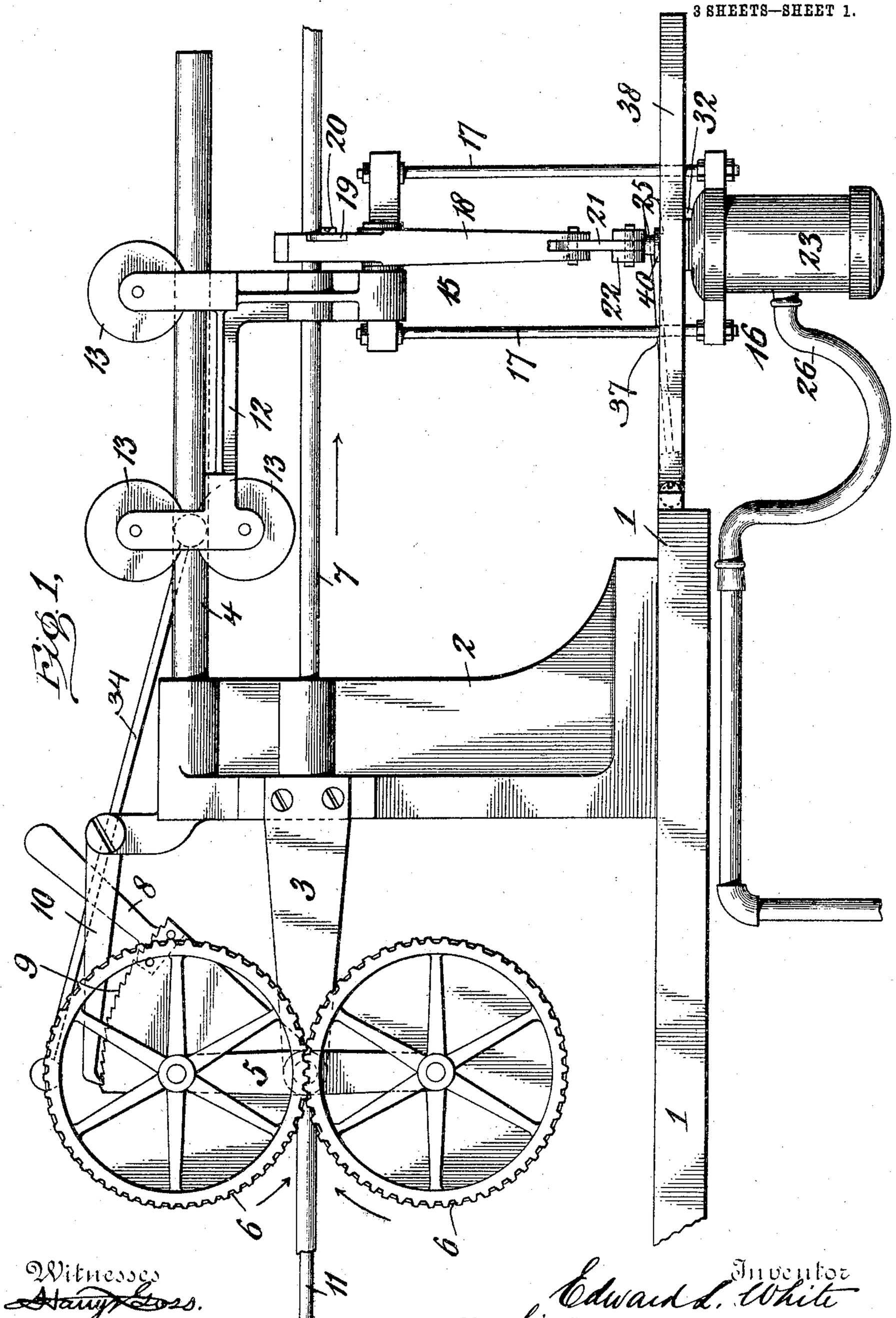
No. 789,776. PATENTED MAY 16, 1905.

E. L. WHITE.

CUTTING MECHANISM.

APPLICATION FILED AUG. 8, 1902.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

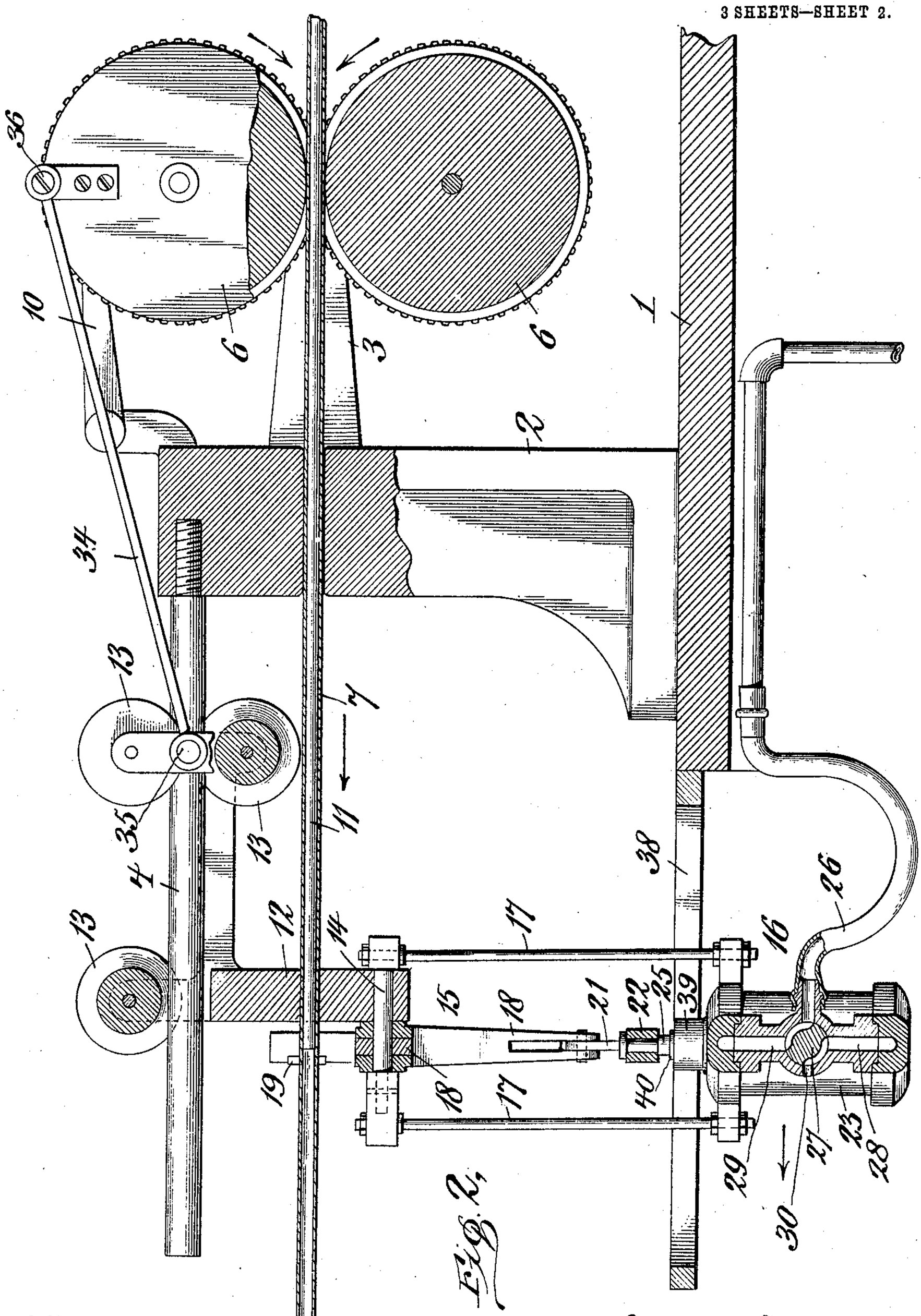

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 5,

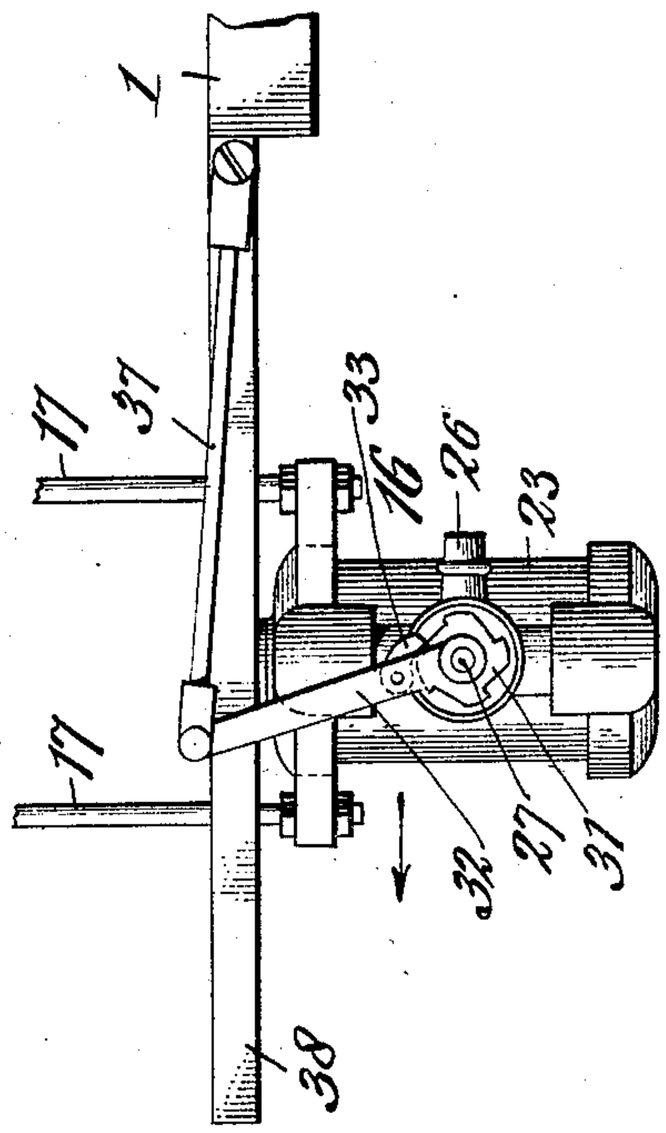

Fig. 6,

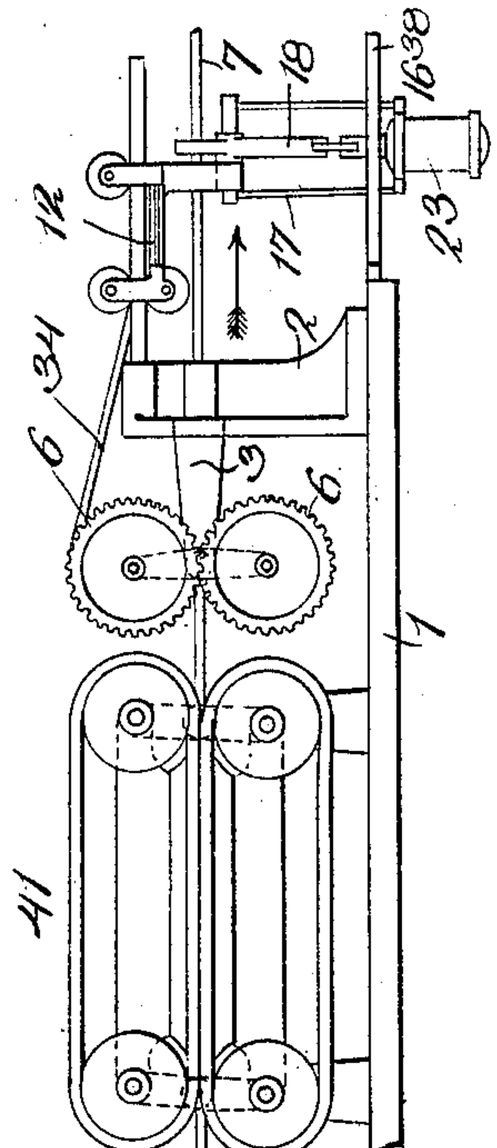

Fig. 3,

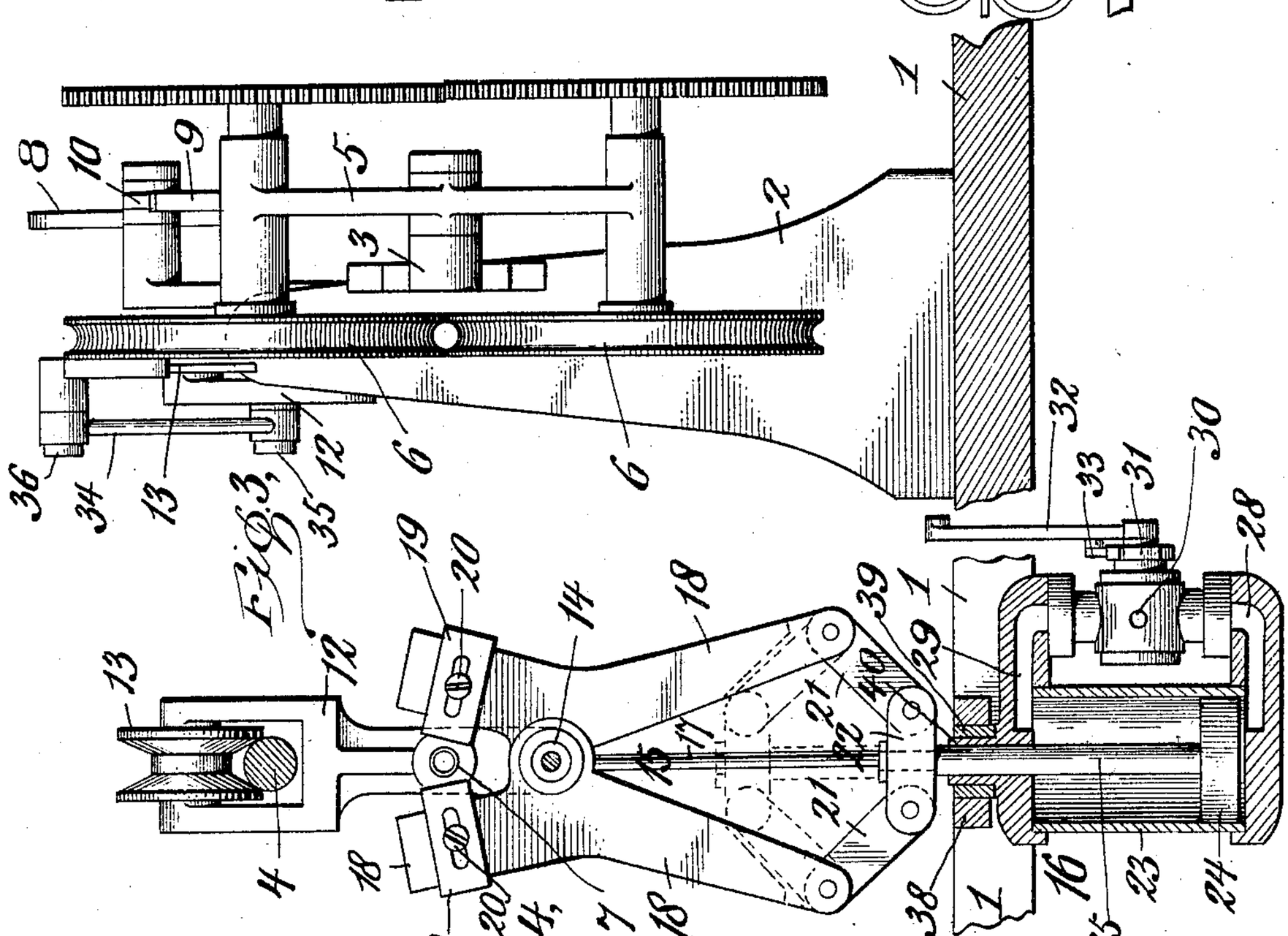

Fig. 4,

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UNITED STATES PATENT OFFICE.

EDWARD L. WHITE, OF ENGLEWOOD, NEW JERSEY.

CUTTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 789,776, dated May 16, 1905.

Application filed August 8, 1903. Serial No. 168,719.

To all whom it may concern:

Be it known that I, EDWARD L. WHITE, a citizen of the United States of America, residing at Englewood, county of Bergen, State of New Jersey, have invented certain new and useful Improvements in Cutting Mechanism, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in cutting mechanism, and particularly to cutting mechanism such as is employed in tube-making machinery for cutting off lengths of tube.

My invention comprises reciprocating cutting means adapted to effect a cutting operation while traveling in the same direction and substantially at the same speed as the tube.

The main object of my invention is to sever a tube into predetermined lengths while it is being fed forward continuously.

My invention further consists in certain novel details of construction and combination of parts to be particularly described in the following specification, and other advantages will appear hereinafter.

I will now proceed to describe a cutting mechanism embodying my invention and will then point out the novel features in claims.

In the drawings, Figure 1 is a rear elevation of cutting mechanism embodying my invention. Fig. 2 is a view in central vertical longitudinal section of the same viewed from the other side thereof. Fig. 3 is an end elevation of the same. Fig. 4 is a detail view in transverse vertical section, showing particularly the cutters and the operating mechanism therefor. Fig. 5 is a detail front view of the operating mechanism for the cutters. Fig. 6 is a view, on a small scale, of a portion of a tube-forming machine having my improved cutting mechanism attached thereto.

In the embodiment of my invention herein a stationary bed-plate 1 supports a pedestal 2, to which is secured a rearwardly-extending bracket 3 and a forwardly-extending guide-stud 4. A bearing-arm 5 is pivoted to the bracket 3 at its rear end, and the said bearing-arm forms a support for two feed-wheels 6 6. The feed-wheels 6 6 have grooved faces adapted to engage a tube 7 and to be fed or rotated thereby. They are preferably geared together and are driven by engagement with the tube in the direction of the arrows in the drawings. The tube itself is continuously fed forward by any suitable means. Such means, however, *per se* forms no part of the present invention, and hence I will not describe or illustrate the same in detail. For the purposes of this specification, however, I have shown in Fig. 6 means at 41 comprising a pair of belts adapted to engage the tube and to feed same forward, such belts driven from any suitable source. (Not shown here.) Continuous movement of the belts 41 will result in a continuous forward feeding of the tube, and so long as the tube is so moved forward such movement will be partaken of by the feed-wheels 6. The bearing-arm 5 is provided with an operating-lever 8 and a quadrant having ratchet-teeth 9 thereon. By grasping the operating-lever 8 the bearing-arm may be swung upon its support, so as to cause the said wheels to press more or less closely upon the tube, and a pawl 10, pivoted to an extension of the pedestal 2, engages the ratchet-teeth 9 to maintain the parts in the desired position to which they have been adjusted. A stationary mandrel 11 is arranged within the tube 6 and is suitably held against movement at some point near its rear end. (Not shown.)

As shown herein, a carriage is suitably supported from the guide-stud 4 by antifriction-rollers 13. The carriage 12 supports a cross-head 14, on which two cutters 15 are pivotally mounted and from which cutter-operating mechanism 16 is suspended by means of side rods 17. The cutters 15 comprise levers 18 and cutting-knives 19. The cutting-knives are shown as secured to the cutting-levers 18 by means of screws 20, the said cutting-knives being slotted to permit their adjustment as they become worn away. The lower ends of the levers 18 are connected by toggle-links 21 with a cross-head 22. Movement of the cross-

head 22 to straighten the toggle-links 21 will bring the cutting-knives 19 together to sever the tube passing between them, while a movement of the cross-head 22 from such position in either direction to carry the links 21 out of alinement either to the position in which they are shown in full lines in Fig. 4 or to the opposite position, in which they are shown in dotted lines in said figure, will move the cutting-knives apart, so as to clear the tube.

To effect movement of the cross-head 22, an operating-cylinder 23 is provided, said cylinder secured to the rods 17 and carried by the cross-head 14 and carriage 12, as previously described, and a piston 24 is mounted in the said cylinder and is connected to the cross-head 22 by means of a piston-rod 25. Motive fluid under pressure is admitted to the cylinder through a pipe 26, connecting with a source of supply, (not shown,) and admission from the pipe 26 to the front or rear end of the cylinder is controlled by means of an admission and exhaust valve 27. Ports 28 and 29 lead from the valve-chamber of the valve 27 to the lower and upper end of the cylinder, respectively, and a port 30 leads from the said valve-chamber to exhaust. In one position of the valve, as shown in Fig. 2, admission from the pipe 26 is permitted through the port 29 to the upper end of the cylinder, while the lower end of the cylinder is permitted to exhaust through the port 28 and exhaust-port 30. In a reverse position of the valve or a position of the same rotated ninety degrees from the position in which it is shown in Fig. 2 fluid will be admitted from the pipe 26 through the port 28 to the lower end of the cylinder and exhaust permitted to take place from the upper end of the cylinder through the ports 29 and 30.

The valve 27 is provided at a point exterior its casing with a ratchet-wheel 31, rigidly secured to its stem, while an operating-lever 32, carrying a pawl 33, is loosely mounted upon the said stem. A reciprocation of the operating-lever 32 through an arc of ninety degrees will cause the pawl 33 to travel loosely over the ratchet-wheel 31 while moving in one direction and will cause same to engage one of the teeth of said ratchet-wheel to carry the valve therewith through an arc of ninety degrees while moving in the other direction.

The cutting mechanism, including the carriage 12, cutters 15, and operating mechanism supported by the rods 17, are caused to reciprocate once for every complete revolution of the feed-wheels 6 6 by means of a connecting-rod 34, connected to the carriage 12 at 35 and connected to the upper feed-wheel 6 at a pivotal point 36, the axis of which is substantially coincident with the periphery of said feed-wheel. The connecting-rod 34 is connected to a feed-wheel 6, which has nothing to do but to operate the carriage, rather than to a part of the mechanism which feeds the tube forward, because it sometimes happens that the feeding mechanism for the tube slips with reference to the tube—that is to say, it slightly overruns same—while the feed-wheels 6 6, being operated by the tube and having nothing else to do but reciprocate the carriage, maintain a correct relation to the tube without such danger of slipping. The pivotal connection of the connecting-rod 34 to the feed-wheel at this point will cause the cutting mechanism to be reciprocated once during every feeding movement of the tube 7 a distance substantially equal to the length of the circumference of the feed-wheels. The speed and direction of the movement of the said mechanism will vary with respect to the feeding movement of the tube 7; but at the moment the point 36 is coincident with a straight line passing from the center of one said feed-wheel to the other—*i. e.*, a position at one hundred and eighty degrees with respect to the position shown in Figs. 1 and 2 of the drawings—the speed and direction of the mechanism will be identical with the speed and direction of movement of the tube. It is at exactly this moment that the cutting-off operation should take place in order that a clean cut may be made. I therefore connect the operating-lever 32 by means of a link 37 with a stationary portion of the device, as the bed-plate 1, so that the reciprocating movement of the operating mechanism compels a vibratory movement of the operating-lever 32 with the desired arc. I then so arrange and construct the valve 27 that just prior to the moment the parts reach the above-mentioned cutting-point the valve will be so turned as to admit motive fluid to the cylinder. At alternate strokes motive fluid will be admitted to the upper and lower ends of the cylinder and exhaust will be permitted from the opposite ends, respectively. A movement of the piston from either one end of the cylinder to the other will have the effect of momentarily drawing the cutters together to cut off the tube in the manner just explained, it being entirely immaterial as to whether the piston moves from the bottom of the cylinder to the top or from the top to the bottom. The cutting movement will be an exceedingly rapid one, as the operating-cylinder is quite small and the admission thereto will be quite rapid. The toggle mechanism is one which gives an effective, powerful, and rapid movement to the cutters, so that admission of motive fluid to the cylinder being effected just prior to reaching the cutting-point the cutters will be rapidly operated at precisely the cutting-point or, in other words, at just the moment the cutters are moving at the same speed and in the same direction as the tube. A slotted

guideway 38 extends forward from the base-plate 1 and forms a lateral guide for the cutting mechanism. An antifriction-roller 39 is mounted upon a boss 40 upon the upper end of the cylinder for engaging the said guideway.

In the specification and drawings I have described and illustrated my invention as applied to cutting off lengths of hollow tubes. It will be understood that my invention is equally applicable for other purposes, such as the cutting off of solid rods or the cutting off of paper tubes filled with tobacco, as in the manufacture of cigarettes, &c. It will also be obvious that the foregoing is but one embodiment of my invention and that the same is capable of many and varied modifications within the spirit and scope of my invention and, further, that certain parts may be employed in connection with other parts of different construction. Hence I do not desire to be limited only to the precise details of construction and combination of parts herein.

What I claim is—

1. In a cutting mechanism, the combination with means for continuously feeding in one direction an article to be severed, and a crank-pin arranged to have a planetary movement of revolution synchronous with such feed, of a cutter, a carrier therefor, a connecting-rod connecting said crank-pin with said carrier, and means for operating the cutter at a predetermined point in the movement of the carrier.

2. In a cutting mechanism, the combination with means for continuously feeding in one direction an article to be severed, and a crank-pin arranged to have a planetary movement of revolution synchronous with such feed, of a cutter, a carrier therefor, a connecting-rod connecting said crank-pin with said carrier, and means controlled by movements of the carrier for operating the cutter at a point about midway of the movement of reciprocation of the carrier.

3. In a cutting mechanism, the combination with means for continuously feeding in one direction an article to be severed, and a feed-wheel whose periphery engages the said article, of a cutter, a carrier therefor, a crank-pin carried by said feed-wheel or part movable coincident therewith at a point opposite its said periphery, a connecting-rod connected to said crank-pin, and to said carrier, and means for operating the cutter at a predetermined point in the movement of the carrier.

4. In a cutting mechanism, the combination with continuously-rotating feed-wheels 6, one of said feed-wheels provided with a crank-pin 36 at a point therein opposite its periphery, of a cutter, a carrier for same, a connecting-rod connecting said carrier with said crank-pin 36, and means for operating said cutter at a predetermined point in the rotation of said feed-wheels.

5. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device comprising two levers 18, a carrier therefor, means for reciprocating the carrier, toggle mechanism for operating the said levers, and means for operating the said toggle mechanism at a predetermined point in the movement of the carrier.

6. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means continuously engaging the article operated upon for reciprocating the carrier, and fluid-pressure-operated means for operating the cutting device.

7. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means for reciprocating the carrier, toggle mechanism for operating the cutting device, and fluid-pressure-operated means for operating the toggle mechanism.

8. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means for reciprocating the carrier, fluid-pressure-operated means carried by the carrier, a fluid-pressure controller, and means operated by the movements of the carrier for operating the said controller.

9. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means for reciprocating the carrier, fluid-pressure-operated means carried by the carrier, a valve traveling with the fluid-pressure means for controlling admission of fluid-pressure thereto, an operating-lever for said valve, and a connection between said operating-lever and a stationary portion of the device.

10. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means for reciprocating the carrier, fluid-pressure-operating means for operating the cutting device, said fluid-pressure-operating means including a piston, and means connecting same with said cutting device, whereby a cutting operation is effected upon movement of the piston in either direction.

11. In a cutting mechanism, the combination with means for feeding forward an article to be severed, a cutting device, a carrier therefor, means for reciprocating the carrier, fluid-pressure-operating means carried by the carrier comprising a cylinder and a piston therein, admission and exhaust valve mechanism for admitting and exhausting motive fluid alternately to and from opposite ends of the said cylinder, and a connection between the piston in said cylinder and the cutting device,

whereby a cutting movement of the cutting device is effected upon each movement of the said piston in either direction.

12. In a cutting mechanism, the combination with means for continuously feeding in one direction an article to be severed, and a feed-wheel adapted to engage the said article and to be operated thereby, of a cutting device, a carrier therefor, means connecting with said feed-wheel for reciprocating the carrier, and means for operating the cutting device at a predetermined point in the reciprocation of the carrier.

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