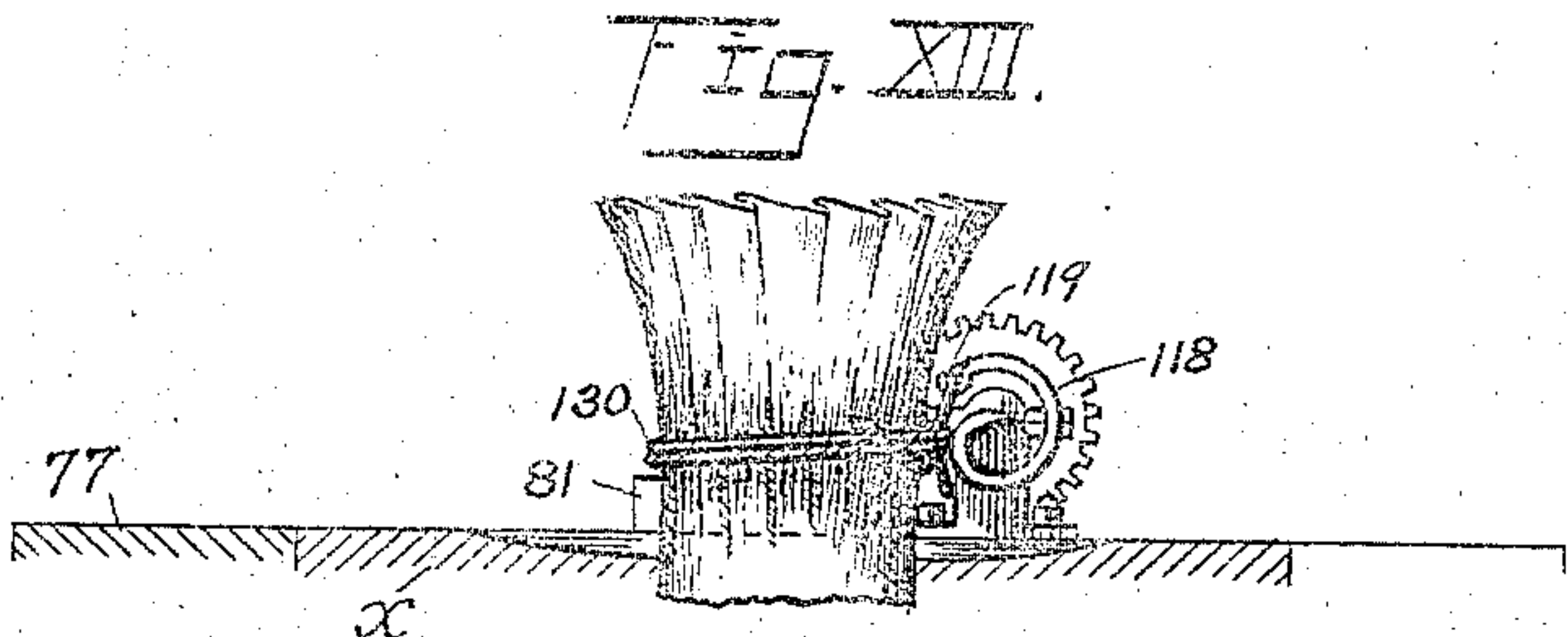
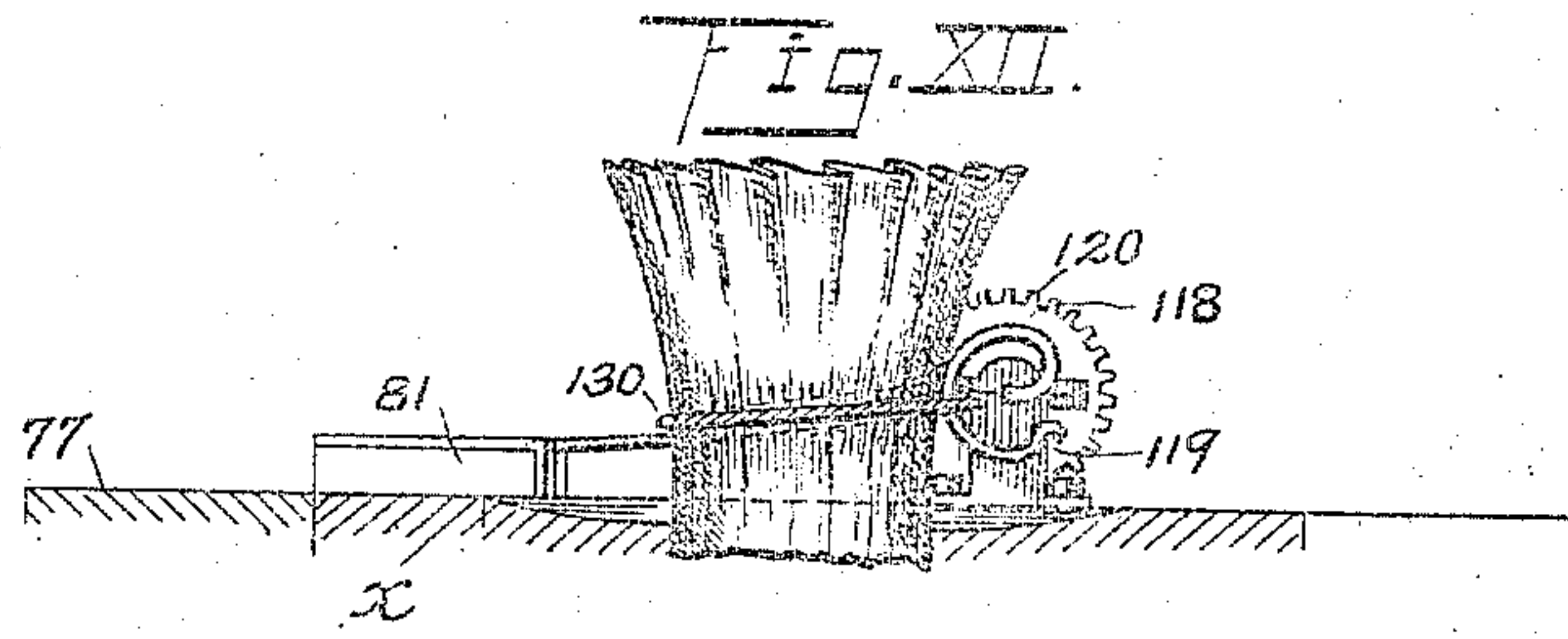
Witnesses:
J. Griswold.
Elsie M. Hopper.

Inventor,
John Rogers,
by *Luther L. Hopper,*
Attorney.

899,764.

J. ROGERS.
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APPLICATION FILED JUNE 20, 1907.

Patented Sept. 29, 1908.
7 SHEETS—SHEET 7.



Witnesses:
E. L. Kelt
F. W. Mugin.

Inventor:
John Rogers,
by Luther L. Fopper,
Attorney.

UNITED STATES PATENT OFFICE.

JOHN ROGERS, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO GEORGE D. ADAMS AND GUSTAV E. KAPPLER, BOTH OF CLEVELAND, OHIO.

BAG FILLING AND TYING MACHINE.

No. 899,764.

Specification of Letters Patent.

Patented Sept. 29, 1908.

Application filed June 20, 1907. Serial No. 379,868.

To all whom it may concern:

Be it known that I, JOHN ROGERS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Bag Filling and Tying Machines, of which the following is a specification.

This invention relates to mechanism for filling, packing and tying bags, and its object is to provide mechanism for filling, packing, and tying a bag with twine, with less labor, more expeditiously and more satisfactorily than has been known heretofore.

Minor objects will appear from the description.

Speaking in general terms, the invention consists in improved means for filling, packing, closing and tying an ordinary open-ended bag, to produce a safe and satisfactory carrying package particularly adapted for granular or powdered materials.

It also consists in the novel features, arrangements and combinations hereinafter described and claimed, an embodiment thereof being illustrated in the accompanying drawings in which

Figure I is a front elevation of the machine showing several parts broken away. Fig. II is a side elevation of the machine with portions broken away, and showing the filling tube partly in section. Fig. III is an elevation largely in section of the lower portion of the filling and packing arrangement. Fig. IV is a plan view of the closing and tying apparatus. Fig. V is an end view of the segmental gears and the pinions for operating the closing and tying mechanism. Fig. VI is a sectional elevation taken on line VI—VI of Fig. VII. Fig. VII is a plan view of the tier. Fig. VIII is another plan view of the tier showing some of its parts in different positions from that shown in Fig. VII. Fig. IX is a detailed side view, and Fig. X is an end view of the hook-shaft of the tier. Fig. XI is a detailed side view of the eye-bar and the tension device of the tier. Fig. XII is a side elevation, partly in section, showing a bag-neck with twine being wrapped around it. Fig. XIII is a side elevation, partly in section, showing the effect of the rotation of the hook 118 and 119, after the eye-bar *z* has thrown a loop of twine around the hook 119.

Fig. XIV is rear elevation, partly in section, showing twine wrapped and tied upon a bag-

neck, and about to be cut off. Fig. XV is an elevation of the gathered bag mouth showing the twine as tied thereon by this machine.

The reference letter *a* indicates the framework of the machine, which it will not be necessary to describe in detail, since it may be varied to suit conditions of installation. It is intended to make the entire apparatus self-contained in a single framework, but for the purposes of this application some parts of the machine are shown supported upon a floor, and others hung from the overhead beams of a building.

Filling tube.—An open-ended cylindrical tube *b* is rigidly secured at its upper end to the frame *a* and depends vertically therefrom, its outer diameter being slightly less than the diameter of the bags to be filled. A spout, or chute, *c* leads into the upper end of the tube *b*, whereby the charges of material to be sacked are fed into the said tube one charge at a time. Any suitable apparatus may be employed in connection with the spout *c* for weighing, or otherwise measuring out and separating the respective charges, and feeding them as required into the tube *b*, for this forms no part of my present invention. A compound valve is provided for closing the lower end of the tube *b*, comprising an even number of thin wings, or doors, all hinged to the tube, and the outer wings *d* overlapping the alternately disposed inner wings *e*. These wings are approximately triangular, save that their hinged sides are circular to fit the tube *b* when they are closed, and they are bent to conform with the circular end of said tube while hanging open, as plainly shown in Figs. I and II. Each of the outer wings *d* has a lug 2 upon its inner face, to which a rod 3 is hinged and carried up inside the tube through a small guide bearing 4 well up in said tube. These rods 3 are provided with small arms 5 projecting inwardly from their upper terminations, by which the valve arrangement of the tube *b* is closed, as will be described hereinafter.

The filling and packing arrangement.—A driving shaft *f* is rotatably mounted in bearings 6 and 7 suitably supported overhead, having a driving pulley 8 secured thereon and driven from a source of power through a belt in the usual way. Another pulley 9 secured upon the shaft *f* is connected through a friction belt 10 with a pulley 11 running loosely upon a shaft *g*, the latter being rota-

tably mounted in bearings 12 and 13 supported upon the frame *a*. The shaft *g* carries a toothed pinion 14 connected by a chain belt 15 with a sprocket wheel 16 upon a jack-shaft *h*, which shaft is rotatable in bearings 17 and 18 upon the frame *a*. A clutch member 19 is rotatably mounted upon the jack-shaft *h*, and has a sprocket pinion 20 secured upon its outer end. The engaging member 10 of the clutch, *i*, is splined to rotate with the shaft *h* and is slidable thereon, being operated by a forked lever *j* pivoted at 21 to the frame *a*. The clutch *i* is preferably a conical friction clutch, but others of the well known 15 types of friction clutches may be employed if desired. A fourth horizontal shaft *k* is supported in bearings 22 and 23 hung from overhead supports, so that said shaft is directly above the axis of the filling tube *b*, and it is 20 rotatable by a sprocket wheel 24 thereon carrying a chain belt 25 passed around the pinion 20.

A crosshead, or yoke, *l* is slidably fitted upon a pair of vertical guides 26 secured to 25 the frame *a*, and springs 27 surround said guides underneath the crosshead. A vertical shaft *m* is rotatably suspended from the crosshead *l*, having a bearing 28 therein with shaft collars above and below it, as shown. 30 Upon the lower end of the shaft *m* is secured an auger *n*, comprising one or more flanges standing out from its central hub with a slight helical pitch, so that the meeting ends of said flange, or flanges, overlap each other, 35 leaving a passage-way between them. Some distance above the auger *n*, two collars are fixedly secured upon the shaft *m*, between which is rotatably supported a spider, or crossbar, 29, from which depends an inner 40 tube *o*. This tube is provided with one or more longitudinal guides upon its outer surface which engage corresponding guides upon the inside of the tube *b* to prevent rotation of the inner tube *o*, and the rotatable 45 auger *n* is loosely fitted in the lower end of said inner tube. A flexible strap *p* is fastened to and adapted to wrap upon the shaft *k*. The lower end of the strap *p* is provided with a hanger 30 connecting it to the cross- 50 head *l*.

From the foregoing it will be seen that, when the shaft *k* is rotated, the strap *p* will wind upon it and raise the vertical shaft *m*, the auger *n*, and the inner tube *o*, which 55 comprise the packer. And when the inner tube *o* is drawn up within the outer tube, the upper edge of said inner tube lifts the small arms 5 of the rods 3, thus raising the wings *d* which carry up the inner wings *e* and thereby 60 close the orifice of the filling tube *b*; whereupon the rotation of the shaft *k* is stopped automatically by means which I will now proceed to describe.

A bevel gear wheel 31 upheld by the frame 65 *a* is slidably splined upon the vertical packer

shaft *m*, and meshes with a corresponding gear wheel 32 secured to the inner end of the shaft *g*. The loose pulley 11 is provided with a clutch 33 by which it may be clamped to the shaft *g* through the shifting of a slid- 70 able clutch member *q*. A bell-crank lever *r* is pivoted to a suitable support 34 on the frame *a*, the depending arm of which is forked to engage the clutch member *q*, and its horizontal arm is extended towards the 75 shaft *m*. A vertical rod 35 is hinged to the horizontal arm of the bell-crank *r*, and its upper end slides in a suitable guide 36 secured to the building or to the framework of the machine. An arm 37 is secured upon 80 the rod 35, and a projecting tripper 38 is carried upon the crosshead *l*. Thus, the packer having reached its upper position, the tripper 38 has raised the arm 37, thereby releasing the clutch *q*, and stopping the rotation of the 85 auger *n* as well as the further upward travel of the packing mechanism, and these parts remain idle while other operations are being performed.

A small platform 39 is placed directly un- 90 der the filling tube *b* to support the bag, and it may be adjustable for height, or be arranged to raise and lower; but it will usually be found more convenient to employ a simple structure, as shown, set low enough for the 95 bag to clear the tube *b* when supported upon the platform, since the bag is first slipped over the tube *b*, and is pushed down almost to the platform by the filling tube *o*.

The closing mechanism:—A hinge shaft 40 100 is supported in suitable bearings upon one side of the platform 39, and supports a swinging frame *s* comprising the upright arms 41 and 42 fixed to said shaft and supporting the respective ends of a rotatable screw-threaded 105 shaft 43. The screw 43 has a right handed thread at one end and a left handed thread at the other, said threads meeting at its middle point, as shown in Fig. IV, and a spur toothed driving pinion 44 is secured to one 110 end of it. A pair of fingers 45 and 46 are screw threaded and fitted to ride respectively upon the right and the left handed threads of the screw 43, said fingers projecting in- 115 board, and being normally held apart by a spring 47. A second hinge shaft 48 is supported in bearings upon the side of the plat- 120 form 39 opposite to the shaft 40, and is parallel with the latter. This shaft supports a swinging frame *t* comprising upright arms 49 and 50 secured to the shaft at their lower ends, and tied together at their upper ends by the horizontal bars 51 and 52.

A shaft *u* to operate the closing and tying means is rotatably supported in bearings 125 53 and 54, being driven by a sprocket wheel 55 thereon through a chain belt 56 passing over a sprocket wheel 57 secured upon the driv- 130 ing shaft *f*. A step-gear comprising three segmental spur toothed gear wheels 58, 59 and

60, is loosely mounted upon the overhanging end of the shaft *u*, and balanced to assume a proper normal position. The segmental gear 58 is opposite to and adapted to mesh with the screw shaft pinion 44. Said step-gear is provided with a clutch member 61 adapted to be engaged by the slidable clutch member *v* which is splined to and revolves with the shaft in the well known way. The clutch member *v* is operated by a foot-lever 62, which may be a bell-crank pivoted at 63 having its upright arm 64 forked to engage a circumferential groove in the clutch member, as shown, and it should have a spring 65 to disengage the clutch when the lever is released by the foot of the operator. Thus, when the frames *s* and *t* are swung together, as in Fig. I, the mouth of the bag is flattened between the screw 43 and the bars 51 and 52, and the ends of the gathering fingers 45 and 46 project between said bars which serve as guides therefor. The operator may now throw the clutch *v* into engagement with the segmental gears, which operates to slide the fingers 45 and 46 toward each other to gather up the bag mouth and compress it into a small space between them, and between the bars 51 and 52 and the screw 43; whereupon the gathered bag mouth is caught by the tying mechanism before said fingers are released. Stops 66 and 67 are provided to support the respective swinging frames *s* and *t* in their idle positions, which latter are shown by dotted lines in Fig. I.

The tying mechanism.—A plate 68 is secured upon the swinging frame *t*, its outer side being supported by struts 69, and guides 70 are secured upon it between which the tier *w* is free to reciprocate. A shaft 71 is rotatably mounted in bearings 72 depending from the plate 68, and carries a spur toothed pinion 73 adapted to mesh with the segmental gear 60. Another toothed pinion 74 is secured on the shaft 71 which meshes with a toothed rack 75 fixed to the bottom of the reciprocating tier *w*. The rack 75 projects through an opening in the plate 68, which arrangement may also serve to limit the travel of the tier *w*. The tier *w* is built upon a box-like structure comprising a lower plate 76, having upturned side flanges, and an upper parallel plate 77 secured upon said flanges. Referring to Figs. VI, VII, and VIII, it will be seen that the tier plates are rectangular to fit between the guides 70, but have a narrowing forward extension which is recessed in its middle portion at 78. A rotary shuttle *x* is mounted at the inner end of said recess, and comprises a spur gear ring having its toothed periphery between the tier plates, its upper face flush with the top of the plate 77, an approximately V-shaped gap 79 leading from its interior to a possible registration with the passage 78, and a fixed lug 80 upon its upper face in the position

shown. A clamping dog 81 is pivoted at 82 upon the shuttle *x*, one end of which is upturned and adapted to be held normally against the lug 80 by a spring 83, and its other end is inclined outwardly and faced to correspond with the curvature of the shuttle.

An upright driving shaft 84 is rotatably mounted in the plates 76 and 77, and has secured upon it a gear wheel 85 between said plates, a toothed pinion 86 just above the upper plate, and a bevel gear wheel 87 upon its upper end. A horizontal shaft 88, Fig. IV, is rotatably mounted in a bracket 89 secured to the tier *w*, and carries upon its inboard end a bevel gear 90 in mesh with the gear 87, and upon its outboard end a spur pinion 91 adapted to mesh with the segmental gear 60. A cam wheel *y*, Figs. VI, VII and VIII, is rotatably mounted upon the tier plate 77, and has gear teeth upon its periphery meshing with the pinion 86. Two intermediate spur wheels 92 and 93 are rotatably mounted between the plates of the tier, each being in mesh with both the wheel 85 and the shuttle *x*, so that the latter is driven by one or the other, or by both of said intermediate wheels according to its position.

A thin lever arm 94 is pivoted at its middle point to the tier plate 77, and its outer and broader end extends underneath the wheel *y* so as to be engaged in succession by two sets of pins 95 and 96 carried upon the under side of said wheel. A tripper arm 97 is pivoted at 98 to the tier plate and provided with a projection on its side toward the shuttle. A connecting bar 99 has its ends hinged respectively to the free ends of the arms 94 and 97, and has a projecting pin 100 to engage the tail of the lever arm 101, which latter is pivoted to the tier plate and has a broadened extension curving beyond its pivot and adapted to engage the dog 81. A light spring 102 in tension between a pin on the tier plate and the broad end of the arm 101 serves to keep the latter, and also the arm 97, normally out of the line of travel of the clamping dog 81, as plainly shown in Figs. VII and VIII.

An eye-bar *z* is loosely mounted upon a pin in a rotatable bearing 103 on the tier plate, so that it may both tilt vertically and swing horizontally. Its forward end overhangs the shuttle, and is provided with a vertical hole, or eye 104, and its rearward end is fitted to an elliptical guide, or cam 105 which is secured to the tier plate. 106 is a light spring bearing upon the rearward part of the eye-bar *z*, and other light springs may be employed if found desirable to assist the eye-bar to traverse the guide 105. A circular groove 107 is formed in the upper face of the cam wheel *y*, and a substantially triangular cam 108 is set therein, as shown. A lever 109 is loosely mounted on the vertical shaft 84, its rearward arm being

bent laterally and provided with a depending pin 110 adapted to slide in the groove 107, and its forward arm being straight and hinged to the end of a connecting link 111, the other end of the latter being hinged to a short arm 112 which is secured to the rotatable bearing 103 of the eye-bar. A light spring 113 is in tension between the forward end of the lever 109 and a suitable rigid connecting point at the left of said lever. Thus the eye-bar *z* is swung laterally by the cam 108, while at the same time the ends of said eye-bar move in a substantially elliptical path. During the greater portion of the revolution of the cam-wheel *y* the eye-bar *z* is held stationary in the position shown in Figs. VI and VII, save for a few slight vibrations caused by the pin 110 traversing recesses 114 made in the outer side of the groove 107, the purpose of which is to assist the running of the twine.

A steel wire, or light shaft 115 is rotatably mounted in bearings 116 and 117 upon the tier plate, being disposed substantially at right angles to the normal position of the eye-bar *z*. The inner end of said wire is bent into a lateral loop 118, and has a hook 119 formed by a sharp outward bend of its extreme end, as plainly shown in Figs. IX and X. The outer end of the hook-shaft is provided with a small toothed pinion 120 in mesh with rack teeth upon the under side of a bar 121 slidably mounted in bearings 122 and 123 upon the tier plate. A spring 124 is disposed in tension to keep the rack bar normally in its forward position, as shown, but a cam 125 upon the wheel *y* is adapted to engage a pin 126 upon the rack bar to push the latter backward once in each revolution of said wheel, which reciprocation of the rack bar accomplishes an approximate revolution of the hook-shaft 115.

A cutter 127 having a knife edge is provided to cut off the twine. Herein I have shown the cutter fixed upon the end of a bracket 128 secured to the tier plate, but this part of my apparatus I propose to improve and make it the subject of another application.

A tension device is employed comprising a stud 129 attached preferably to the eye-bar *z* at its bearing, an aperture through said stud for the passage of the twine 130, a loose lower washer 131 upheld by a shoulder on the stud, an upper loose washer 132, an adjustable nut 133 screw threaded upon the upper end of the stud, and a spring 134 on the stud in compression between the nut and the upper washer.

Operation.—To operate the machine power is applied to the shaft *f* which rotates the loose pulley 11, and also the shaft *u* with the slidable clutch member *v*. The packing mechanism is held at the upper point of its

travel by the clutch *i*, so that the inner tube *o* is within the filling tube *b* and the wings *d* and *e* are closed. The swinging arms *s* and *t* are in their outer position.

A bag to be filled is slipped over the lower end of the filling tube *b*, and a charge of powdered or granular material sufficient to fill the bag is fed into the said tube so that substantially all of it enters the tube *o*, and is upheld by the auger *n*. The operator then grasps the lever *j* and releases the clutch *i*, whereupon the shaft *m* and its attachments descends by gravity, the wings *d* and *e* open downward, and the inner tube *o* enters the bag carrying the latter down nearly to the platform 39, to which it settles while its upper end is guided by the vertically hanging wings *d* and *e*. The tripper 38 in its descent strikes the bell-crank *r*, thus sliding the clutch member *q* to engage the shaft *g* with the pulley 11, and operating to rotate the auger *n*; which auger bores into the material above it, transfers said material to its under side, and packs it down into the bag. The clutch *i* should then be thrown back into engagement with its loose member 19, causing the packer to rise slowly out of the bag while the rotating auger feeds the material therein and presses it down. These movements continue until the tripper 38 engages the arm 37 and releases the clutch member *q*, whereupon the packer is withdrawn into the tube *b*, the winged valve on the bottom of said tube is closed, the filling and packing mechanism is at rest awaiting a new charge, and the filled bag stands clear upon the platform 39. The operator then swings in the frames *s* and *t*, and presses the foot-lever 62 to start the closing and tying mechanism. The gathering fingers 45 and 46 operate first, gathering up and closing the mouth of the bag, but, before said fingers are released, the tier *w* has been brought forward, the recess 78 and gap 79 therein forming a passage for the gathered bag mouth which, as the tier comes to rest, is held within the central bore of the shuttle *x*.

As soon as the gathered bag mouth is fairly within the shuttle *x*, the latter begins to revolve in the direction shown by the arrow in Fig. VII; which view also shows the twine or cord 130 for tying the bag leading in from a reel or spool, not shown, which may be located in any convenient position alongside the machine or upon the tier. The twine is first threaded through the tension device at 129, and then downwardly through the eye 104 in the forward end of the eye-bar *z*. The depending end of the cord drags between the lug 80 and the clamping dog 81, which latter is held open at the proper time by the lever 101 being shifted by the bar 99, lever 94, and pins 96 on the wheel *y*; and upon the dog being released it springs against the lug 80 and clamps the end of the cord therebetween.

Thus, as the shuttle *x* revolves, the cord is carried around the gathered bag mouth under tension, making two, three, or more wraps thereabout according to the relative gearing of the machine, the wraps, or strands of the cord lying in the loop 118 of the hook-shaft 115. Although the gearing of the tier as shown herein would make three wraps, I consider that for ordinary packages two wraps, as shown in Fig. XII, is sufficient; but it is obvious that this is a matter of relative timing of the movements of the respective parts of the machine.

While the wraps are being made, the eye-bar *z* remains in the position shown in Fig. VII, save for the several slight vibrations for assisting the passage of the cord caused by the recesses 114. But, after the last wrap has been drawn against the looped wire 118, the cam 108 operates the eye-bar causing it to describe its elliptical movement, as indicated in Fig. VIII, which throws a loop of the twine over the hook 119, the shaft 115 of which then revolves, so that said loop of twine is carried up by the said hook inside the wraps, and out over them away from the bag, and, as it is carried over, the knife 127 intercepts the loop and severs the twine; after which the shaft 115 is released and returns to its original position, but in its return rotation the strands of twine upon the bag have sprung clear of its looped end 118. At about the same time the pin 95 on the wheel *y* operates through the lever 94, the bar 99, and the trip-lever 97 to throw the latter inward against the clamping dog 81; thus releasing the advancing end of the twine from said clamp, whereupon the bag is tied as shown in Fig. XII, and the shuttle advances to and stops in the position shown in Fig. VIII. It will be noticed that just before the advancing end of the twine is released by the clamp 81, and while the hook 119 is in operation, the eye-bar *z* is returning rapidly to its original position; which movements in connection with the tension device at 129 operate to pull the cord taut and tighten the knot before the cord is released and cut off. The foot-lever 62 is now released, and the swinging frames *s* and *t* are then thrown back to the position shown by dotted lines in Fig. I, which causes the tier to recede by gravity to its outer position, whereupon the bag may be removed.

As shown in Fig. XII, this apparatus ties what is known as a "miller's knot", or what is sometimes termed a "half hitch". This knot is comparatively easily undone by dexterous human fingers, but until thus manipulated it holds fast, because the middle wrap, or wraps, is pulled tightly across the knot, which prevents the loose ends of the twine slipping backward beneath the strands of the close drawn enwrapment.

I further point out and distinctly claim as my invention—

1. In a bag filling machine, the combination of an upright filling tube, inner wings and overlapping outer wings hinged to the lower end of said tube, and means connected with said outer wings for folding said wings over the orifice of said tube, substantially as set forth.

2. In a bag filling machine, the combination of a fixed upright filling tube, a tubular packer casing adapted to reciprocate therein, overlapping wings hinged to the lower end of said filling tube, and means operated by said packer whereby said wings are folded over the orifice of said filling tube when said packer is drawn within said filling tube, substantially as set forth.

3. In a bag filling machine, the combination of a fixed upright filling tube, a tubular packer casing adapted to reciprocate therein, a rotatable auger in the lower part of said packer, overlapping wings hinged to the lower end of said filling tube, and means whereby said packer upon being drawn into the filling tube operates to fold said wings over the orifice of said filling tube, substantially as set forth.

4. In a bag filling machine, the combination with a filling tube secured in an upright position, of a rotatable shaft axially mounted to reciprocate within said tube, a tube adapted to reciprocate with said shaft within said filling tube and through the lower orifice thereof, and a packing auger secured to the lower end of said shaft within said inner tube, substantially as set forth.

5. In a bag filling machine, the combination with a filling tube secured in an upright position, of a rotatable shaft axially supported to reciprocate within said tube, a tube adapted to reciprocate with said shaft within said filling tube and project through the lower orifice thereof, a packing auger secured to the lower end of said shaft within said inner tube, and a valve for closing the lower orifice of said filling tube operated by said reciprocating elements, substantially as set forth.

6. In a bag filling machine, the combination with a frame, and a filling tube depending vertically therefrom, of a crosshead slidable in vertical guides above said tube, a rotatable shaft depending from said crosshead axially of said tube, a packing auger on the lower end of said shaft, a tube inclosing said auger and loosely supported upon said shaft, means for rotating said shaft, and means for raising and releasing said crosshead, substantially as set forth.

7. In a bag filling machine, the combination with a frame, a filling tube depending therefrom, and packing mechanism in said tube operated by a shaft provided with a crosshead slidable in vertical guides above

said tube, of cushion springs beneath said crosshead, means for raising and releasing said crosshead, and means for rotating said shaft controlled by said raising and releasing means, substantially as set forth.

8. In a bag filling machine, the combination with a frame, a filling tube depending therefrom, packing mechanism in said tube operated by an axial shaft, and means for supporting, guiding and rotating said shaft, of means controlled by the operator for raising and releasing said shaft, substantially as set forth.

9. In a bag filling machine, the combination with a frame, a filling tube depending therefrom, packing mechanism in said tube operated by an axial shaft, and means for supporting and guiding said shaft, of means controlled by the operator for raising and releasing said shaft, and means for rotating said shaft adapted to be thrown into operation by the dropping of said packing mechanism and thrown out of operation when said packing mechanism is raised to its highest position, substantially as set forth.

10. In a bag filling machine, the combination with a frame, a filling tube depending therefrom, and packing means in said tube operated by a vertical shaft, of mechanism for raising and rotating said shaft adapted to be thrown into operation by the dropping of said packing means and thrown out of operation when said packing mechanism is raised to its highest position, a clutch interposed in said shaft raising mechanism, and a lever for operating said clutch, substantially as set forth.

11. In a machine of the class described, the combination of means for flattening together the walls of the open end portion of a bag, means for gathering said flattened bag end into a neck, means for wrapping a flexible cord about said neck, and means for tying a knot in said cord, substantially as set forth.

12. In a machine of the class described, the combination of a pair of frames adapted to approach a bag from opposite sides thereof so as to intercept and flatten the open end portion of said bag, a pair of fingers mounted upon one of said frames, means for closing said fingers upon the flattened end portion of said bag to gather the same into a central neck, and mechanism mounted upon the other one of said frames adapted to wrap a flexible cord about said neck and tie the ends of said cord into a knot, substantially as set forth.

13. The combination of a rotary shuttle adapted to receive the neck of a bag and wrap a flexible cord thereabout, and means operating in connection with said shuttle for tying said cord into a knot, substantially as set forth.

14. The combination of a rotary shuttle

adapted to receive the neck of a bag and wrap a flexible cord thereabout, means operating in connection with said shuttle for tying a knot in said cord, and means for severing said cord, substantially as set forth.

15. The combination of a circular shuttle ring having a gap leading into its central aperture to receive the neck of a bag, means for rotating said shuttle ring, means upon said shuttle ring for catching and holding a cord, and means operating in connection with said rotating means for releasing said cord from said cord holding means, substantially as set forth.

16. The combination of a circular shuttle ring having a gap leading into its central aperture to receive the neck of a bag, means for rotating said shuttle ring, a spring closed clamp upon said shuttle ring, means for introducing the end of a cord into said clamp, and means for releasing said cord from said clamp, substantially as set forth.

17. The combination of a circular shuttle ring having a gap leading into its central aperture to receive the neck of a bag, means for rotating said shuttle ring, a spring closed clamp upon said shuttle ring, means for introducing the end of a cord into said clamp, means for tying said cord, and means for releasing said cord from said clamp, substantially as set forth.

18. The combination of a rotatable shuttle ring having a gap leading into its central bore, a clamp upon said shuttle ring for catching and holding a cord, a shaft having a lateral loop terminating in a hook overhanging the bore of said shuttle ring, and interdependent means for operating said shuttle ring, said clamp and said hook-shaft, substantially as set forth.

19. The combination of a rotatable shuttle ring having a gap leading into its central bore, a clamp upon said shuttle ring for catching and holding a cord, an oscillative eye-bar for guiding said cord, a shaft having a lateral loop terminating in a hook overhanging the bore of said shuttle ring, and interdependent means for operating said shuttle ring, said clamp, said eye-bar and said hook-shaft, substantially as set forth.

20. The combination of a rotatable shuttle ring having a gap leading into its central bore, a clamp upon said shuttle ring for catching and holding a cord, an oscillative eye-bar for guiding said cord, a shaft having a lateral loop terminating in a hook overhanging the bore of said shuttle ring, means for severing the said cord, and interdependent means for operating said shuttle ring, said clamp, said eye-bar and said hook-shaft, substantially as set forth.

21. The combination of a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, a gear wheel upon said shaft, a pair of intermediate gear wheels adapted to en-

gage both said driving wheel and said shuttle, and means operated by said driving shaft for catching a cord, wrapping it about said bag neck, tying it thereon and releasing it, substantially as set forth.

22. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, and operative gearing between said shaft and said shuttle, of a clamp on said shuttle; an oscillatory eye-bar overhanging said shuttle, a rotatable hook-shaft overhanging the central aperture of said shuttle, a cam-wheel rotatable by said driving shaft, and means whereby said cam-wheel operates said clamp, said eye-bar and said hook-shaft, substantially as set forth.

23. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft and operative gearing between said shaft and said shuttle, of a spring closed clamp on said shuttle, a cam-wheel rotatable by said driving shaft having projecting pins, trip-levers pivoted adjacent to said shuttle adapted to engage said clamp, a lever fulcrumed adjacent to said cam-wheel so as to be swung by said projecting pins, an operative connection between the last named lever and said trip-levers, and a spring for keeping said trip-levers normally out of contact with said clamp, substantially as set forth.

24. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, and operative gearing between said shaft and said shuttle, of a bar overhanging said shuttle having an eye in its shuttle end, a universal pivot for said eye-bar, a guide cam engaging the tail of said eye-bar, and operative connections with said driving shaft for holding and oscillating said eye-bar, substantially as set forth.

25. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, and operative gearing between said shaft and said shuttle, of a bar overhanging said shuttle having an eye in its end, a universal pivot for said eye-bar, a guide cam engaging the tail of said eye-bar, a cam-wheel driven by said shaft having a side cam and a circular groove therein, a lever provided with a projection fitting said cam and groove, and operative connections between said lever and said eye-bar, substantially as set forth.

26. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, and operative gearing between said shaft and said shuttle, of a bar overhanging said shuttle having an eye in its end, a universal pivot for said eye-bar, a guide cam engaging the tail of said eye-bar, a cam-wheel driven by said shaft having a side cam and a circular groove therein, a lever provided with a projection fitting said cam and groove, an arm on the pivotal bearing of

said eye-bar, and a link connecting said arm with said lever, substantially as set forth.

27. The combination with a rotatable shuttle adapted to receive the neck of a bag, a driving shaft, and operative gearing between said shaft and said shuttle, of a bar overhanging said shuttle having an eye in its end, a universal pivot for said eye-bar, a guide cam engaging the tail of said eye-bar, operative connections with said driving shaft for holding and oscillating said eye-bar, and a tension device upon or adjacent to said eye-bar, substantially as set forth.

28. The combination with a cord-catching shuttle adapted to receive and rotate about the neck of a bag, and means for rotating the same, of a rotatable shaft having a lateral loop provided with a hooked end overhanging said shuttle, and means connected with the operating means of said shuttle for holding said hook-shaft in position and rotating it at certain relative intervals, substantially as set forth.

29. The combination with a cord-catching shuttle adapted to receive and rotate about the neck of a bag, and means for rotating the same, of a rotatable shaft having a lateral loop provided with a hooked end overhanging said shuttle, a toothed pinion on said hook-shaft, a slidable bar having rack teeth in mesh with said pinion, and means connected with the driving means of said shuttle for reciprocating said rack-bar at certain relative intervals, substantially as set forth.

30. The combination with a cord-catching shuttle adapted to receive and rotate about the neck of a bag, and means for rotating the same, of a rotatable shaft having a lateral loop provided with a hooked end overhanging said shuttle, a toothed pinion on said hook-shaft, a slidable bar having rack teeth in mesh with said pinion, a spring to hold and return said rack-bar, and a cam operated by the driving means of said shuttle adapted to engage and slide said rack-bar at certain relative intervals, substantially as set forth.

31. In a bag tying mechanism, the combination with a slidable frame having a recess therein, and means for sliding said frame at certain requisite intervals, of a driving shaft mounted upon said frame, means for rotating said shaft at the forward position of said frame, a cord-catching shuttle rotatable by said shaft and adapted to receive the neck of a bag through said recess, and means for guiding and tying a cord mounted upon said frame and operated by said driving shaft, substantially as set forth.

32. In a bag tying mechanism, the combination with a cord-catching shuttle adapted to receive and rotate about the neck of a bag, and means for rotating the same, of a bar mounted upon a universal pivot having an eye in its end overhanging said shuttle, a guide cam engaging the tail of said eye-bar,

a cam-wheel operated in unison with said shuttle, a circular groove in said cam-wheel having an off-set and recesses therein, a lever provided with a projection fitting said groove, and operative connections between said lever and said eye-bar, substantially as set forth.

In testimony whereof I affix my signature

in the presence of two subscribing witnesses at Cleveland, Ohio, this 17th day of June, 1907.

JOHN ROGERS.

Witnesses:

FRANK STONE,

A. J. McKENNA.