

No. 765,429.

PATENTED JULY 19, 1904

H. J. HURD.  
PAPER TUBE ROLLING MACHINE.

APPLICATION FILED APR. 2, 1903.

NO MODEL.

7 SHEETS—SHEET 1.

Fig. 1.

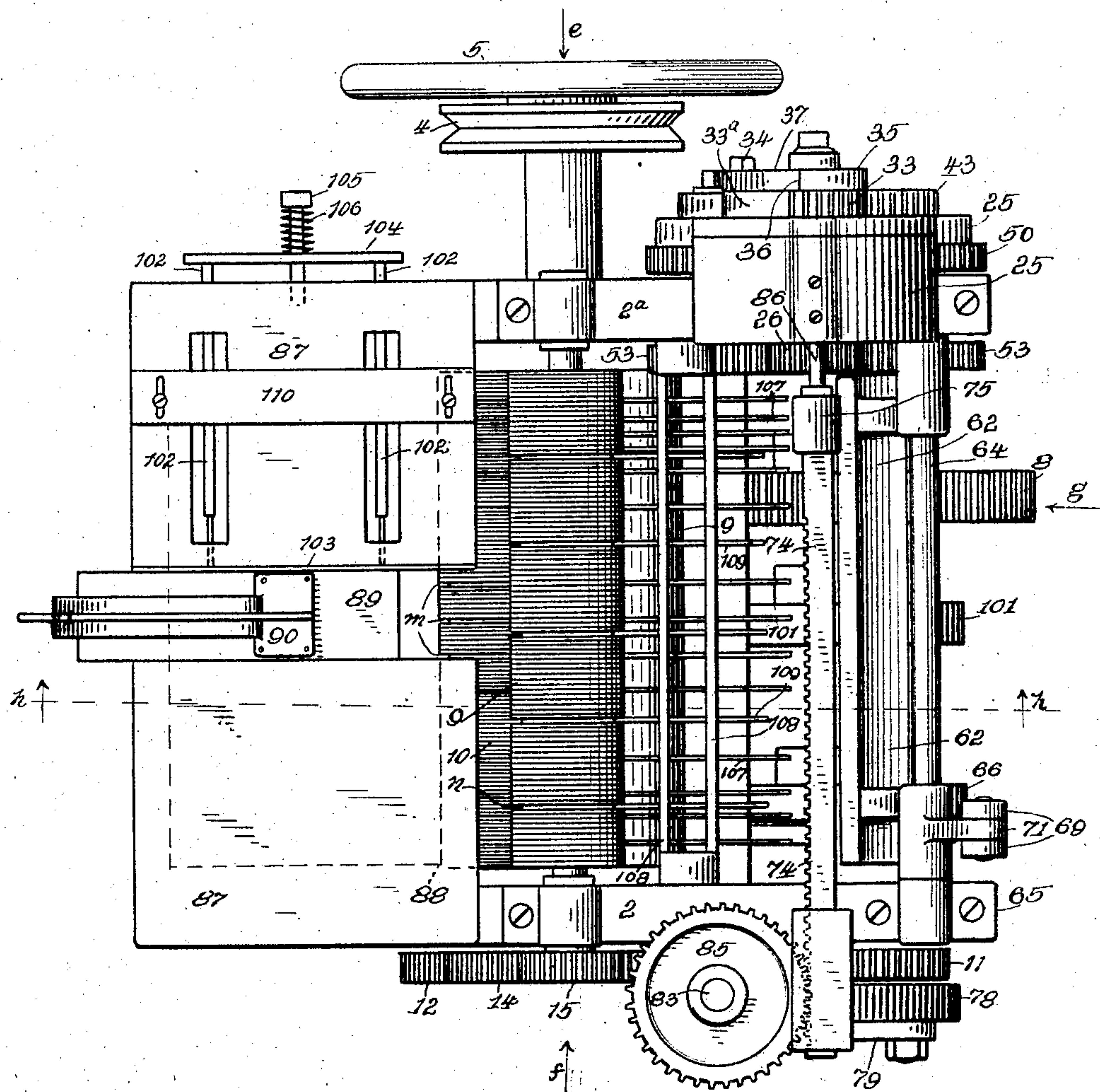
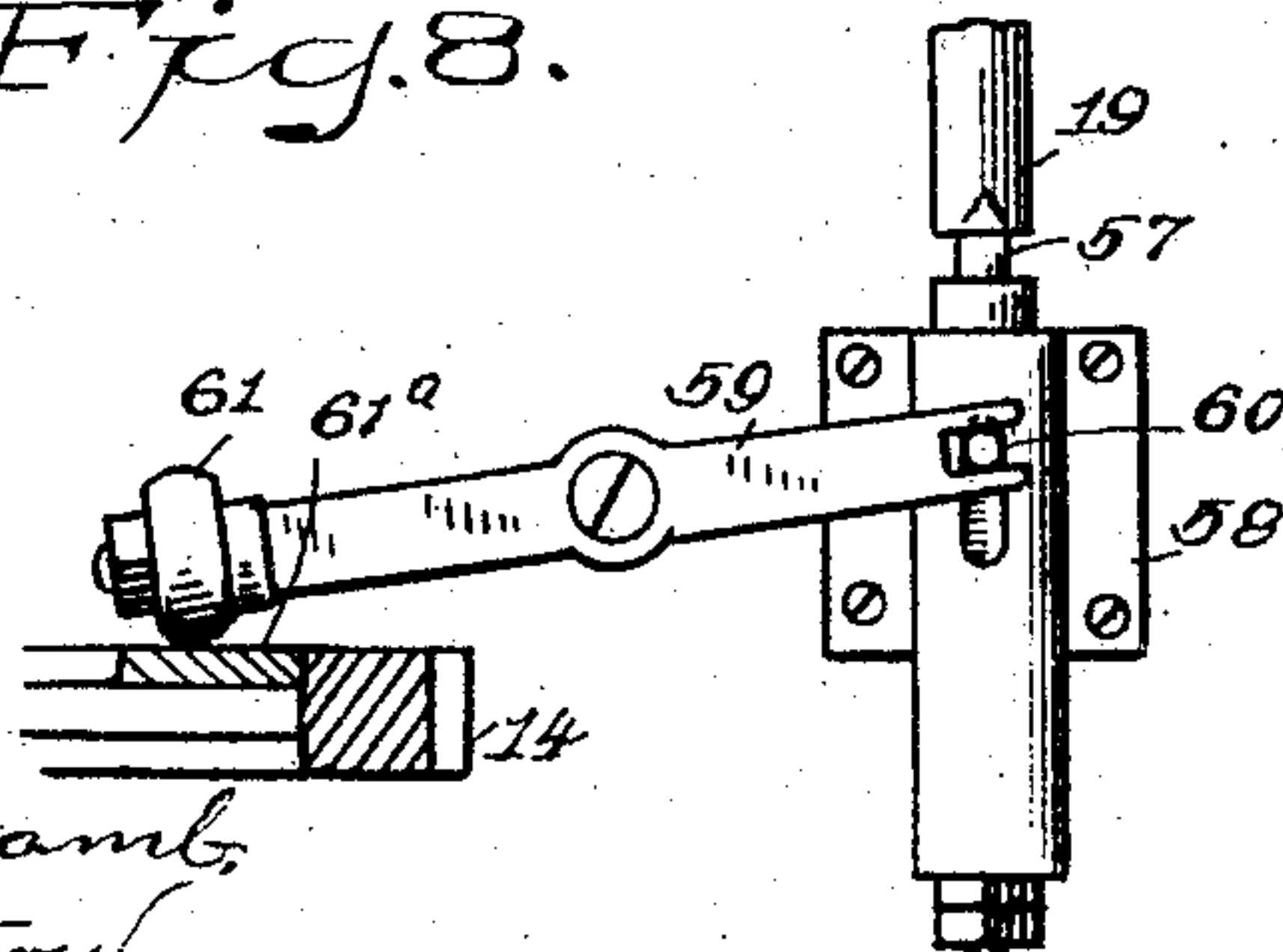


Fig. 8.



WITNESSES.

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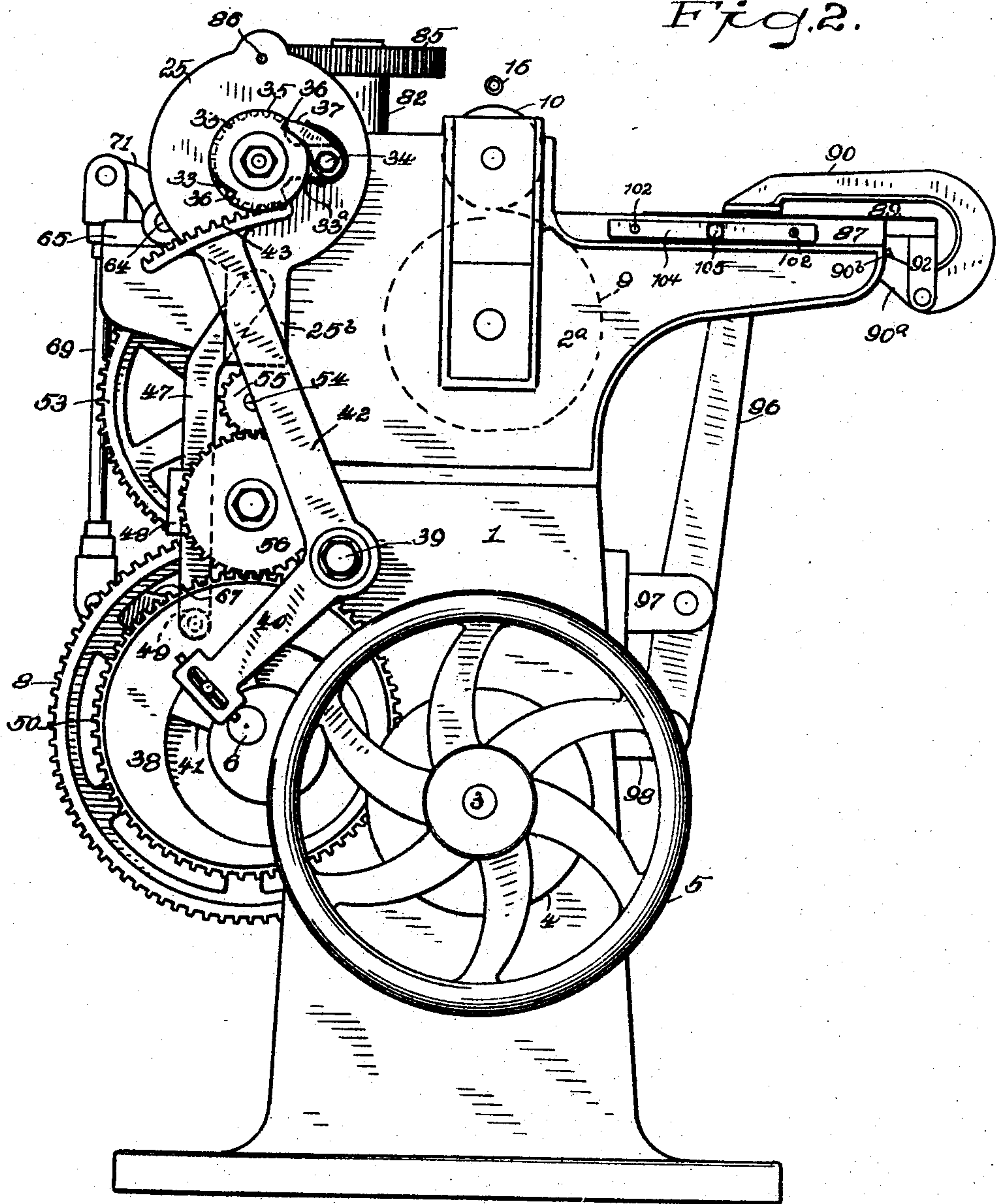
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7 SHEETS—SHEET 2.



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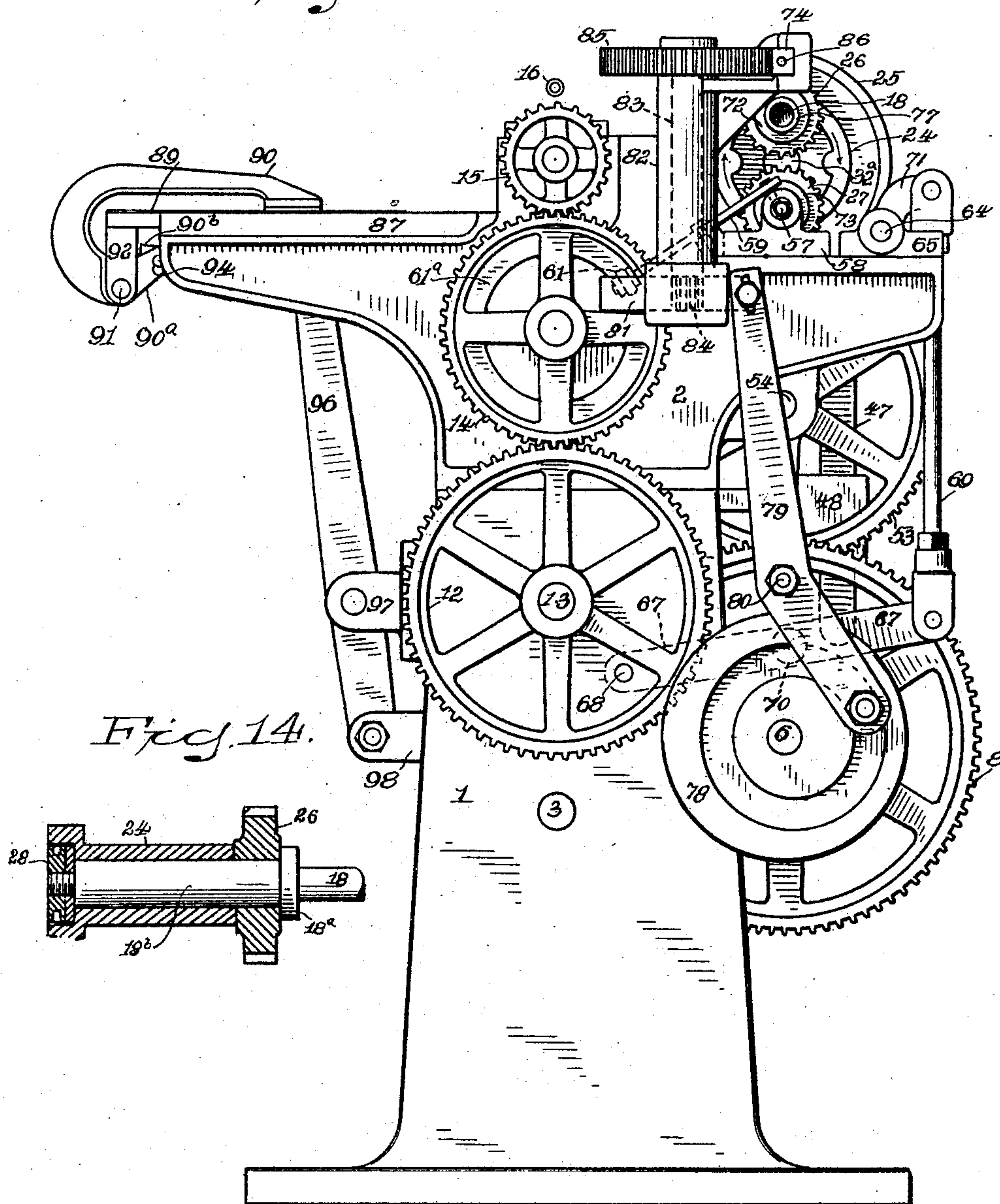
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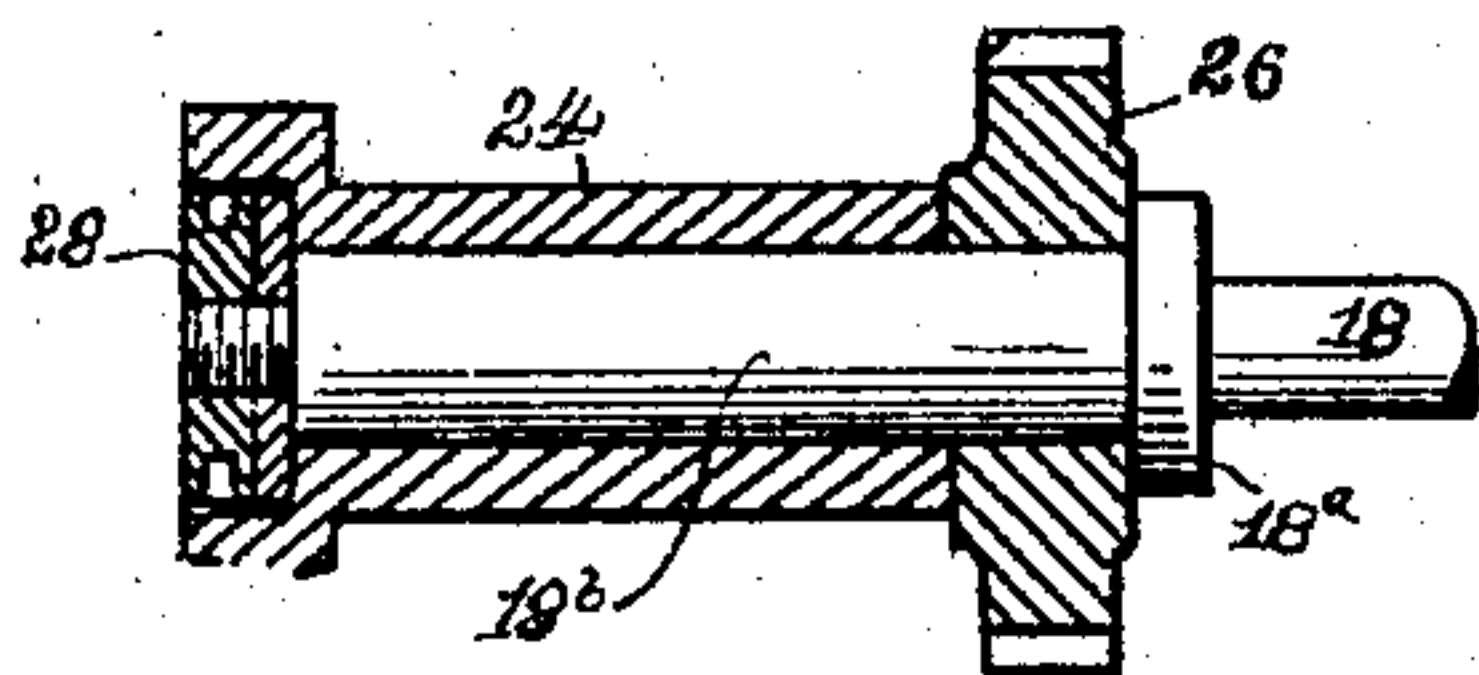
NO MODEL.

7 SHEETS—SHEET 3.

*Fig. 3.*



*Fig. 14.*



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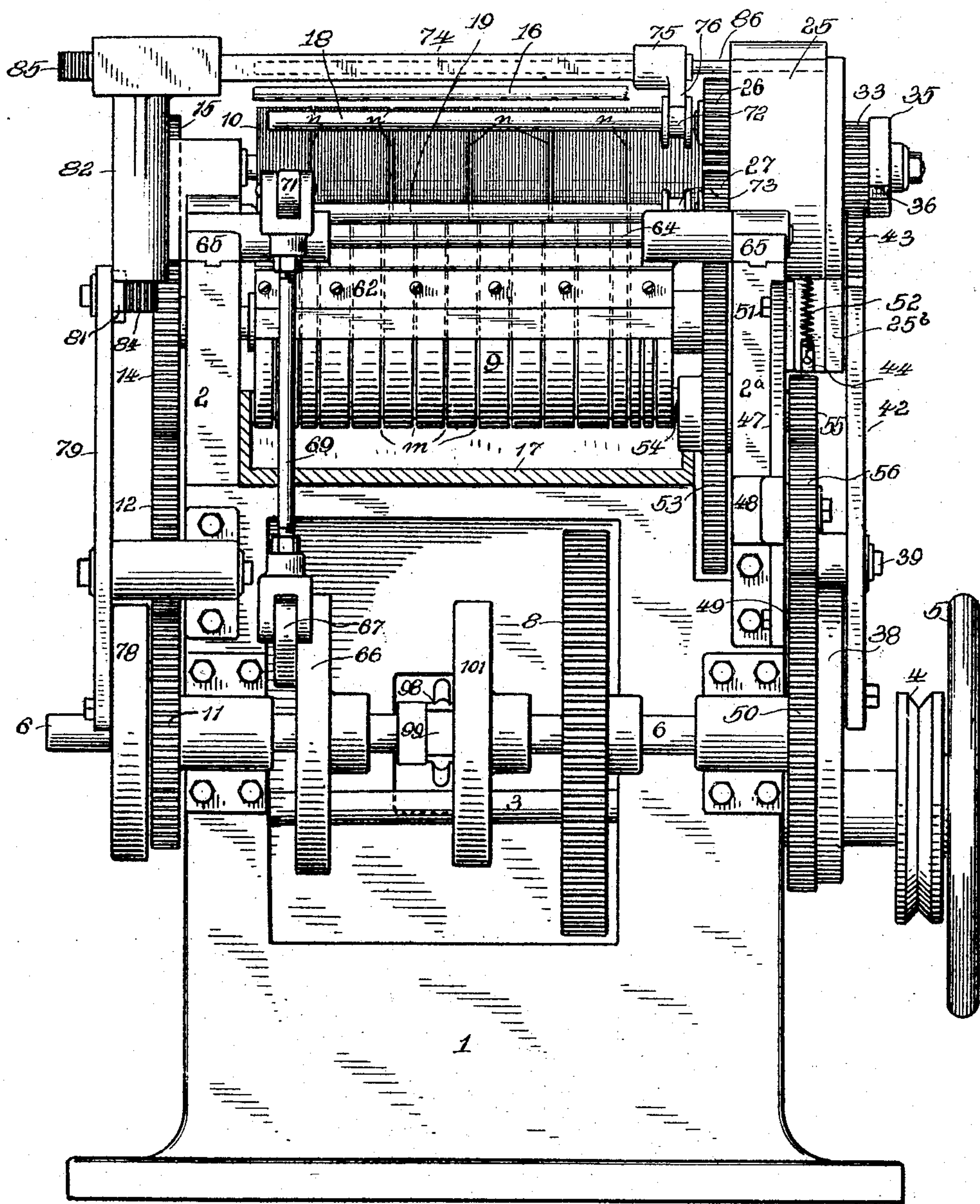
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7 SHEETS—SHEET 4.

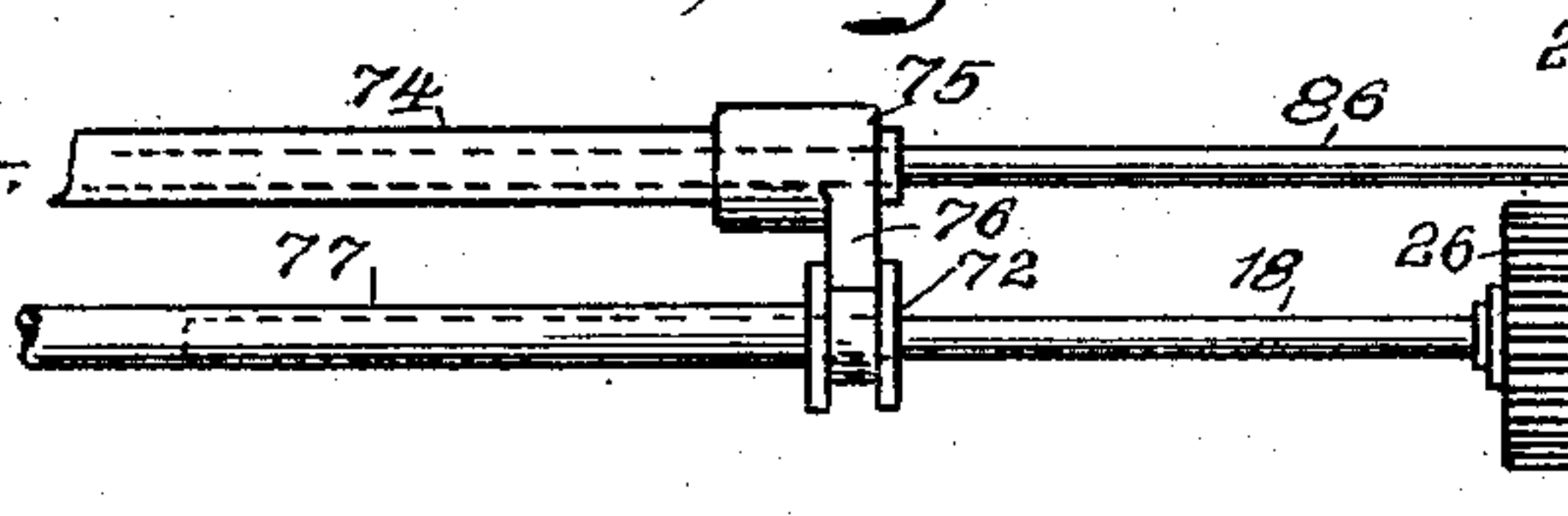
*Fig. 4.*



*Fig. 11.*

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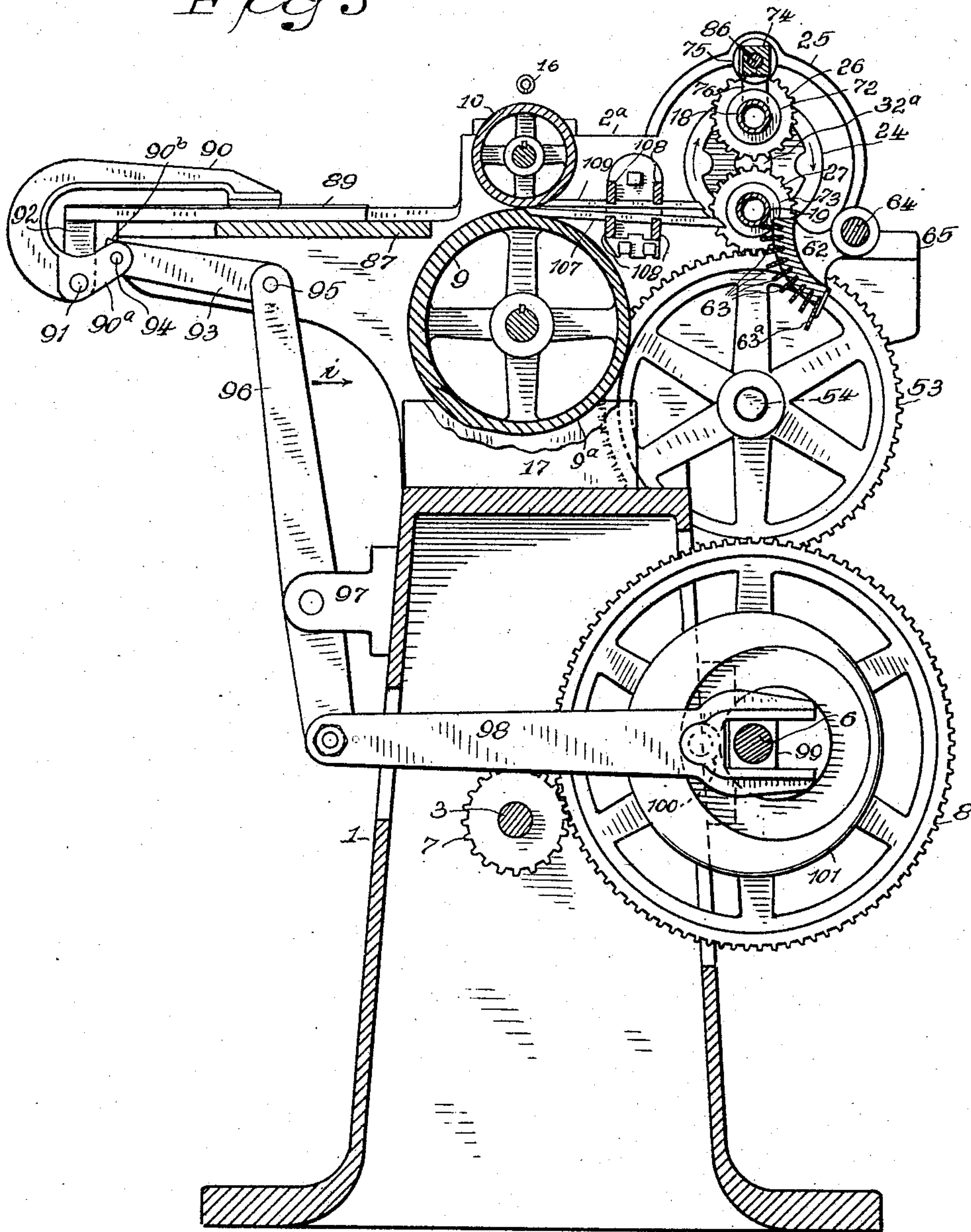
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7 SHEETS—SHEET 5.

*Fig 5*



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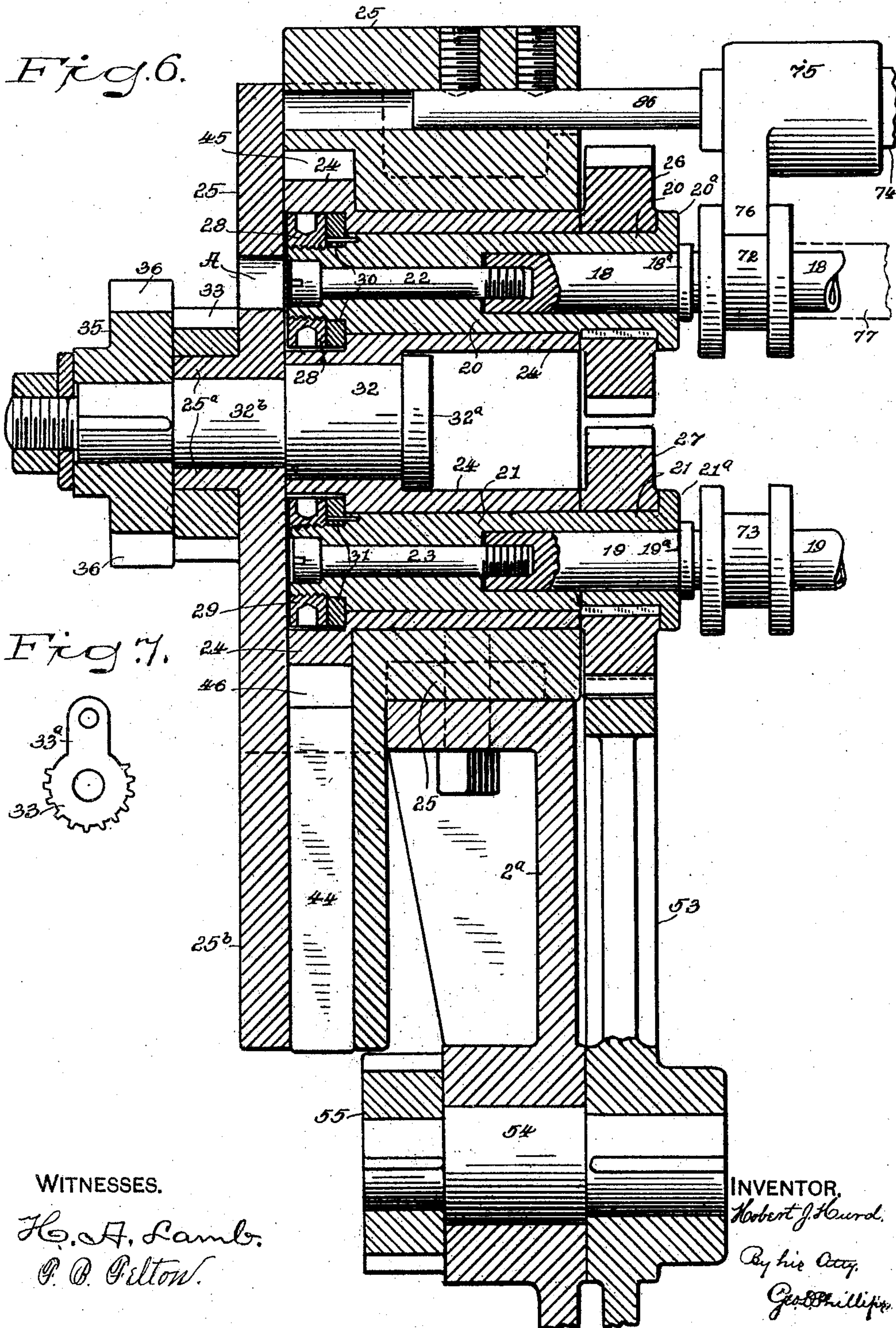
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NO MODEL.

7 SHEETS—SHEET 6.





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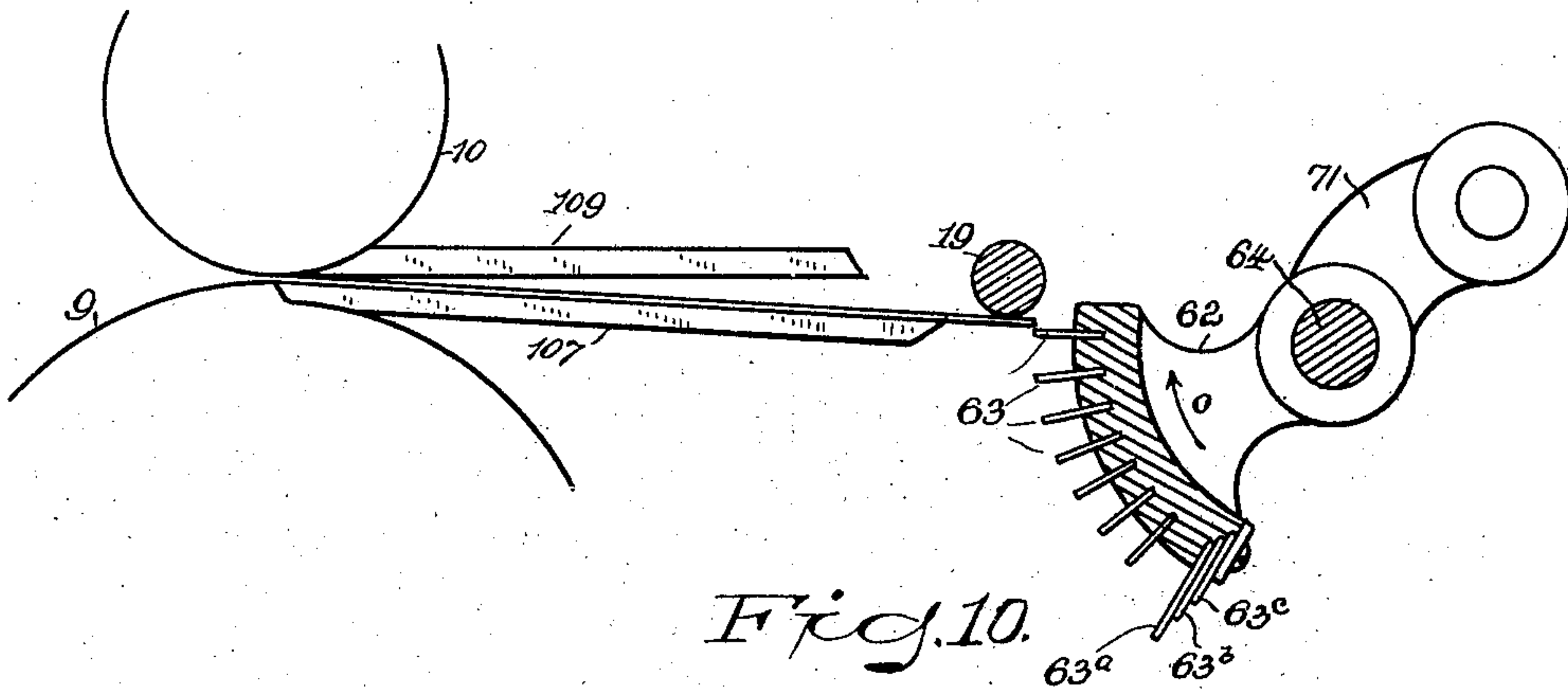
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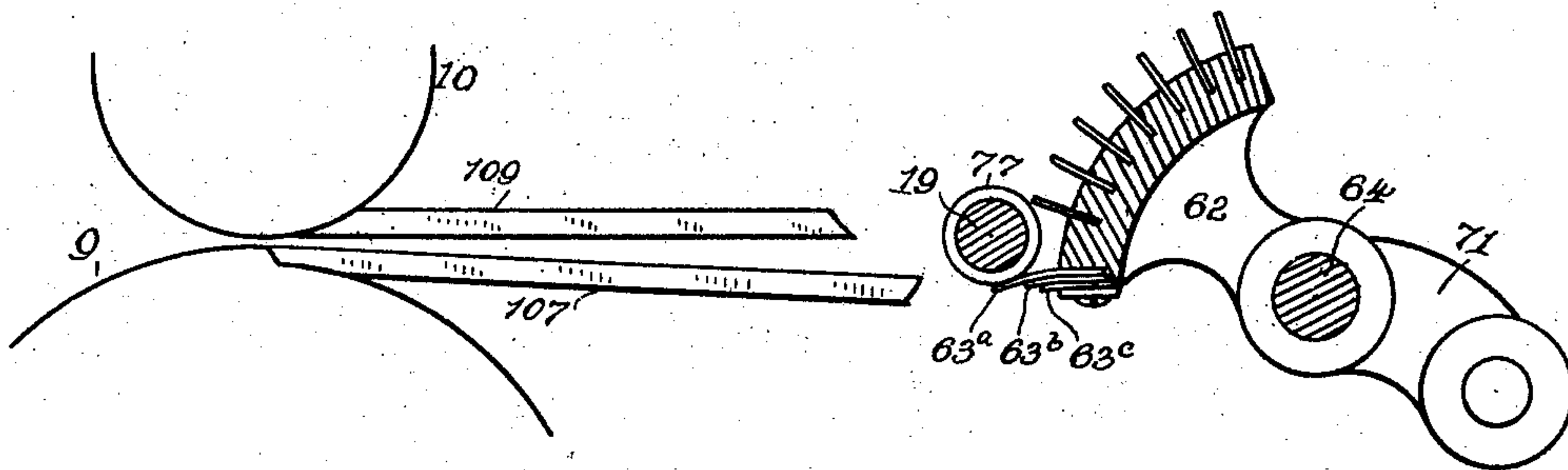
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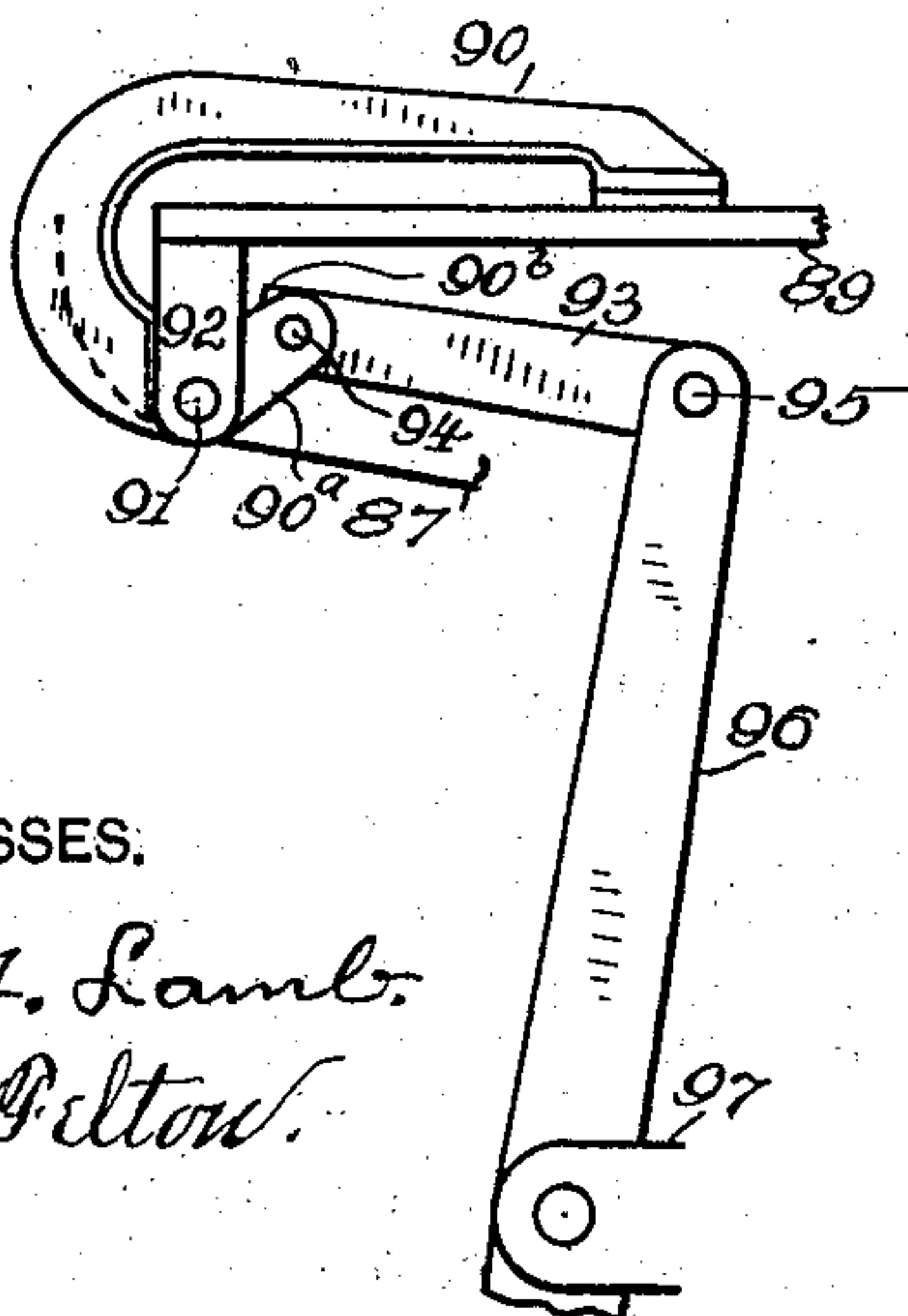
*Fig. 9.*



*Fig. 10.*



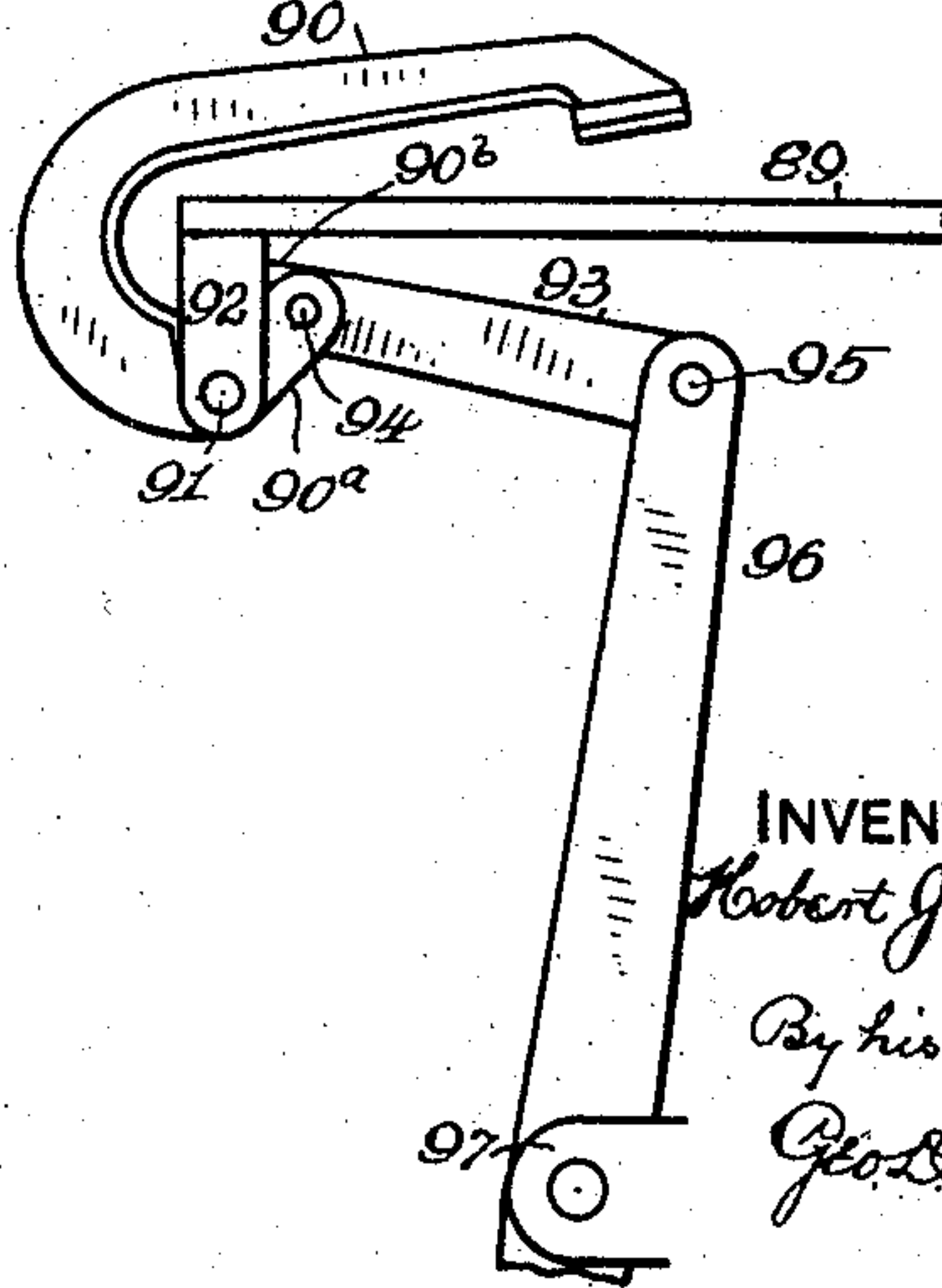
*Fig. 12.*



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*Fig. 13.*



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# UNITED STATES PATENT OFFICE.

HOBERT J. HURD, OF BRIDGEPORT, CONNECTICUT.

## PAPER-TUBE-ROLLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,429, dated July 19, 1904.

Application filed April 2, 1903. Serial No. 150,816. (No model.)

*To all whom it may concern:*

Be it known that I, HOBERT J. HURD, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Paper-Tube-Rolling Machines, of which the following is a specification.

My invention relates to paper-tube-forming machines; and it consists in certain improvements to be more fully set forth in the accompanying specification, whereby an increased output and a more economical production of paper tubes is effected.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a plan view of the machine, showing a section of paper of which the tube is formed on the feeding-table. Fig. 2 is a side elevation of the machine looking in the direction of arrow *e*, Fig. 1. Fig. 3 is a side elevation of the machine looking in the direction of arrow *f* of Fig. 1. Fig. 4 is a rear elevation of the machine, broken view of the paste-discharging pipe looking in the direction of arrow *g* of Fig. 1. Fig. 5 is a sectional elevation of the machine on line *h h* of Fig. 1. Fig. 6 is an enlarged detail sectional view of the rotating arbor-carrying head and its case or housing, broken view, partly in section, of the tube-forming arbors, broken view of the tube-ejecting rack, sectional view of their driving-pinions, broken sectional view of the driving-gear for said pinions, sectional view of the segmental pinion and notched disk forming part of the mechanism for operating the arbor-rotating head, and broken sectional view of the machine-frame for supporting the case or housing for said head. Fig. 7 is a detail view of the segmental pinion connected with the rotating head. Fig. 8 is a detail view of the lower arbor-support and the center operating-lever, broken view of the gear carrying the cam-plate for operating said lever, and broken view of the lower arbor engaged by the center. Fig. 9 is a broken detail end elevation of the paste-rolls, sectional view of one of the tube-forming arbors, showing a section of paper in readiness

to be wound about said arbor, sectional view of the segmental wiper and its shaft, said wiper in its normal position in readiness to guide the paper about the arbor. Fig. 10 is a view similar to Fig. 9, showing the wiper at a standstill with the last flexible finger engaged with the tube. Fig. 11 is a detail view of one of the arbors in its elevated tube-ejecting position, broken view of the tube-ejecting rack with its finger engaging a movable collar on said arbor, broken view of a tube being ejected from the arbor. Fig. 12 is a detail side elevation of the paper-clamping finger in its extreme outer position in readiness to be carried forward, broken view of the paper-feeding slide to which said finger is pivoted, broken view of the lever operating said slide and finger, and broken view of the paper-feeding table. Fig. 13 is a view similar to Fig. 12, showing the slide and clamping-finger in its extreme forward position with the finger released from contact with the paper and in readiness for its backward travel. Fig. 14 is a modified detail broken view of one of the tube-forming arbors, broken sectional view of the rotating head, and sectional view of the arbor-pinion.

Its construction and operation are as follows:

1 represents the base of the machine; 2 and 2<sup>a</sup>, the uprights.

3 is the main driving-shaft, carrying on its outer end the driving-pulley 4 and the hand-wheel 5.

6 is a jack-shaft driven from the main shaft through the medium of the pinion 7 and the large gear 8. (Seen more clearly at Figs. 3 and 4.)

9 and 10 are paste-rolls, driven through the medium of the gear 11 on shaft 6, intermediate gear 12 on stud 13, and gears 14 and 15, mounted on the journals of said rolls. The lower and larger of these rolls has a portion of its periphery cut away, so as to let go of the paper as soon as the end of the same is properly engaged by the tube-winding arbor presently to be more fully explained. The entire surface of the upper roll and that portion of the lower roll which operates in conjunction with the upper roll to carry the pa-



per along is covered with fine corrugations to hold the paste discharged from the supply-pipe 16, which paste passes over the rolls and is discharged into the pan 17. (Shown in sectional view at Fig. 4 and broken view at Fig. 5.) From this pan the paste is pumped up again, by means not shown, into the supply-pipe 16.

18 and 19 are the tube-rolling arbors, whose inner ends are anchored in holes provided in the outer ends of rotatable journals 20 and 21, Fig. 6, and they are secured therein by means of the retaining-screws 22 and 23, whose heads are let into the inner ends of said journals. These screws, in conjunction with the shouldered portions 18<sup>a</sup> and 19<sup>a</sup> of said arbors, will insure a firm anchorage for the arbors. The object of this enlarged detachable journal for each of the tube-forming arbors is for convenience in changing the arbors for the different sizes of tubes required, especially in the manufacture of tubing for paper shot-shell. In removing the arbors all that is necessary is to insert a screw-driver through the hole A when an arbor is in an upper position and remove the retaining-screws and withdraw the arbor from its journal. Therefore it makes no difference, so far as the rotatable feature of the arbor is concerned, whether the end of the arbor is detachably secured to an enlarged part to form the journal or the inner end of the arbor is enlarged, as shown at 18<sup>b</sup>, Fig. 14. These journals are rotatably mounted in the head 24, which head is in turn also rotatably mounted in the case or housing 25, secured to the side frame 2<sup>a</sup> of the machine. (Seen also at Figs. 1, 2, 3, 4, and 5.) 26 and 27 are pinions keyed on these journals, whose sides are embraced by the outer face of said head and the shoulders 20<sup>a</sup> and 21<sup>a</sup> of said journals. The inner ends of these journals are threaded, and on these threaded ends are the adjusting-nuts 28 and 29. 30 and 31 are washers placed between said nuts and a shouldered portion of said journals, which washers are pinned to the journals, so that when said journals rotate the nuts and washers will turn in unison therewith, and thus prevent the nuts working loose.

The rotatable head 24 is rigidly mounted on the enlarged portion of the screw, bolt, or shaft 32, whose head 32<sup>a</sup> engages a shouldered portion of said head, so as to operatively retain the same within the housing 25. 33 (see Fig. 2 and also detail view Fig. 7) is a segmental pinion reciprocally mounted on the projection 25<sup>a</sup>, Fig. 6, of said housing. This pinion through the medium of its arm 33<sup>a</sup> supports the stud 34, projecting from said arm. The portion 32<sup>b</sup> of the stud 32 is rotatably mounted in said housing and has rigidly secured to its outer end the plate 35, provided with the notches 36.

37, Fig. 2, is a pawl mounted on the stud 34, which pawl is adapted to alternately en-

gage with said notches and rotate the head 24 within its housing for the purpose presently to be described.

The segmental pinion 33 is actuated by means of the face-cam 38, mounted on the jack-shaft 6, Figs. 2 and 4.

39 is a stud which supports a double-arm lever, whose short arm 40 is adjustably connected to the sliding block 41 of said cam, while the long arm 42 carries at its outer end the toothed segment 43 to register and drive the segmental pinion 33.

The toothed segment 43 has an oscillating movement that alternately rotates the head 24 through the medium of the segmental pinion 33 and the alternate engagement of the pawl 37 with the notches in the plate 35, so that when the paper is being wound on one of the tube-rolling arbors the other arbor is in an upper and diametrically opposite position. When the arbors are thus located in vertical alinement with each other, the head 24 is temporarily locked against rotation while a tube is being rolled, and this is accomplished by means of the bolt 44, Figs. 4 and 6, alternately engaging the notches 45 and 46, Fig. 6, diametrically located in the said head 24. This locking-bolt is timed to operate in either of said notches, as the case may be, by means of the slide-bar 47, Figs. 2 and 4, operatively supported in the bracket 48, secured to the base or bed of the machine. The lower end of this bar carries the roll 49, adapted to be engaged by a cam lug or projection (not shown) in a recess in the face of the gear 50, which gear is mounted on the shaft 6. The locking-bolt 44 is operatively mounted in the tailpiece 25<sup>b</sup> of the housing 25. 51 is a screw which connects the upper end of the slide-bar 47 with the said locking-bolt, so that when the rotatable head, carrying the arbors, is about to be turned the slide-bar 47 will be actuated downward to withdraw said bolt from the notch in said head with which it was engaged, and thus release said head, so that it may be partially rotated by means of the mechanism before described. 52 is a retractile spring which operates to carry said bolt up to engage said notches independent of the sliding bar 47.

The arbors, as before mentioned, are anchored in rotatable bearings located in the rotatable head 24. Consequently these arbors rotate with their bearings. The pinions 26 and 27, mounted on these bearings, are alternately brought into engagement with the intermediate gear 53, mounted on the inner end of the short shaft 54, journaled in the upright 2<sup>a</sup>. The outer end of this shaft carries the pinion 55. 56 is another intermediate gear, which connects said pinion with the driving-gear 50 on the shaft 6. Therefore by means of this arrangement the pinions connected with the tube-arbors are alternately registered with the gear 53, so that said arbors will be rotated while in their lower or tube-forming position,



while the other or upper-positioned arbor will, being disconnected from said gear, remain stationary.

The outer end of the arbor engaged in tube-rolling is supported by the longitudinally-operating center 57, mounted in the housing 58, Figs. 3 and 8. 59 is a pivotally-supported lever whose upper forked end engages with the pin 60, projecting up from said center. The opposite end of this lever carries the roll 61, adapted to engage with the cam projection (not shown) located on the inner face of the plate 61<sup>a</sup> of the gear 14. The movement of this lever is so timed with respect to the revolving feature of the arbors that when one of said arbors is in operation the center will support its free end and when the tube is rolled and the arbor is ready to be revolved the center 57 is automatically withdrawn.

62, Figs. 1, 5, 9, and 10, is a segmental wiper, roll-presser, and paste-scraper having the flexible fingers or brushes 63 inserted in its periphery. This wiper is rigidly mounted on the shaft 64, which shaft is journaled in the boxes 65, secured to the side frames of the machine. This combined wiper, presser and scraper, whose purpose will presently be more fully explained, is reciprocally operated by means of the vertical face-cam 66, (seen at Fig. 4,) mounted on the jack-shaft 6.

67 (see also Fig. 3) is a short lever pivoted by one end to the stud 68 of the bed, while the other end is pivotally supported in one of the forked ends of the vertical connecting-rod 69. Midway of this lever is the roll 70, which engages with said face-cam 66. The upper forked end of the connecting-rod 69 is pivotally connected to the arm 71 of the combined wiper, presser, and scraper shaft 64. The mechanism thus described will give a reciprocating or oscillating motion to the said wiper. As soon as a complete tube has been formed on the lower arbor, as before mentioned, then this arbor is revolved into the upper position, with the tube still on it, and while a tube is being formed on the other arbor the completed tube on the upper arbor will be ejected therefrom in the following manner, viz: 72 and 73, Figs. 4, 5, 6, and 11, are grooved collars loosely mounted on the tube-forming arbors, and 74 (see also Fig. 1) is a rack carrying on its inner end the collar 75, having the finger 76, adapted to register with the grooved collar on the upper arbor, so that when the said rack is longitudinally and outwardly operated it will push the completed tube 77, Fig. 11, off from its arbor.

The rack 74 is operated through the medium of the face-cam 78 and the lever 79. (Shown at Figs. 3 and 4.) This lever is pivotally supported on the stud 80, its lower end carrying a roll to engage with said cam, while its upper end is pivoted to one end of the short rack 81, operatively mounted in the lower end of the bracket 82. 83 is a short vertical

shaft mounted in this bracket, which carries at its lower end the pinion 84 to register with said rack, and at its upper end it carries the horizontal gear 85 to register with the upper tube-ejecting rack 74. This rack has a longitudinal hole formed therethrough and is adapted thereby to slide freely on its supporting-rod 86.

87, Figs. 1, 2, 3, and 5, is the table on which the square of paper 88 (shown by dotted lines at Fig. 1) is placed, this paper being of its proper size necessary to make a finished roll. 89 is a slide operatively working in said table. 90 is the feed-clamping finger pivotally supported on the pin 91, located in the projection 92 of the slide 89. 93 is a link pivotally supported on the pin 94 of the toe 90<sup>a</sup> of said finger and the pin 95 in the upper end of the vertical lever 96. This lever is pivotally supported in the bracket 97, with its lower end pivoted to the outer end of the horizontal lever 98. The forked end of this lever is fulcrumed on the jack-shaft 6 through the medium of the square block 99. 100, Fig. 5, is a roll on the vertical face of this lever, which roll engages with the vertical face of the cam 101. (Shown also at Fig. 4.) The mechanism just described operates and controls the movement of both the slide 89 and the finger 90. This slide is always under a spring tension as follows: 102, Fig. 1, represents tension-rods operating transversely in the table 87, whose free ends bear against the gib 103 of said slide. 104 is a cross-bar which connects the outer ends of said tension-rods. 105 is a tension-adjusting screw passing through this cross-bar and whose threaded end is adjustably connected to the table. 106 is a tension-spring located between the head of said screw and said cross-bar. By this means the proper tension is exerted against said slide for the purpose presently to be explained. It will be understood that the upper surface of the slide projects a trifle above the upper surface of the table in order to place the paper fully under the control of the feed-clamping finger.

At Figs. 1, 2, 3, 5, and 11 the finger 90 is in its extreme outer position, with its free end brought down to grip the paper. The movement of the lever 90 in the direction indicated by the arrow *i* (shown at Fig. 5) will carry the slide and finger forward until the forward end of said paper has entered into the bite of the paste-rolls, and as soon as this occurs said lever will begin to retreat. Now owing to the friction on the slide 89 there will be a resistance offered to its backward movement. Consequently the finger will turn on its pivotal support (see Fig. 13) until the stop 90<sup>b</sup> of said finger strikes against the projection 92 of the slide. This stop will limit the upward movement of the finger and determine its extreme open position. When this takes place, the slide will then be under full control of the lever 96, and said slide and its finger will be



carried to their extreme outer position in readiness for another sheet of paper. The tension on the slide will also hold it against a forward movement until after the finger has  
 5 been brought down and reengaged with the slide, whereupon the slide, finger, and paper will be carried forward toward the paste-rolls. The pivotal points of the link 93 on the finger and lever are so positioned with respect to  
 10 the pivotal support of the finger on the projection 92 of the slide as to give a toggle-joint effect in the grip of the finger on the slide.

107, Figs. 1 and 5, represents narrow strips  
 15 of metal adapted to form a bridge between the lower paste-roll and the tube-forming arbor to support the paper in transit. One end of these strips or bars rests in the grooves *m* of the lower paste-roll and at the bottom  
 20 of said roll, while their opposite ends are arranged in close proximity to one of the tube-forming arbors when in its lower position. The central portions of these bars are attached to the lower rails of the cross-piece  
 25 108, the ends of which rails are supported in the side frames of the machine. 109 represents another series of bars or strips of metal attached to the upper rails of the cross-piece 108. One end of these bars registers with the  
 30 circumferential grooves *n*, formed in the upper paste-roll 19. These upper and lower bars are quite close together near the paste-rolls, but diverge from each other as they approach the tube-forming arbor, and between  
 35 these series of upper and lower bars the paper is fed to said arbor.

110 is a guide for the edge of the paper adjustably mounted on the table 87 and is shown in the plan view, Fig. 1.

40 Operation: The square or section of paper 88 is fed onto the table 87 by mechanism (not shown) and from there fed into the paste-rolls in the manner previously described, and from these rolls it passes over the intervening  
 45 bridge until its forward end (see also Fig. 9) passes under the rapidly-rotating arbor 19 and above the upper one of the series of flexible fingers 63 of the segmental wiper 62. Then this wiper is carried up in the direction  
 50 of arrow *o*, and the several flexible fingers thereon will assist in folding the paper around the tube-forming arbor, or, in other words, will guide and maintain the end of the paper in the proper direction to form the tube. The  
 55 last finger, 63<sup>a</sup>, is reinforced by other and shorter flexible fingers 63<sup>b</sup> and 63<sup>c</sup>, as this feature is thought to give a better result, although a single and thicker finger could be used. When, therefore, the segmental wiper-frame  
 60 62 has rotated far enough to bring the last flexible finger, 63<sup>a</sup>, firmly in contact with the tube being formed, the said wiper-frame will halt, (see also Fig. 10,) while the arbor will still continue to rotate. The pressure of this  
 65 last finger will cause the paper to wind evenly

about the arbor and smooth out any wrinkles that would tend to form. It also forces out and away from the forming-tube all surplus paste, so that when the tube is completed both  
 70 its exterior and interior surface will be smooth and even. Being thus held firmly against the arbor during the process of winding the tubes are all wound of exact diameters, which is an important feature in forming tubes for paper  
 75 shot-shells. When the tube is completed on the lower arbor, said arbor and wiper will begin to retreat simultaneously, the arbor in the direction of arrow *p*, Figs. 3 and 5, to an upper position and the wiper toward its lower  
 80 or normal position, and when the second arbor is in the winding-field the wiper is ready to move upward. In other words, the segmental wiper follows the first on retreating arbor, and the second on approaching arbor follows the wiper and all move synchronously.  
 85 While a fresh tube is being formed on this second arbor, the mechanism for operating the rack 74 is brought into action for ejecting the previously-formed tube from the upper  
 90 arbor, as shown at Fig. 11.

The construction of the machine is such that it is continuous in its operation. In other words, it is so constructed that it can be adjusted so no time is lost by one part waiting  
 95 until after an important operation is being performed by another part of the machine. Machines have been constructed where the tube-winding arbor remains in the same position, and therefore the paper-feeding mechanism must halt until after the finished tube  
 100 has been ejected from the arbor, while in my construction the tube is being ejected outside of the winding-field and during the time that the winding operation is still going on. This reversible feature of the tube-forming arbors  
 105 enables the paper-feeding mechanism to operate continuously, for when the paper is between the paste-rolls, as before mentioned, the feed-clamping finger and slide are retreating and by the time the section of paper  
 110 within the bite of the feed-rolls has passed therefrom another section has entered. So with respect to the tube-forming arbors, as soon as the arbor enters the winding-field the paper just discharged from the paste-rolls is  
 115 taken up by said arbor. It will thus be readily seen that as the machine is capable of being run at high speed this continuous operation must greatly increase the production and lessen the cost.  
 120

The segmental wiper has many advantages over one of concentric form. With this latter form of wiper it is necessary to move it bodily away from the tube-forming arbor as soon as a tube is formed and carry it down  
 125 and below said arbor, so as not to interfere with an incoming strip of paper about to engage the arbor. These motions require more or less complex mechanism to carry them out. With my form of wiper it simply oscillates  
 130



back to its normal position by the same simple mechanism that effected its forward movement.

In machines of this character it is customary to employ a presser device adapted to be brought against the tube while being rolled, so as to form the same true and even and also to remove the surplus paste and to operate this device independent of the wiper. This, too, requires extra mechanism to operate it. I combine both a wiper to start the paper around the arbor and a presser and paste-scraper in one and the same tool.

While I show and have described an arrangement of cams, levers, &c., for operating the vital features of the machine, I hold myself at liberty to deviate therefrom in order to produce the required effect by substantially the same or other well-known and equivalent means.

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

1. In a paper-tube-rolling machine of the character described, the combination of an intermittently-rotatable head carrying tube-forming arbors journaled therein, a pinion for each of said arbors, a continuously-running gear located outside of said head adapted to be engaged by the pinion of the arbor on which a tube is being formed, while the other arbor and the said head remain stationary, means for automatically locking said head against rotation while a tube is being formed and unlocking the same after a tube is formed, for the purpose set forth.

2. In a paper-tube-rolling machine of the character described, the combination of an intermittently-rotatable head carrying tube-forming arbors journaled therein, a pinion for each of said arbors, a continuously-running driving-gear located outside of said head, means for rotating said head to bring the pinion of one of said arbors to register with said gear and rotate the arbor to form a tube, means for automatically locking said head against rotation while said tube is being formed, a tube-ejector above the tube-rolling field adapted to remove the previously-formed tube from the stationary arbor, for the purpose set forth.

3. The combination, in a paper-tube-rolling machine, comprising, an intermittently-rotatable head carrying independently-rotatable tube-forming arbors, a shaft on which said head is rigidly mounted, said shaft journaled in a stationary part of the machine and carrying a notched member rigidly secured on its outer projecting end, a segmental pinion surrounding said shaft having an arm pivotally supported on a stationary part of the machine and carrying a pawl adapted to engage said notched member, a segmental gear adapted to engage said segmental pinion to rotate said head through the medium of said pawl, notched

member and segmental pinion, for the purpose set forth.

4. The combination, in a paper-tube-rolling machine, comprising, paper feeding and pasting devices, an intermittently-rotatable head carrying independently-rotatable tube-forming arbors, driving-pinions on said arbors, a continuously-running driving-gear located outside of said head with which said pinions are adapted to be alternately engaged so as to rotate said arbors when in the tube-winding field, automatic mechanism adapted to lock said head against rotation while a tube is being formed, and unlock said head after the tube is formed, means for rotating said head, an ejector for removing the finished tube while a tube is being formed on another of said arbors, for the purpose set forth.

5. The combination, in a paper-tube-forming machine, comprising, paper feeding and pasting mechanism, an intermittently-rotatable head carrying independently-rotatable tube-forming arbors, pinions on said arbors, a continuously-running driving-gear located outside of said head adapted to be alternately engaged by said pinions when their arbors are in the tube-rolling field so as to rotate one arbor while the other remains stationary, automatic means adapted to lock said head against rotation while a tube is being formed, and unlock said head after the tube is formed, a support for the free end of the arbor when a tube is being formed thereon, automatic means whereby said support is brought in contact with said arbor and disengaged therefrom, a tube-ejector adapted to remove a tube from said stationary arbor while a tube is being formed on the other of said arbors rotating in the tube-rolling field, for the purpose set forth.

6. In a paper-tube-rolling machine, the combination with a rotating arbor, of a combined segmental wiper, presser and scraper adapted to reciprocate on a pivotal support and be adjusted to and from said arbor for different sizes of tubes to be formed, said combined wiper, presser and scraper carrying flexible fingers, suitable means whereby it is caused to halt temporarily while one or more of said fingers are in contact with the tube on said rotating arbor, for the purpose set forth.

7. In a paper-tube-rolling machine, the combination with a rotating arbor of a segmental wiper having flexible fingers radially projecting therefrom, for the purpose set forth.

8. The combination, in a paper-tube-rolling machine, comprising, paper feeding and pasting devices, an intermittently-rotating head carrying independently-rotating tube-forming arbors, pinions on said arbors, a driving-gear for said pinions located outside of said head with which said pinions are adapted to alternately engage so as to rotate an arbor located in the tube-rolling field, means for automatically rotating said head when a tube is



formed and locking it against rotation while a tube is being formed, a segmental wiper adapted to reciprocate on a pivotal support in close proximity to the arbor on which a  
 5 tube is being formed, said wiper carrying flexible fingers adapted to engage the paper, automatic means whereby said wiper is temporarily halted while one or more of its fingers are in contact with the tube being rolled,  
 10 for the purpose set forth.

9. The combination, in a machine for automatically rolling paper tubes, comprising, paper feeding and pasting devices, an intermittently-rotatable head carrying independently-  
 15 rotating tube-forming arbors, pinions on said arbors a driving-gear for said pinions located outside of said head, said pinions adapted to alternately engage said gear so as to rotate an arbor in the tube-rolling field, means for  
 20 automatically locking said head against rotation and unlocking the same, automatic means for temporarily supporting the free end of an arbor while a tube is being formed thereon and releasing the same, a reciprocating  
 25 segmental wiper pivotally supported in close proximity to the arbor on which a tube is being formed, said wiper carrying flexible fingers to engage said paper and tube, means for temporarily halting said wiper while still  
 30 engaged with the tube so as to wind the same smooth and even and remove the surplus paste, means for returning said wiper to its normal position, for the purpose set forth.

10. In a paper-tube-rolling machine, the  
 35 combination with a rotating arbor about which paper is rolled in tubular form, of a combined wiper, presser and scraper, of segmental form adapted to reciprocate on a pivotal support, said combined wiper, presser and scraper, carrying flexible fingers radially projecting there-  
 40

from, means whereby said wiper is caused to halt temporarily while said fingers are in contact with the tube on said rotating arbor, for the purpose set forth.

11. The combination, in a paper-tube-roll  
 45 ing machine, comprising, an intermittently-rotatable head carrying independently-rotatable arbors, pinions on said arbors, a driving-gear located outside of said head adapted to be alternately engaged by said pinions, means for  
 50 automatically locking said head against rotation and unlocking the same, a pivotally-supported segmental wiper adapted to oscillate on its support, means whereby it is halted while its fingers are still in contact with a tube  
 55 being formed on one of said arbors, means for rotating said head to carry the arbor out of the rotative influence of said driving-gear so that, while an arbor on which a tube has been  
 60 formed is passing out of its tube-winding position, the wiper is retreating to its normal position and the other arbor is carried into position to form another tube, an ejector adapted to remove the previously-formed  
 65 tube, for the purpose set forth.

12. In a paper-tube-forming machine of the character described, of combined feeding and pasting rolls of different diameters, circumferential grooves formed in the faces of said  
 70 rolls, the lower roll having a portion of its surface cut away, means whereby the same circumferential speed is imparted to both rolls, for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 21st day of  
 75 March, A. D. 1903.

HOBERT J. HURD

Witnesses:

S. J. CHAFFEE,  
 G. W. FINN.