

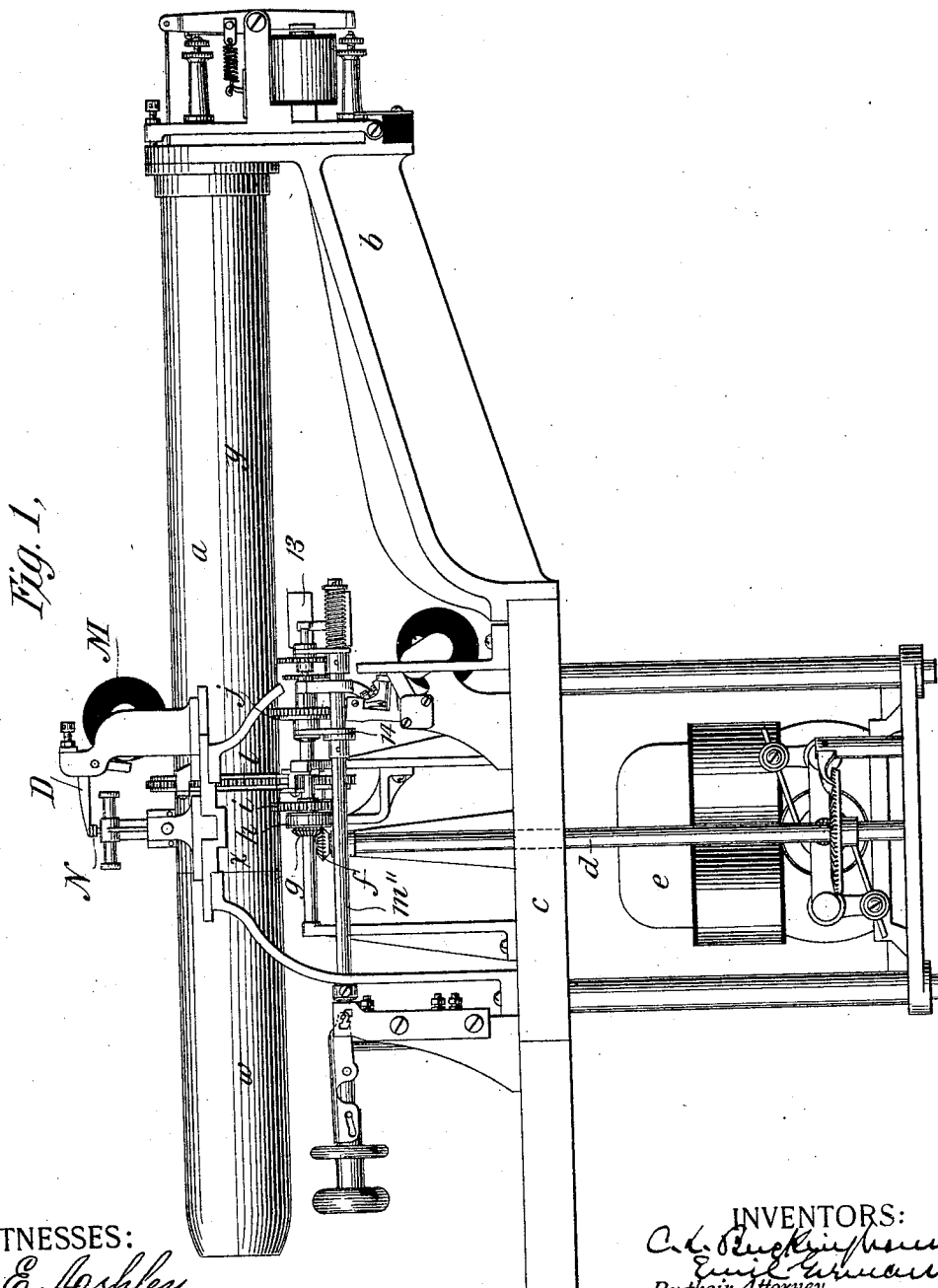
(No Model.)

5 Sheets—Sheet 1.

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

No. 579,634.

Patented Mar. 30, 1897.



WITNESSES:

C. E. Ashley
John C. Sanders

INVENTORS:

C. L. Buckingham
E. Germann
By their Attorney
C. L. Buckingham

(No Model.)

5 Sheets—Sheet 2.

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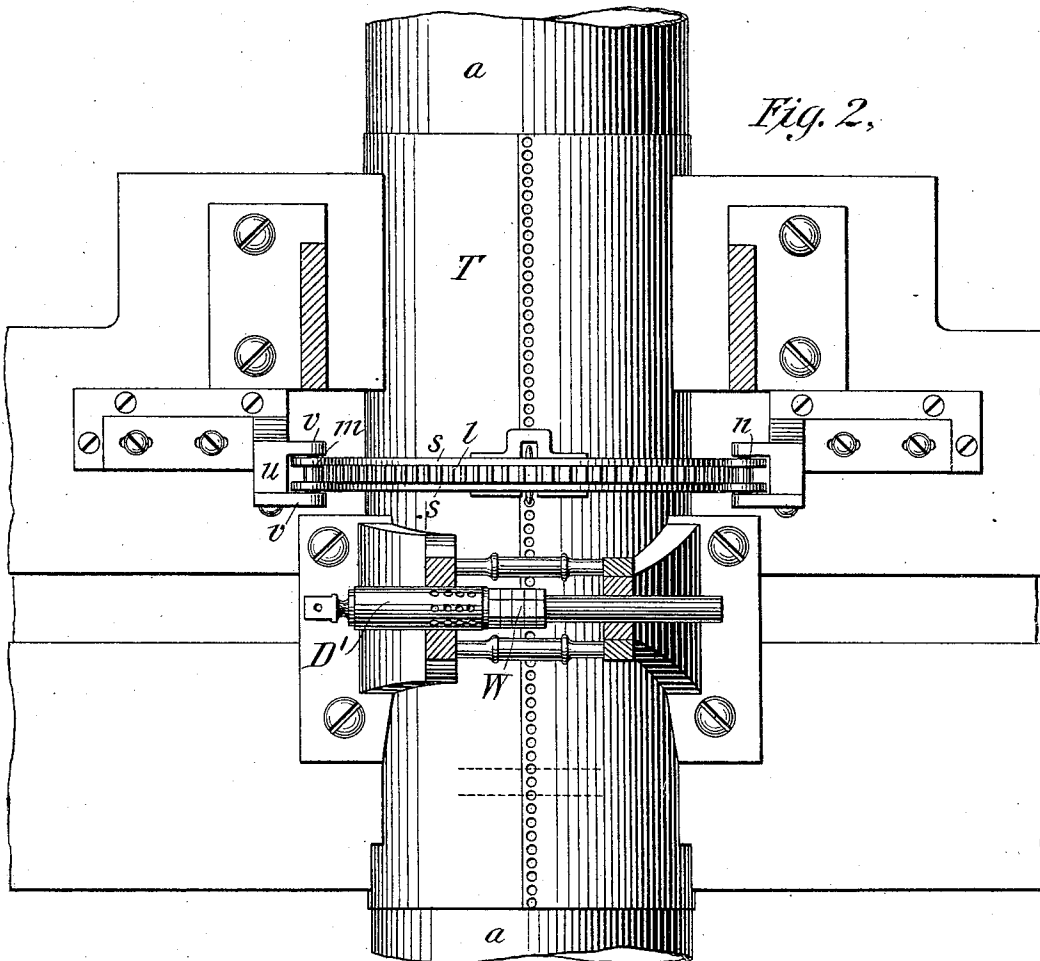


Fig. 2,

Fig. 3^a
w' v' x'

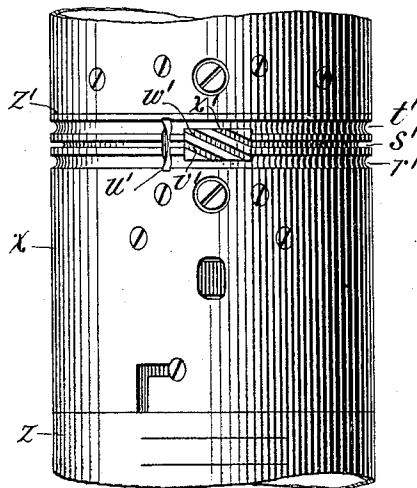


Fig. 3

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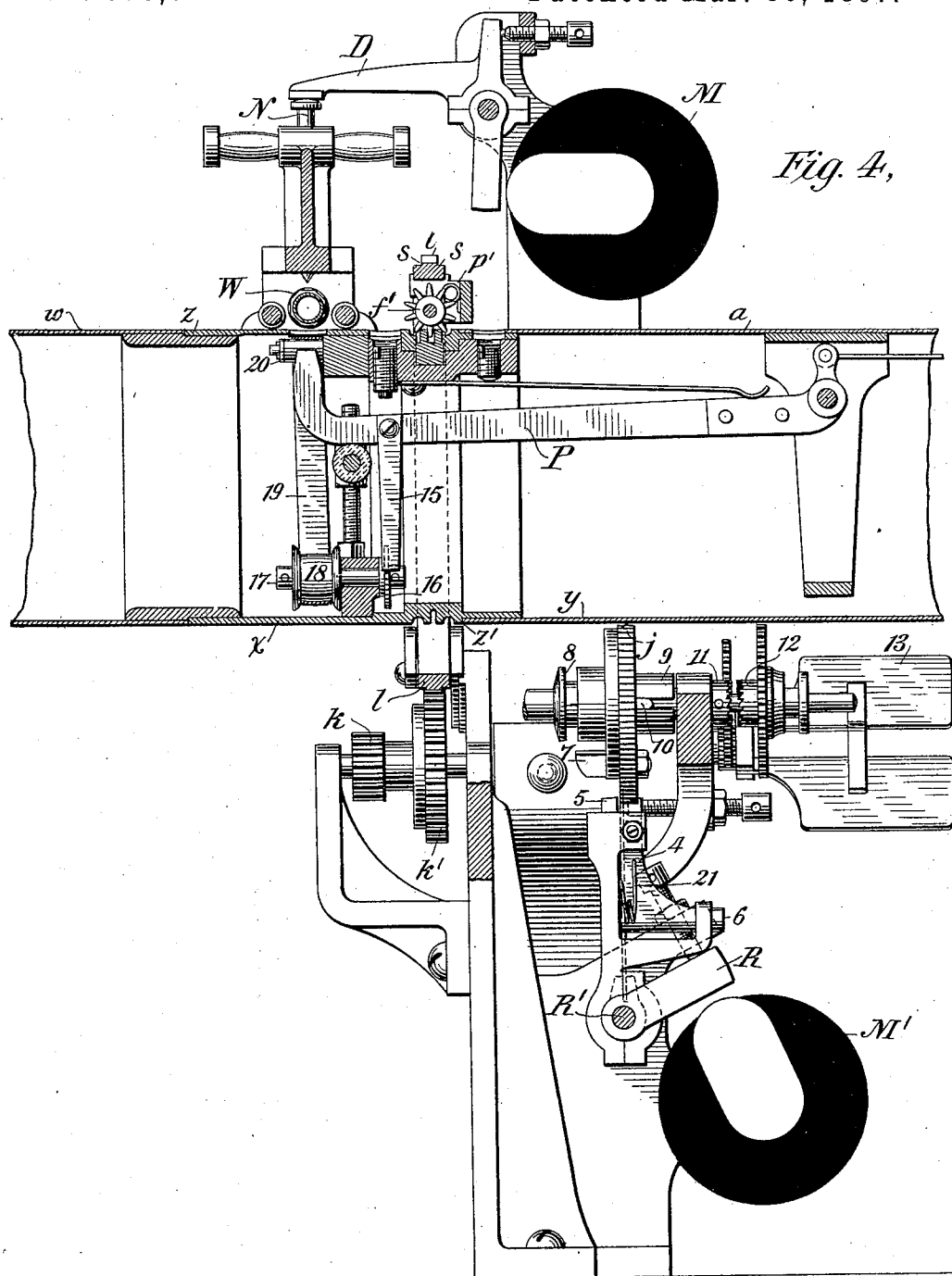
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5 Sheets—Sheet 3.

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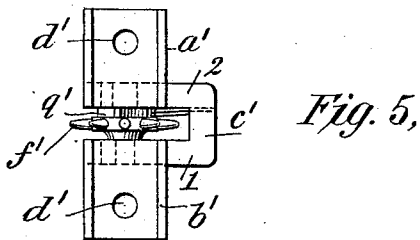


Fig. 5,

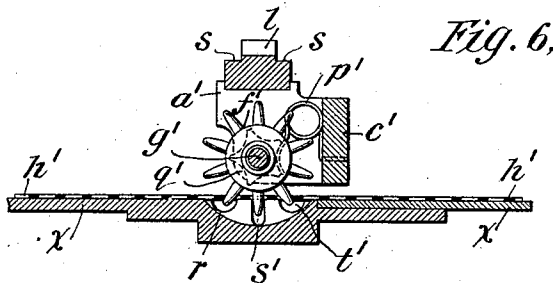


Fig. 6,

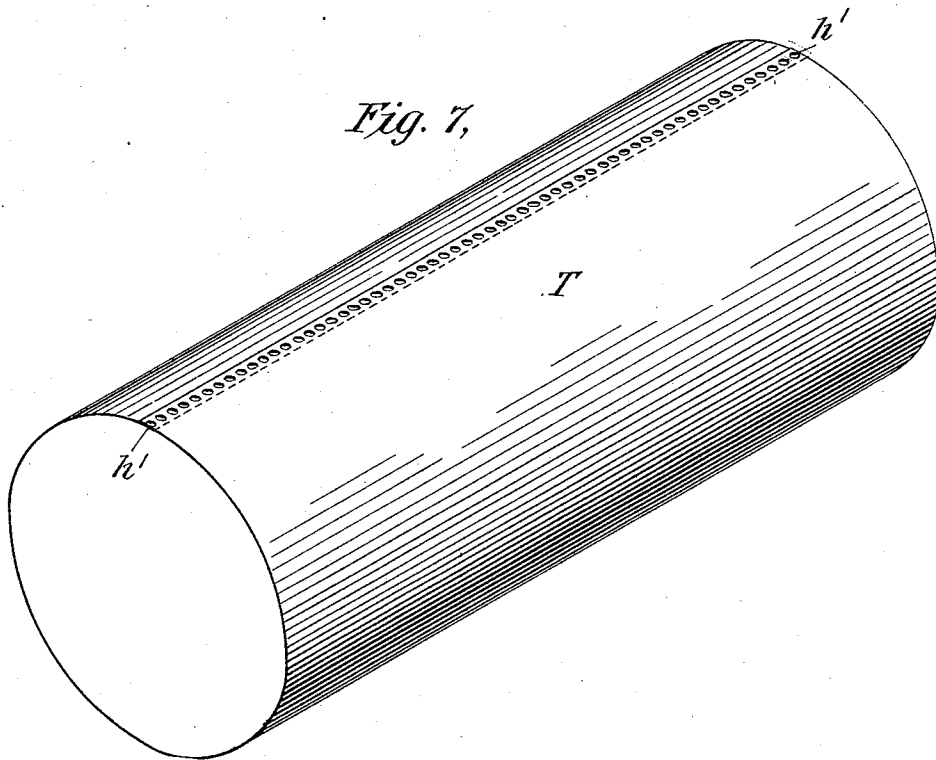


Fig. 7,

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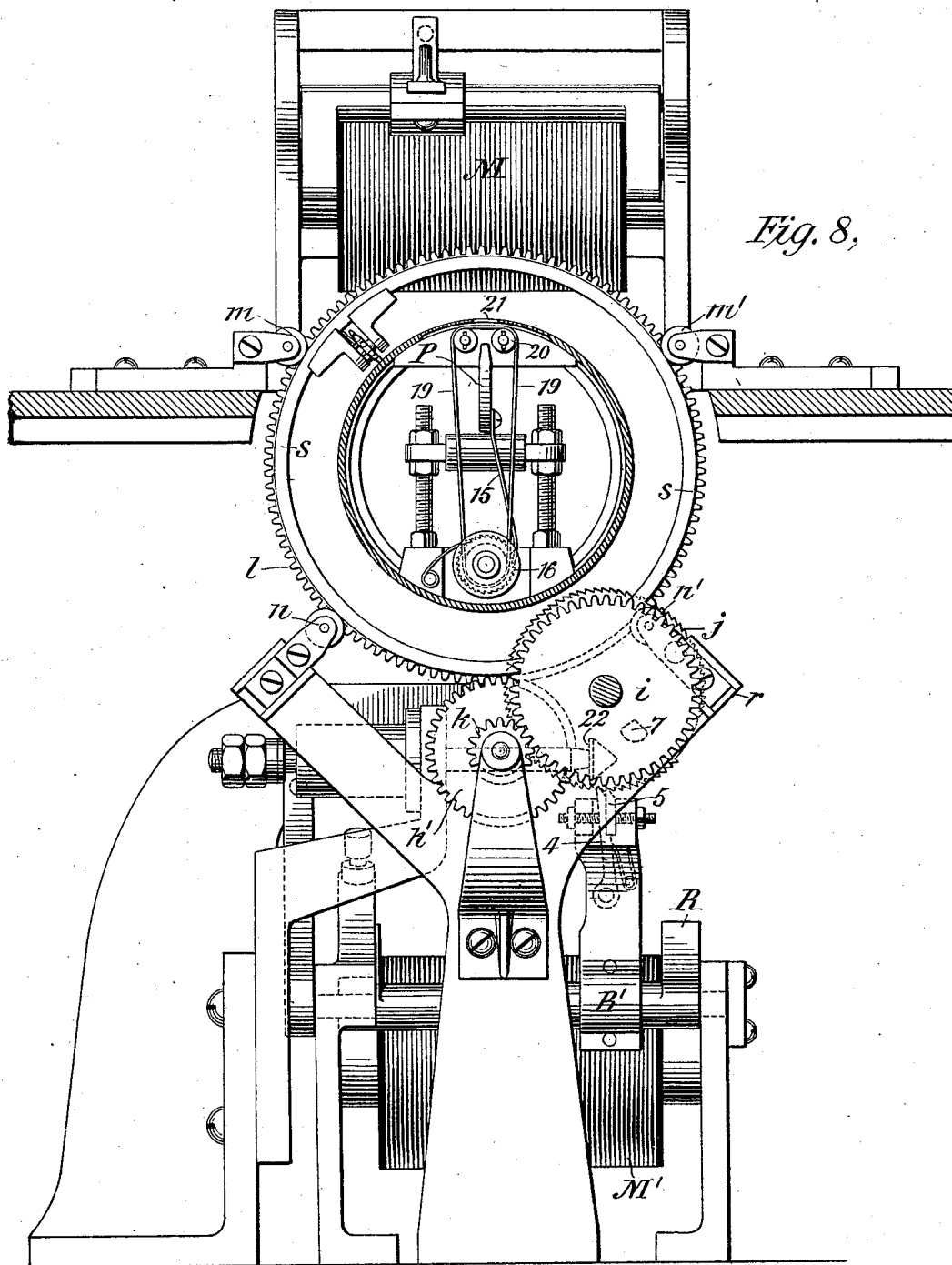
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UNITED STATES PATENT OFFICE.

CHARLES L. BUCKINGHAM, OF NEW YORK, AND EMIL GERMANN, OF BROOKLYN, NEW YORK; SAID GERMANN ASSIGNOR TO SAID BUCKINGHAM.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 579,634, dated March 30, 1897.

Application filed August 28, 1896. Serial No. 604,208. (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, which is 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.

The object of our invention is to effect such rotary and axial feed of the paper tube positively, and to this end we employ 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 the page, which is directly connected by a train of spur-wheels with the paper in such manner that from the beginning to the end of the message the sheet shall be positively and mechanically geared with the escapement-wheel. That is to say, the paper tube is fed circumferentially step by step for each letter and axially from line to line under the direct action of the escapement-wheel and a train of gearing which directly connects the paper tube with said escapement-wheel, and as a special means for enabling such gear connection we provide in the lap or double thickness of paper, where the edges are pasted together, a line of perforations, into 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 invention further consists in other and more specific means of improvement herein-after set forth.

Our invention is more fully 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 the paper tube, the type-wheel and dogging-thimble of the printer, and a part of the gearing for rotating the blank or paper tube upon which a message is to be printed. Fig. 3 is a plan view showing that part of the tubular support 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. 3^a is a detail. Fig. 4 represents a sectional view through the fixed support for the paper tube, the dogging apparatus for setting the type-wheel, and a train of gearing by which a feed action is communicated from the step-by-step escapement-wheel to the paper tube or blank. Fig. 5 represents the spur-wheel with the row of holes in the lap of the paper tube and mounted upon a wheel of the train connecting with the step-by-step escapement. Fig. 6 shows the spur-wheel and its supporting-bracket. Fig. 7 represents a paper 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. 8 is an end view showing various details of construction, and particularly those of the gear-train for mechanically and positively joining the step-by-step escapement of the printer with the paper tube or blank.

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 by pasting or otherwise fastening its edges together, and upon this tube messages are printed line by line in page form. In other patents we have shown various forms of apparatus for moving the paper tube, but in each there exists the difficulty that for each line the paper is liable to be fed too great a distance or not far enough, thus rendering the margin inexact or crooked, while in some instances letters which should appear upon a succeeding line are printed at the end of the line preceding. To avoid these difficulties, we now employ a train of gearing for joining the escapement or step-by-step wheel with the paper tube in such manner as to positively convey to the tube the move-

ments of the wheel both for circumferential and axial feed.

In Fig. 7 is shown a sheet of paper formed into a tube T, whose overlapping edges, when
 5 pasted together, are perforated with a line of holes h h , into which the teeth of a small spur-wheel are connected, whereby the tube may
 10 be given circumferential feed a step at a time for each succeeding letter and axially from line to line in forming the page. The
 15 train of gearing for connecting the escapement-wheel with the paper tube is represented in Figs. 1, 2, 3, 4, 5, 6, and 8. In this
 20 connection, j is a ratchet-wheel upon whose shaft is rigidly fixed a wheel i , which meshes with a wheel k , upon whose shaft is also placed
 25 a larger wheel k' , gearing with a large ring-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
 30 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
 35 that the teeth of f' may project through the holes in the paper tube into circumferential or diagonal grooves formed in the periphery of the tubular support. Thus as
 40 the escapement or step-by-step wheel j is permitted to rotate its movement is imparted by way of spur-wheels i k k' l to the small spur-wheel f' , the teeth of which projecting
 45 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
 50 a continuous propulsive action from a motor e , Fig. 1, gearing with a shaft d , which in turn, by a beveled gear f g , imparts a winding tendency to one end of a coiled spring,
 55 the other end of which is connected with the shaft upon which the spur-wheel i is mounted, and by this means with each movement of the escapement-pallets which control wheel
 60 j the train of wheels connecting j with the wheel meshing with the paper tube is given a step of rotation. The teeth upon wheel j , with the exception of a blank portion, are
 65 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 sufficient length to permit an abnormally-long step of rotation, a step usually made
 70 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
 75 to rotate a distance representing the two margins of the printed page. The escapement just referred to is operated by magnet
 80 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
 85 fixed with reference to its supporting-bracket, while 4 is movable around an axis 6. By this means as armature R is attracted pawl
 90 5 will be drawn into a space between teeth

of the ratchet-wheel, while pawl 4 will be disengaged. This action, however, permits the
 95 escapement-wheel to move only a very small distance, while at the same time pawl 4 is disconnected from the wheel and by means
 100 of a spring 21 is caused to move backward in a direction opposite to the rotation of the escapement-wheel and into such a position that
 105 upon the retraction of armature R it will drop into the next notch just before pawl 5 is disconnected. In other words, just before
 110 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
 115 wheel, under the action of the propelling motor, free to rotate an additional step.

Although we desire to limit ourselves to no
 120 specific form of ring-wheel l , we have shown a preferred construction in Figs. 2, 4, and 8,
 125 in which are represented a ring having horizontal projecting edges or flanges s and a surrounding series of spur-teeth. By this means
 130 wheel l is easily mounted and retained in position meshing with spur-wheel k' , since by this construction friction rollers or guides m
 135 m' n n' , having central grooves, may support the wheel both circumferentially and axially. The peripheries of these rollers serve as guides
 140 and supports for the flanges s s , while their central groove affords a passage-way for the spur-teeth of the wheel, the sides of said
 145 grooves at the same time serving to hold said wheel in an accurate axial position. Upon
 150 the inner periphery of the wheel l is affixed a bracket or shoe, (particularly shown in Figs. 5 and 6,) within which is pivoted the small
 155 spur-wheel f' , which meshes with the holes in the paper tube. In Figs. 5 and 6 is shown a bracket-piece a' , joined to b' by means of a
 160 yoke c' , having arms 1 and 2, within which is pivoted a shaft g' , carrying the spur-wheel f' , and to secure the bracket to the wheel l
 165 the arms a' b' are preferably provided with screw-holes d' , by means of which its convex surface may be bolted to the inner periphery
 170 of l , as shown in Fig. 8.

Preparatory to the printing of a message
 175 spur-wheel f' is brought into a predetermined position with reference to the tubular support, and while f' is in this position the tubular
 180 blank is pushed along the support until the first holes in the lap of the tube are brought into mesh with its teeth. The particular
 185 means by which this is accomplished are shown in Fig. 3, in which is represented a small slot u' , cut into the tube lengthwise
 190 slightly at one side of a central line. If wheel f' is brought into the plane of the slot u' , obviously it may be rotated and the paper tube
 195 may be thrust forward, since the teeth of f' will find a clearance in the slot and will at the same time mesh with the holes h h' of the
 200 tube T.

To accomplish the circumferential feed of
 205 the paper tube, wheel f' is swept circumferentially around the tubular support a , its teeth at the time being stationary with refer-

ence to its own axis, they being held within the circumferential grooves $r' s' t'$ of the tubular support, as shown in Figs. 3 and 6. At the end of each line of the message, however, the teeth of the wheel are brought to the inclined grooves $v' w' x'$, and by this means wheel f' is given a rotation equal to the angular space covered by two of its teeth and a distance equal to that from one line to the next, and it is by this means that the paper, while given a circumferential rotation representing the two margins of the page, is also moved axially a sufficient distance for a new line. Thus it is seen that the spur-wheel f' , while bodily carried by the ring-wheel l , has its teeth projecting through the holes in the lap of the paper tube T into the circumferential grooves in the tubular support and that the wheel f' is held stationary upon its own axis during the printing of a line, while thereafter it is rotated sufficiently to move the paper for a new line while the teeth of the wheel are moving through the inclined grooves $v' w' x'$. To the end, however, that the teeth of wheel g' may move freely past the slot u' the inclined grooves $v' w' x'$ are terminated a short distance at the right of the slot, whereby the teeth of the wheel in normal operation after passing the inclined grooves must find their normal position within the planes of the circumferential grooves before reaching the position of the slot. To further insure against the catching of the teeth of wheel f' in passing slot u' , the wheel is provided with a small dogging check-wheel q' , having concaved or notched sides within which the curved end of a spring or dog p' may press. By this means the teeth of f' can have but one normal position, as shown in Fig. 6, a position in which they are certain to enter the circumferential grooves after passing the slot u' , while printing from one line to the next or at the beginning of the first line of a message.

Cam-wheel q' and its spring p' are particularly necessary in determining the position of the teeth of the wheel when a blank for a new message is first inserted. Without some such arrangement the teeth of the wheel would be left in any angular position, so that upon the first operation of the feeding device they might be caught by the ends of the ridges between the circumferential grooves of the tube.

In carrying out our invention we employ manual means for connecting and disconnecting the escapement-wheel from its pallets, whereby at the end of a message, if only part of a line has been printed, the escapement-wheel and its accompanying gear may immediately return to a zero position. This apparatus we have particularly shown in Figs. 1 and 4, in which m'' is a rod carrying a hand-button at one end and an arm near the other, engaging in a groove 8, formed in the hub or support of the escapement-wheel j . Another part of the hub, carrying the escapement-wheel is provided with a slot within which

slides a pin 10, connected to the driving-shaft, while upon an auxiliary disk fastened to the escapement-wheel j is a tooth 7, the end of which in normal rotation clears a fixed stop 22, but which, when rod m'' is pulled to the left, is brought into the path of such fixed stop, whereby as the escapement-wheel is disengaged from its pallets stop 7 will be put into a unison position; that is to say, in such a position that wheel f' will at the time be in the plane of slot u' .

The conditions essential in operating the escapement are that its wheel shall not rotate at the time of actuating the press mechanism or when armature R is attracted by magnet M' . It should only operate when armature R is moving into a back position or after printing has taken place. A further condition is that the escape-wheel at the end of a message, when it is desired to let the apparatus or train run to zero, shall be disconnected from the fixed pallet of the escapement and not from the movable pallet. If the wheel were disconnected from the movable pallet and not from the fixed one, the re-engagement would be with the movable pallet, and thereby one false step of rotation would take place in the escapement, thereby causing a disarrangement of the lines of the printed message. To avoid this difficulty, the escapement and its magnet have been arranged as shown in Figs. 4 and 8, in which, for unison disengagement, the escape-wheel is moved to the left, assuming at the same time the armature R to be attracted so that stationary pawl 5 would normally be in a position to arrest the teeth of the wheel. Upon disengagement the wheel is pulled to the left of 5, leaving it free to rotate, and by this means it is apparent that when rod m'' is thrust to the right the teeth of the wheel will be pushed back over the stationary tooth of the escapement, thus at the beginning of a new line leaving the escapement-wheel in the exact position it would have occupied if disengagement had not taken place.

If a message were completed after having printed only a few characters upon a line and the escapement-wheel were disconnected from its pallets, the feeding-train would move to unison position with great rapidity. To avoid injuring the apparatus by unnecessary blows, a train of gearing carrying a fly or fan has been provided, as shown in Figs. 1 and 4, which may be connected to the shaft of the escapement-wheel at the time the latter is disconnected from its pallets. This organization has been specifically described and claimed in another application and affords no part of the present invention except as it is a part of the combination of our new positive-feed arrangement. As here shown, a clutch 11 and 12 is normally disconnected, the free portion thereof being connected to fan 13. Upon pulling m'' to the left to disengage the escapement-wheel from its pallet 11 and 12 of the fly-clutch will be engaged,

thus joining the fly with the escapement-train.

As shown in former patents, a rubber band is carried within the tubular support between the type-wheel and the press-hammer. In such instances, however, the rubber band is rotated by the action of a wheel within the tubular support driven by a friction feeding device acting from without the tube; but as the friction feeding device is now omitted it is necessary to employ other means for actuating the rubber band. As shown in Figs. 4 and 8, 19 is such a rubber band, it being carried around two upper rollers 20 and a single lower roller 18, placed upon a shaft 17, also provided with a ratchet-wheel 16, with whose teeth an arm 15, attached to the press-lever, engages. By this means, with each movement of arm P, the band 19 is given a slight movement, and during continued operation its entire length is repeatedly brought opposite the small aperture 21, through which the press acts upon the type.

The tubular support *a* is made in three sections *w x y*, as shown in Figs. 3 and 4. Sections *w* and *y* are preferably brass tubing of a circumference slightly less than the length of the paper sheet of which the tubes are formed, while the middle section *x* is of iron, whose shell is thicker than that of *w* and *y*, and particularly at that part within which the circumferential and inclined grooves for controlling the action of spur-wheel *f'* are cut. As shown in Figs. 3 and 4, the tube is provided with two joints *z* and *z'*. A further detail of this construction is shown in Fig. 3^a, which consists of a small block of metal having a cylindrical and convex surface within which the diagonal grooves *v' w' x'* are cut. Corresponding with such block the tube-section *x* is provided with an aperture, and within this aperture is closely fitted the block, all of which forms the arrangement of the circumferential and inclined slots, as shown in Fig. 3.

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

1. In a printing-telegraph apparatus, a stationary tubular support, a sheet of paper formed into a tube having a row of holes perforated in the lap of said tube, an escapement-wheel, a spur-wheel meshing with said row of holes and a train of gearing for positively connecting the escapement and spur wheels together, as and for the purpose set forth.

2. In a printing-telegraph, a stationary support, a paper tube having a row or series of perforations, a step-by-step wheel, a train of gearing positively connected with said step-by-step wheel and a spur-wheel gearing with the holes in said sheet of paper which is positively driven with said step-by-step wheel and train of gearing, as and for the purpose set forth.

3. In a printing-telegraph, a stationary tubular support, a sheet of paper formed into

a tube movable thereon, a feed-wheel positively engaging with said sheet of paper, a step-by-step actuating mechanism and a train of gearing for positively connecting said actuating mechanism with said wheel in engagement with said paper tube.

4. In a printing-telegraph, a tubular support for a sheet of paper, a paper tube upon which a message is to be printed, a wheel whose teeth engage with said paper tube, means for rotating said wheel circumferentially around said tubular support with the paper blank, means for rotating said wheel about its own axis for feeding said paper tube axially from one line position to the next, a step-by-step actuating mechanism and a train of gearing positively connecting said actuating mechanism with said feed-wheel, as and for the purpose set forth.

5. In a printing-machine, a stationary support, a tubular blank adapted to be rotated thereon, having a row of holes along its seam, a feed-wheel whose teeth mesh with said holes, a wheel carrying said feed-wheel circumferentially around said tubular support and paper blank, a train of gearing connected therewith, an escapement for controlling the step-by-step action of said train of gearing and circumferential and inclined grooves cut in the periphery of said stationary support, as and for the purpose set forth.

6. In a printing-telegraph, the combination of a stationary support *a* having circumferential grooves *r' s' t'* inclined grooves *v' w' x'*, gear-wheel *l*, feed-wheel *f'*, an escapement-wheel *j* and a train of gearing for positively connecting wheels *l* and *f'* together, as and for the purpose set forth.

7. In a printing-telegraph, a stationary support *a*, a tubular blank upon which messages are printed in page form, a row of holes perforated in said blank parallel with its axis, a feed-wheel for engaging with said row of holes, and an auxiliary wheel for carrying said feed-wheel circumferentially around said stationary support, means for holding said feed-wheel against rotation upon its own axis during the printing of lines, and cams for causing rotation of said feed-wheel upon its axis between the end of one line and the beginning of the next, as and for the purpose set forth.

8. In a printing-telegraph, the combination of a fixed support, a paper tube upon which messages are printed, a row of holes perforated in said tube parallel with its axis, a spur-wheel meshing with said row of holes, and an auxiliary wheel within which said spur-wheel is journaled, as and for the purpose set forth.

9. In a printing-machine, a stationary support for a paper tube, a tube upon which messages are printed in page form having a series of holes in said tube, a feeding device meshing with said row of holes, means for moving said feeding device around said tube,

and means for connecting said feeding device positively with a step-by-step escapement or motor.

10. In a printing-telegraph, a support for
5 carrying a paper tube, a sheet of paper in tubular form having a row of holes perforated parallel with its length, a feed-wheel meshing with said row of holes, a ring-wheel moving outside of said tubular support carrying
10 said feed-wheel and circumferential grooves formed within the exterior of such support, as and for the purpose set forth.

11. In a printing-telegraph, the combination of a paper tube upon which messages
15 are printed, a spur-wheel for feeding the same circumferentially and axially, a ring-wheel for carrying said feed-wheel, a dogging-disk, q' , and a pallet or dog p' for holding the teeth of said feed-wheel in their desired position.

20 12. In a printing-telegraph, a fixed tubular support, a feed-wheel f' , a bracket within which said feed-wheel is journaled, said bracket being connected to and forming a part of a ring-wheel l for carrying wheel q' ,
25 as and for the purpose set forth.

13. The combination of feed-wheel f' , a ring-carrying wheel l having spur-teeth upon its periphery, guiding-surfaces s and a bracket formed of parts $a' c' b'$, as and for the purpose
30 set forth.

14. In a printing-machine, a stationary tubular support, a paper tube upon which messages are to be printed, a row of holes perforated therein parallel with its axis, a feed-
35 wheel f , a ring-wheel l for carrying said feed-wheel, circumferential and inclined grooves cut in the periphery of said tubular support and a slot u' cut in said support parallel with its axis, as and for the purpose set forth.

40 15. In a printing-machine, the combination of a stationary support, a paper tube upon which messages are to be printed, a feed-wheel for moving said tube, means for carrying said feed-wheel around the tube, circumferential
45 grooves cut in said stationary support and a groove u' within which said feed-wheel is adapted to rotate, as and for the purpose set forth.

16. In a printing-machine, a stationary support, a paper tube upon which messages are
50 to be printed, a feed-wheel connecting with said paper tube, a wheel l carrying said feed-wheel around the tube, having flanges s , and grooved rollers for supporting said wheel, as
55 and for the purpose set forth.

17. A tubular type-writer or telegraph blank, upon which messages or other matter is to be printed, with a lapped edge having a row of equidistant holes in the lap.

18. A tubular type-writer or telegraph 60 blank, upon which messages or other matter is to be printed, with a lapped edge parallel to the axis of the tube having a row of equidistant holes in the lap.

19. In a printing-machine, an escapement- 65 wheel, two escapement-pallets, one movable and the other fixed, and means for manually disengaging said escapement-wheel from its fixed pallet whereby the escapement-wheel is withdrawn from the fixed rather than the 70 movable pallet, as and for the purpose set forth.

20. In a printing-machine, a stationary paper-support, a tube upon which messages are to be printed, a feed-wheel meshing with
75 said tube, a ring-wheel carrying said feed-wheel, a manual disengaging device, and a unison-stop, as and for the purpose set forth.

21. A stationary support, a paper tube upon which messages are to be printed, a feed-wheel 80 gearing with said paper tube, an auxiliary wheel carrying said feed-wheel, a train of gearing connected therewith, an escapement for controlling the step-by-step action of said feed-wheel, a manual disengaging device for 85 releasing said feed-wheel from its pallets, a unison-stop for arresting said feed-wheel and its train in unison position and a fly-train which is automatically put in connection with said feeding apparatus to modify or slow its 90 movement upon disengagement of the escapement-wheel from its pallets.

22. In a printing-machine, a stationary, tubular support a for carrying a paper tube, said support being formed in three parts, w , 95 x , y , in the part x of which are cut circumferential and inclined grooves, as and for the purpose set forth.

23. In a printing-telegraph system, a tubular support having an opening, 21, a press- 100 pad within said tubular support, and a type-wheel on the exterior thereof, a rubber band or belt, 19, mounted within said tube, a ratchet-wheel, 16, and a pawl, 15, for actuating said belt, as and for the purpose set forth. 105

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Witnesses:

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