

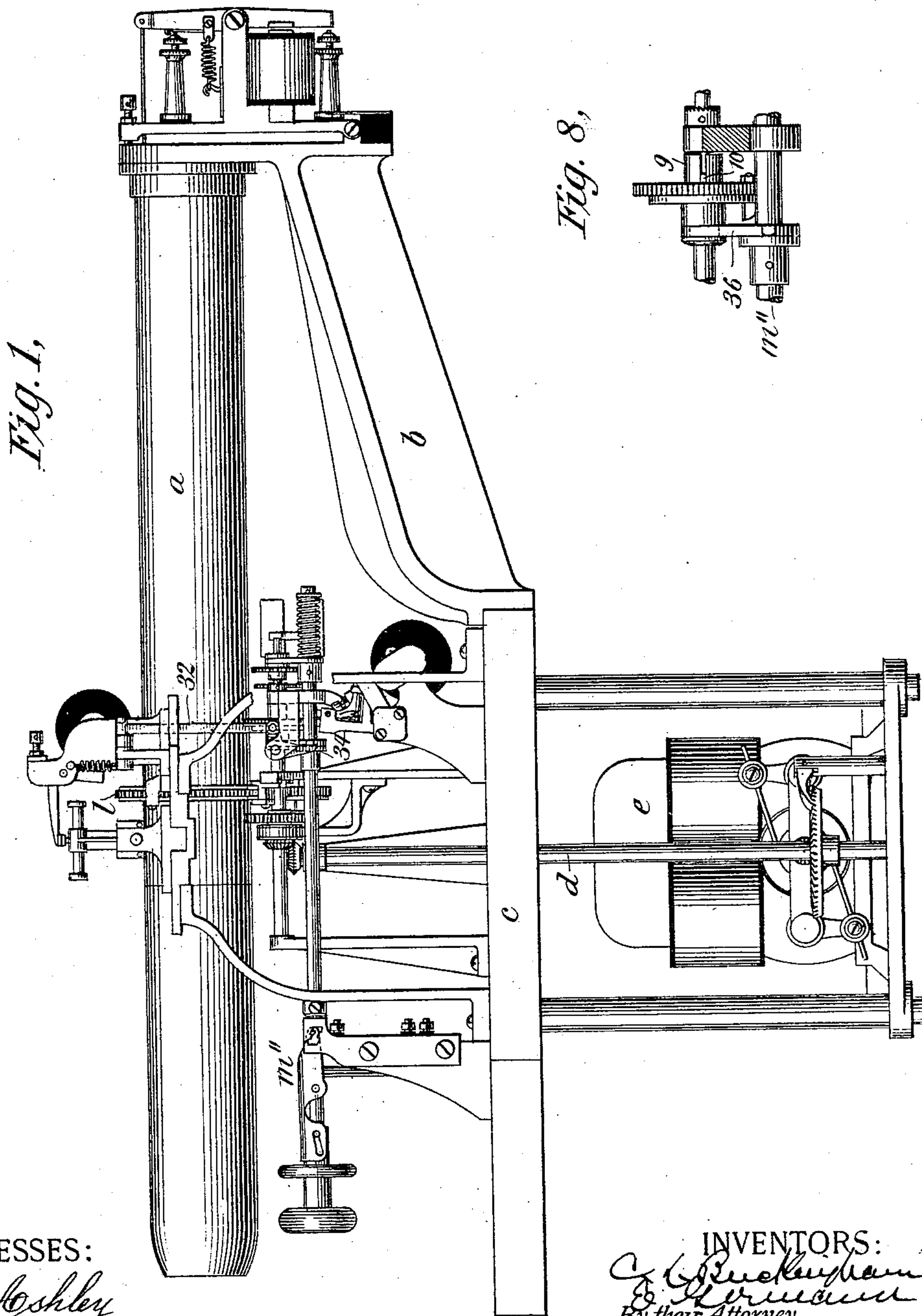
(No Model.)

5 Sheets—Sheet 1.

C. L. BUCKINGHAM & E. GERMANN.  
PRINTING TELEGRAPH.

No. 579,635.

Patented Mar. 30, 1897.



WITNESSES:  
*C. E. Ashley*  
*H. W. Lloyd*

INVENTORS:  
*C. L. Buckingham*  
*E. Germann*  
By their Attorney  
*C. L. Buckingham*

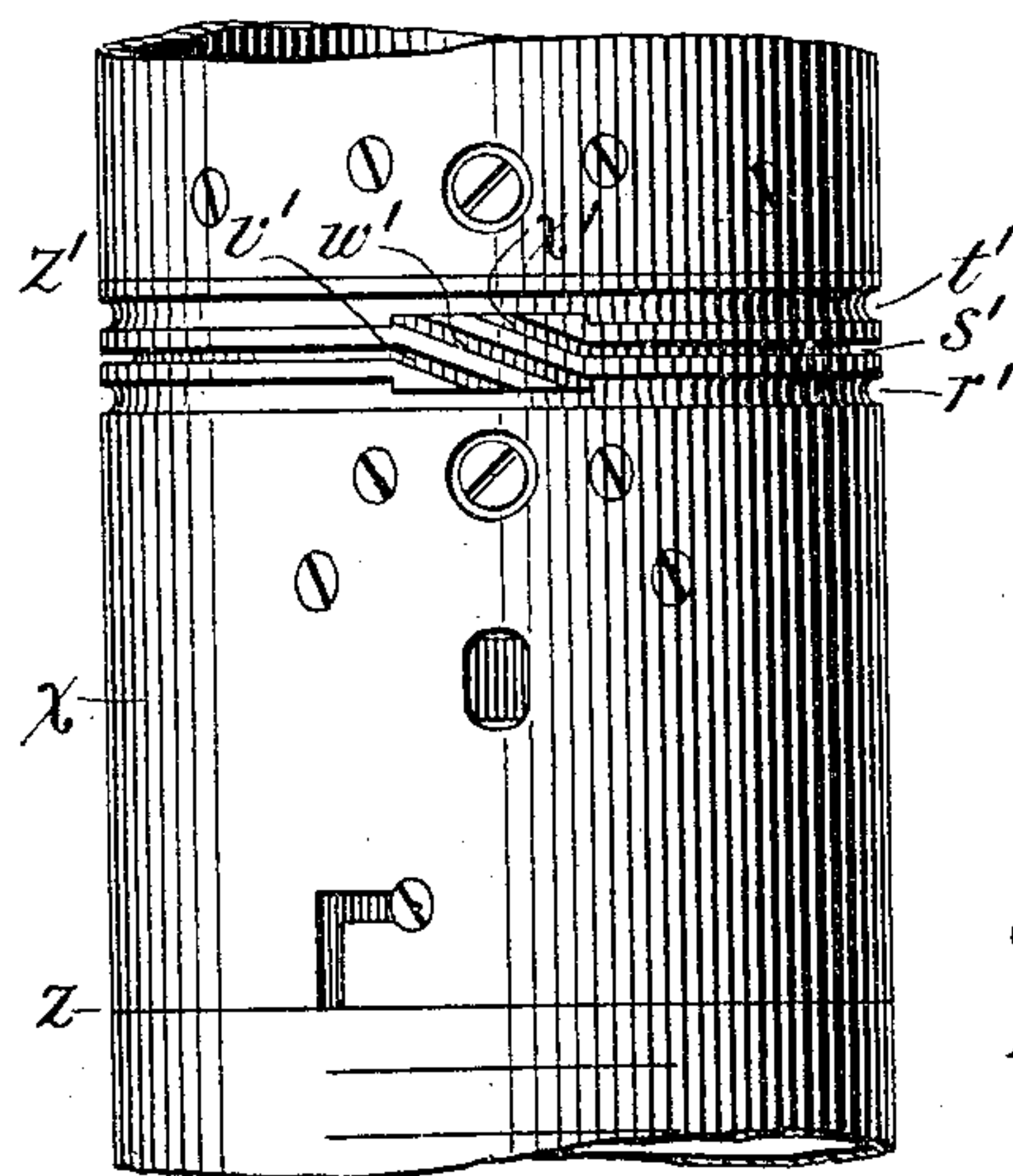
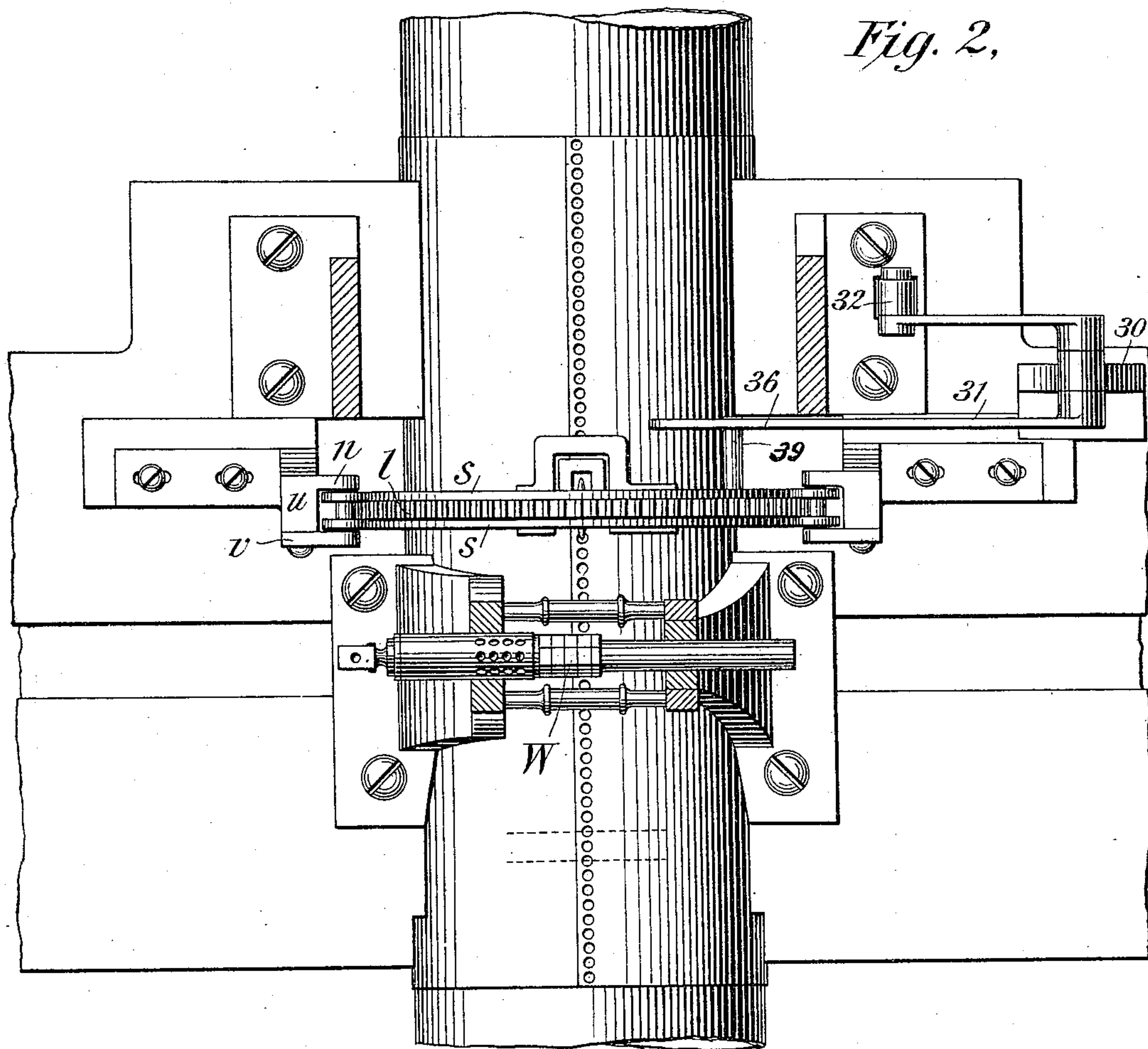
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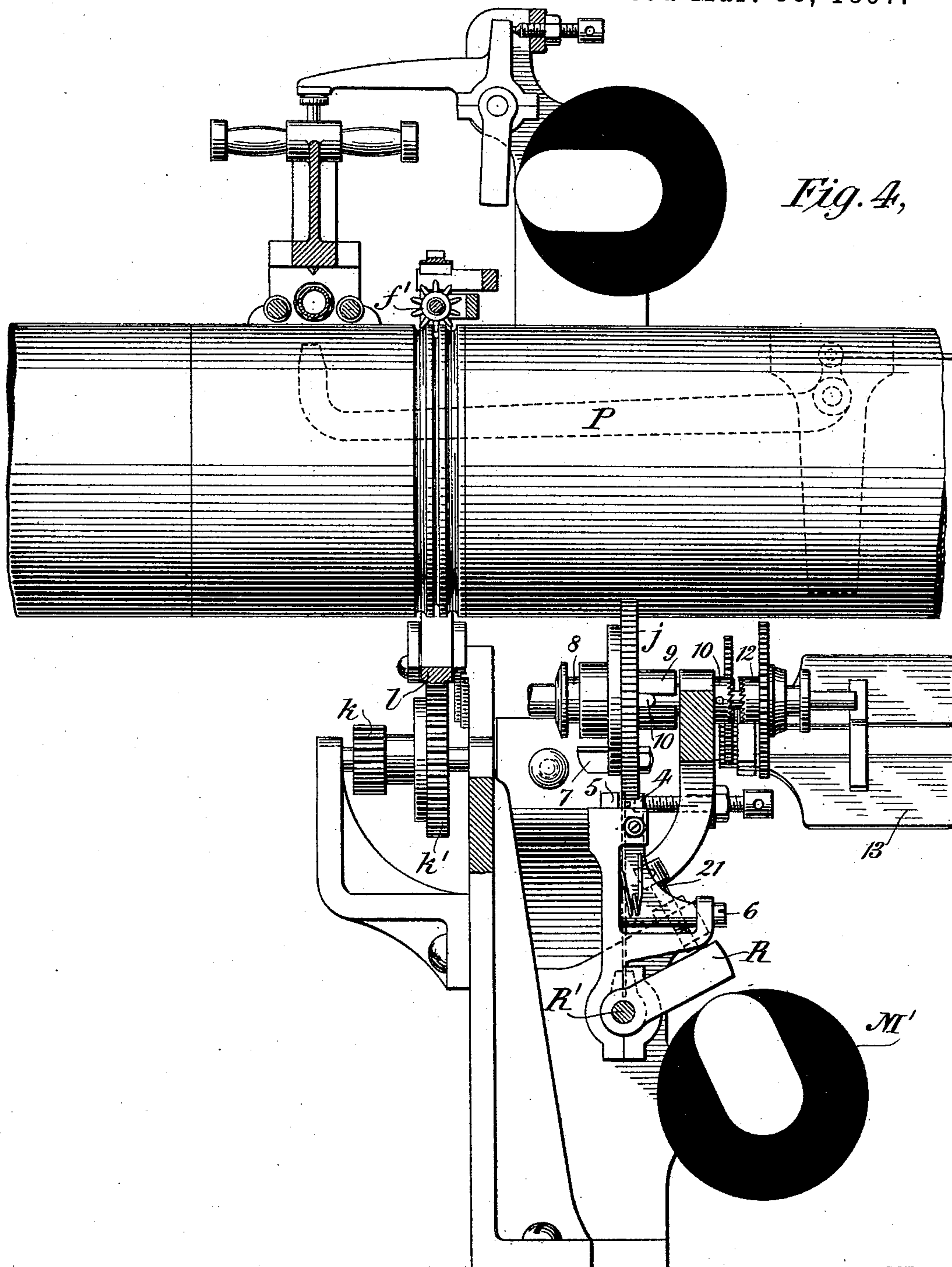
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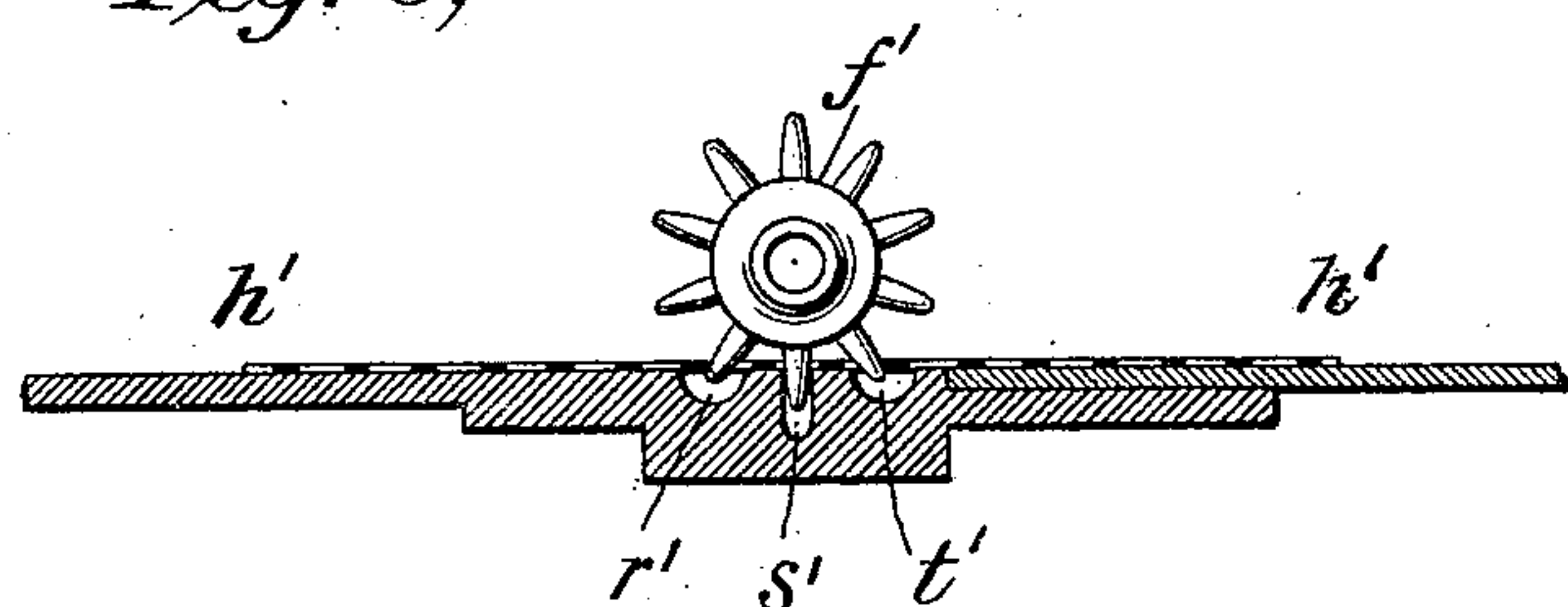
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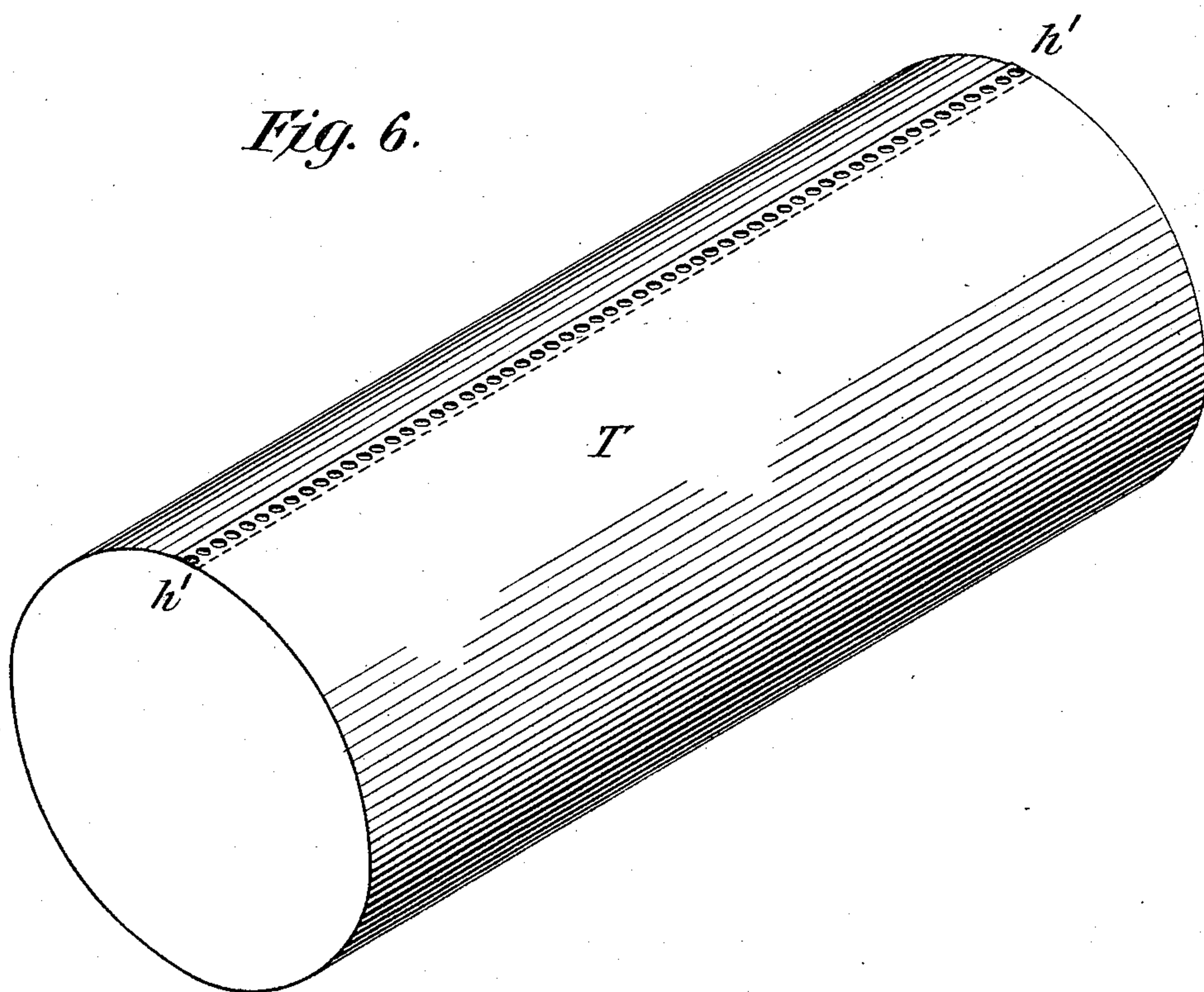
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*Fig. 5,*



*Fig. 6.*



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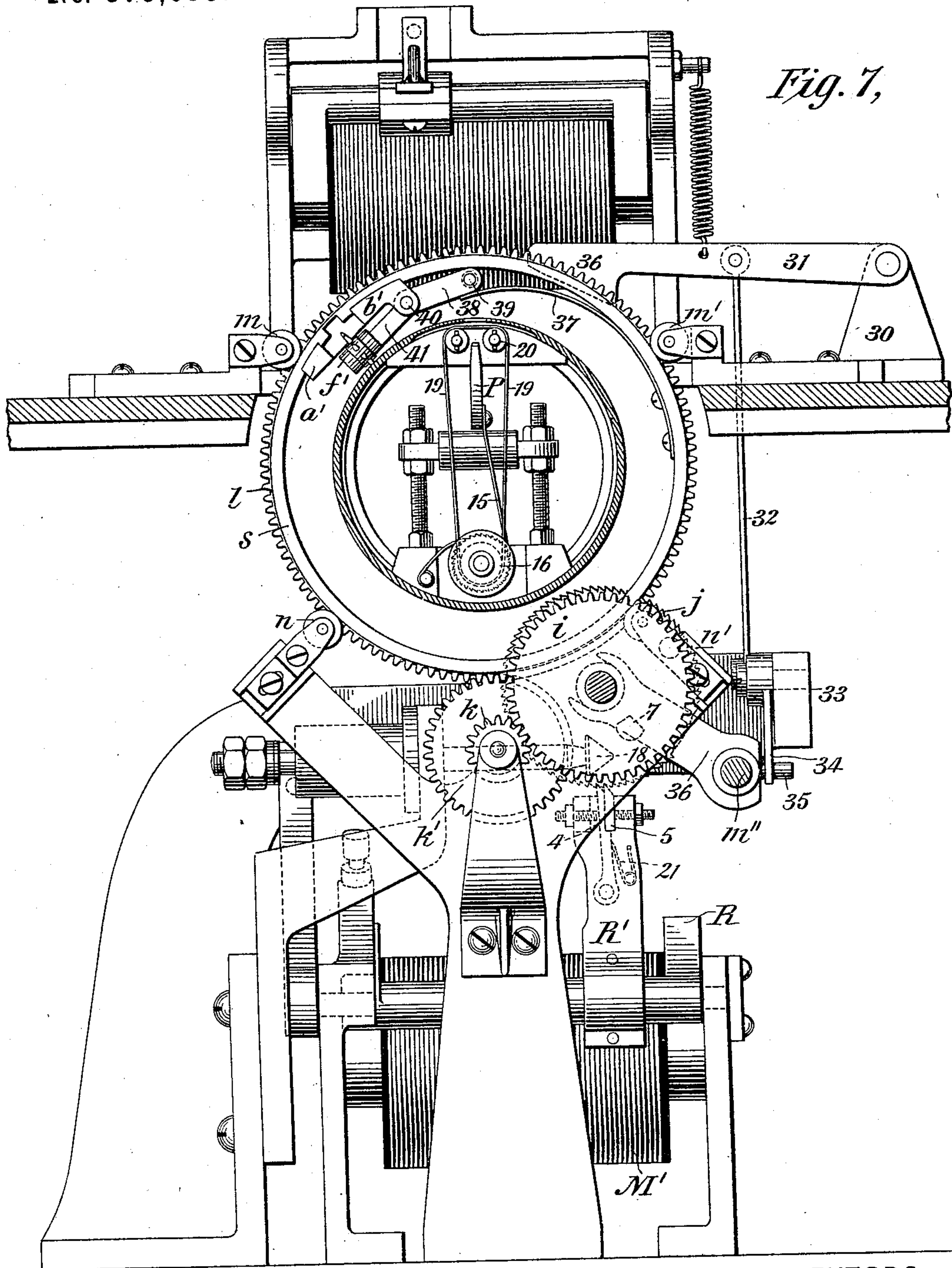
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# UNITED STATES PATENT OFFICE.

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## PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 579,635, dated March 30, 1897.

Application filed September 3, 1896. Serial No. 604,713. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES L. BUCKINGHAM, of the city and county of New York, and EMIL GERMANN, of Brooklyn, county of Kings, State of New York, citizens of the United States of America, have made a new and useful improvement in that class of printing-telegraphs in which messages are printed upon sheets of paper whose edges are pasted or otherwise fastened together to form a tube, said tube being thereafter placed upon a stationary tube or support and given rotary and axial movements for feeding the same from one letter or space position to the next and from line to line throughout a message, of which the following is a specification.

In an application filed by us August 28, 1896, Serial No. 604,208, we have described and claimed an invention the object of which is to positively effect a rotary and axial feeding of the paper tube, and to that end we there showed an escapement-wheel, subject to the continuous propulsive action of a motor, having a number of teeth equal to the number of characters in each line upon a page, the escapement-wheel being directly connected by a train of spur-wheels or other gearing with the paper in such manner that from the beginning to the end of a message the sheet is positively and mechanically geared with the escapement-wheel; and as a special means for effecting such gear connection between the paper tube and an escapement-wheel we provide in the lap or double thickness of paper, where the edges are pasted together, a line of perforations, into the holes of which the teeth of a spur-wheel, positively joined with the escapement-wheel, are adapted to mesh, and with which the teeth of said spur-wheel are in mesh throughout the printing of a message.

Our present invention relates to certain improvements other than those disclosed in said application, Serial No. 604,208, for conveniently enabling the removal of one paper tube at the end of a message and the insertion immediately thereafter of a second tube.

Our invention is set forth by reference to the accompanying drawings, in which—

Figure 1 represents a side view of a printer of that class in which messages are printed

upon sheets of paper first made into tube form. Fig. 2 is a plan view showing a stationary support for a paper tube, a type-wheel and dogging-thimble for the printer, and a part of the gearing for rotating the blank or paper tube upon which the message is to be printed. Fig. 3 is a plan view showing that part of the tubular support and cam-grooves thereon whereby the wheel gearing with the row of holes in the lap of the paper tube, is enabled to feed said tube axially from one line position to the next. Fig. 4 represents a side view of the fixed support for the paper tube, the dogging apparatus for setting the type-wheel, and the train of gearing by which the feed action is communicated from a step-by-step escapement to the paper tube or blank. Fig. 5 represents a side view of the spur-wheel with its teeth meshing within the row of holes in the lap of a paper tube and a cross-section of one part of the shell of which the stationary support for the paper tube is formed. Fig. 6 is a perspective view of a tube or blank, showing a row of holes in the lap formed by the double thickness of paper where its edges are pasted or otherwise fastened together. Fig. 7 is an end view showing the fixed tubular support, partly in section, with various details of construction, and particularly those of the gear-train for mechanically and positively joining a step-by-step escapement with the paper tube or blank. Fig. 8 represents the escapement-wheel, a zero-stop thereon, and its sleeved support whereby it may be moved along its shaft or journal for the purpose of disengaging the teeth of said wheel from the escapement-pallets.

Referring to Fig. 1, *a* represents a metallic tube rigidly supported at its right end upon a bracket *b*, affixed to a base-plate *c*. Upon the metallic tube *a* is placed a sheet of paper formed into a tube *T* by pasting or otherwise fastening its edges together, as shown in Figs. 2 and 6, and upon this tube messages are printed line by line in page form. The tube *T*, formed of a sheet of paper whose edges are fastened together, is provided with a line of holes *h h*, into which the teeth of a small spur-wheel *f'* are connected, as shown in Fig. 5, said wheel being positively geared with a step-by-step or escapement wheel *j*, whereby



the tube may be given a circumferential feed a step at a time for each succeeding letter or space and axially from line to line in forming a page. The train of gearing for connecting the escapement-wheel with the paper tube is represented in Figs. 1, 2, 3, 4, 5, and 7. In this connection  $j$  is a ratchet-wheel upon whose shaft is rigidly fixed a wheel  $i$ , meshing with a wheel  $k$ , and upon the shaft of the latter is placed a wheel  $k'$ , gearing with a large gear-wheel  $l$ , which surrounds the tubular support  $a$  and which is supported upon friction-rollers  $m m' n n'$ . The ring-wheel  $l$  is of a diameter considerably in excess of that of the supporting-tube  $a$  and sufficiently greater to enable the mounting of a small spur-wheel  $f'$  upon or within the ring-wheel in such relation that the teeth of  $f'$  may project through the holes in the paper tube and thence into circumferential or diagonal grooves formed in the periphery of the tubular support. Thus as the escapement or step-by-step wheel  $j$  is permitted to rotate its movements are imparted by way of spur-wheels  $i k k' l$  to a small spur-wheel  $f'$ , the teeth of which, projecting through the holes of the paper tube, carry the latter circumferentially from one letter position to the next around the stationary tubular support. This train of gear is subject to a continuous propulsive action from a motor  $e$ , Fig. 1, gearing with a shaft  $d$ , which in turn, by means of a beveled gear, imparts a winding tendency to one end of a coiled spring, the other end of which is connected with the shaft upon which the escapement-wheel  $j$  and spur-wheel  $i$  are mounted, and by this means with each movement of the escapement-pallets which control wheel  $j$  the train of wheels connecting  $j$  with the wheel meshing with the paper tube is actuated. The teeth upon wheel  $j$ , with the exception of a blank portion, are equally spaced over its periphery and are of a number equal to the characters in each line of the printed message, while that portion of the periphery upon which no teeth appear is of such length as to permit an abnormally long step of rotation—a step usually made equal to six or seven of the shorter steps—and it is by this means that the paper tube is at a single step of the escapement permitted to rotate a distance representing the two margins of the printed page. The escapement just referred to is operated by magnet  $M'$  and an armature  $R$ , which is pivoted upon a shaft  $R'$ , upon which is carried a suitable bracket and pawls 4 and 5, the pawl 5 being fixed with reference to its supporting-bracket, while 4 is movable around an axis 6. By this means as armature  $R$  is attracted pawl 5 will be drawn into a space between teeth of the ratchet-wheel, while pawl 4 will be disengaged. This action, however, permits the escapement-wheel to move only a very small distance, while at the same time pawl 4 is disconnected from the wheel, and by means of spring 21 said pawl is caused to move backward in a

direction opposite to the rotation of the escapement-wheel and into such position that upon the retraction of armature  $R$  it will drop into the next notch an instant before pawl 5 is disconnected. That is to say, just before disengagement of pawl 5 pawl 4 will be thrown into that cavity of the wheel next back of the one which pawl 5 had left, thus leaving the wheel, under the action of the propelling-motor, free to rotate an additional step.

In Figs. 2, 4, and 8 we have shown a preferred form of our ring-wheel  $l$ , in which is represented a ring having horizontal projecting edges or flanges  $s s$  and a surrounding series of spur-teeth. By adopting this construction wheel  $l$  may be easily mounted and maintained in its position, while at the same time its teeth mesh with spur-wheel  $k'$ , since the friction-rollers or guides  $m m' n n'$ , having central grooves, will support the wheel both circumferentially and axially. Moreover, while the peripheries of these rollers serve as guides and supports for the flanges  $s s$ , the central grooves of the rollers afford a passage-way for the spur-teeth of the wheel, the sides of said grooves at the same time serving to hold said wheel in an accurate axial position. Upon the inner periphery of the wheel  $l$  is affixed a bracket or shoe, (particularly shown in Figs. 4 and 7,) within which is pivoted the small spur-wheel  $f'$ . In Fig. 4 is shown a bracket formed of legs  $a' b'$ , fastened upon or within the ring-wheel  $l$ , between which project the teeth of wheel  $f'$ , while upon  $b'$ , at 40, is pivoted a lever having two arms 38 41, upon the latter of which is mounted wheel  $f'$ . Upon the free end of lever 38 is a horizontal projecting pin 39, which during rotation of ring  $l$  may come in contact with cam 36, formed at the free end of lever 31, the latter being pivoted at 30. As the paper tube arrives at that point of its rotation where the long step takes place pin 38 may, when cam 36 is depressed, come in contact therewith and thereby raise spur-wheel  $f'$  above the paper tube and sufficiently far to remove its teeth from the holes in the lap of the tube and from the circumferential and diagonal grooves formed around the stationary support. The special purpose of this arrangement is to enable paper tubes to be easily removed from and others quickly inserted in the machine. In the normal operation of the machine cam 36 is in an upper position, and as the ring-wheel makes one rotation after another pin 39 will not come in contact therewith. At the end of a message, however, when escapement-wheel  $j$  is disconnected from its pallets, cam 36 is depressed into a lower position, whereby as the escapement-wheel rotates into a zero position pin 39 will, near the latter part of the movement and while the teeth of  $f'$  would be passing through the diagonal slots  $v' w' x'$ , be lifted therefrom and entirely away from the paper tube.

As shown in Figs. 1 and 7,  $m''$  is a horizon-



tal rod which is pulled by the operator for drawing wheel *j* to the left away from the escapement-pallets 4 5. This is done by means of an arm 36, having a forked end surrounding the slotted portion *h* of the hub of said wheel. Upon the pull-rod is also a pin 35, which engages within the slotted end of arm 34, pivoted at 33, which as rod *m''* is moved draws rod 32 backward, and with it lever 31. Thus as the escapement-wheel is released and as the unison-pin 7 comes in contact with stop 18, cam 36 being depressed, the teeth of wheel *f'* are thrust from the grooves surrounding the stationary support of the paper tube. Upon thrusting the pull-rod *m''* back to the right, or into its normal position, cam 36 will be raised above the path of pin 39, whereupon wheel *f'* will be lowered and its teeth will be pressed into the holes of the paper, assuming a new tube to have been placed upon the support. As a means for positively depressing wheel *f'* a spring 37 (shown in Fig. 7) is employed, the free end of which bears beneath arm 38.

The escapement-wheel and disconnecting apparatus are of the form shown in our preceding application, the hub of the escapement-wheel 9 being provided with a slot within which is a pin 10, whereby said wheel may be moved along its shaft, although still subject to rotation when disconnected from the pallets of the escapement-wheel. We have also shown, as in our former case, a fly-train having a fan 13, which is connected and disconnected by means of a clutch 11 and 12, the clutches being brought together upon disconnection of the escapement-pallets from wheel *j* and again separated when the wheel is returned into connection with said pallets.

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

1. In a printing-machine, the combination of a stationary support, a paper tube, a step-by-step or escapement wheel *j*, a train of gear, feed-wheel *f'*, a manual disconnecting apparatus, cam 36, means for lowering said cam through said manual disconnecting apparatus, and means, substantially as described, whereby said wheel *f'* may be raised and lowered, as and for the purpose set forth.

2. In a printing-machine, the combination

of a stationary support, a tube of paper thereon having a row of holes, circumferential and diagonal slots in said fixed support, feed-wheel *f'*, a step-by-step or escapement wheel, a train of gearing joining said step-by-step and feed wheels, and means for raising the feed-wheel from the paper tube at the end of a message, as and for the purpose set forth.

3. In a printing-machine, the combination of a stationary support, a paper tube mounted thereon having a row of holes at its lap, a step-by-step or escapement wheel, a feed-wheel gearing with said row of holes, a train of gearing joining the escapement and feed wheels, a cam with which the bearings of the feed-wheel engage, and a manual device for disconnecting the escapement-wheel from its pallets at the end of a message.

4. In a printing-machine, the combination of a stationary, tubular support, a paper tube, a feed-wheel engaging therewith, an escapement or step-by-step wheel, a train of gearing connecting said escapement and feed wheels, and means for raising and lowering said feed-wheel, for the purpose set forth.

5. In a printing-machine, the combination of a stationary support, a tube of paper, a feed-wheel, an escapement-wheel, a train of gearing joining said wheels, a cam for raising said feed-wheel from the paper tube at the end of a message and a manual device for operating said cam, for the purpose set forth.

6. In a printing-machine, the combination, substantially as described, of a stationary, tubular support, a paper tube, feed-wheel *f'*, ring-wheel *l*, a pivoted support 40, carrying arms, 41, 38, cam 36, spring 37, circumferential grooves in said tubular support, escapement-wheel *i*, unison-stops 7 and 18, manual disconnecting-rod *m''*, and means whereby the movement of said rod is communicated both to lower cam 36 and disconnect escapement-wheel *j* from its pallets, as and for the purpose set forth.

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Witnesses:

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JOHN C. SANDERS.