(No Model.) 3 Sheets—Sheet 1.

C. L. BUCKINGHAM & E. GERMANN.

TELEGRAPH RECEIVER.

No. 568,513. Patented Sept. 29, 1896.

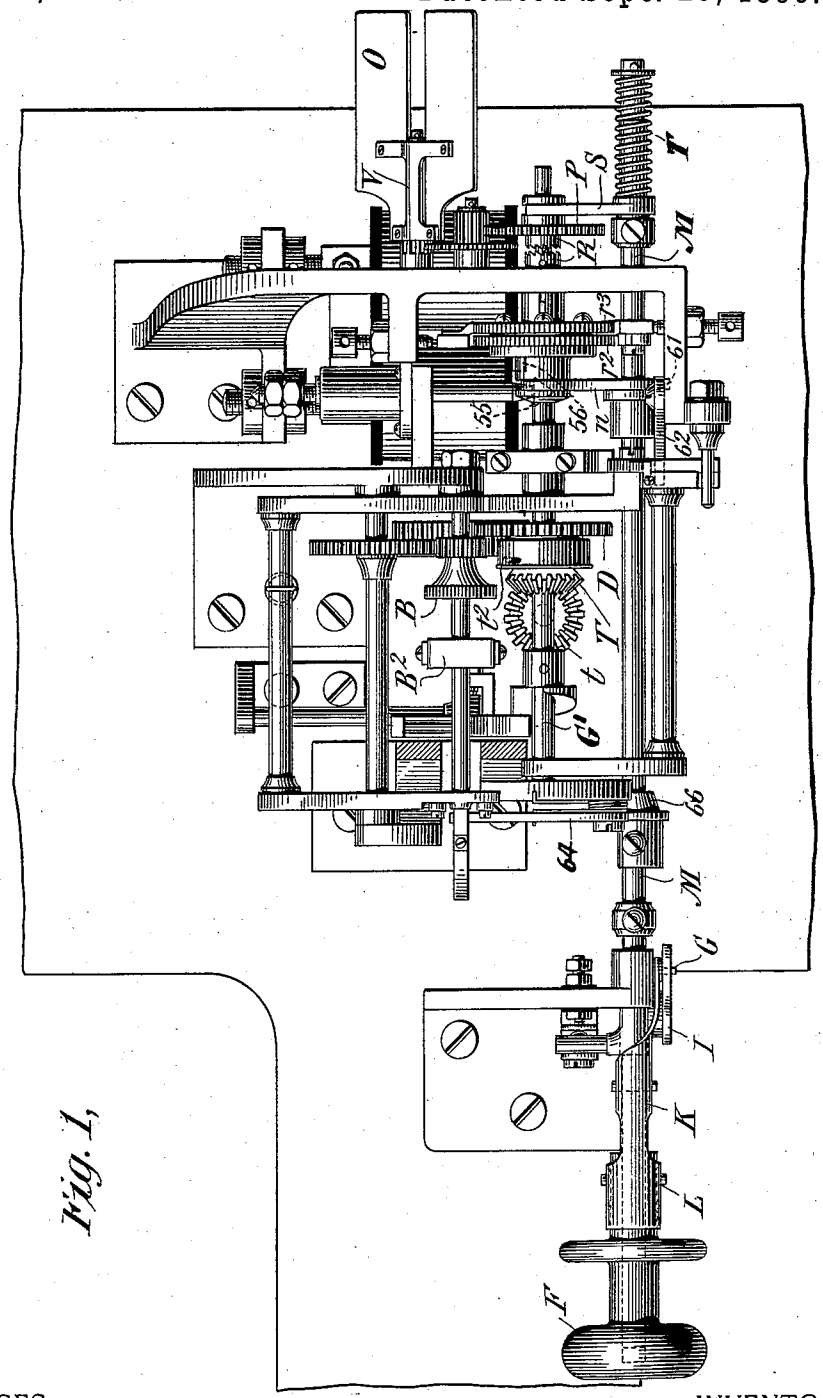


Fig. 1.

WITNESSES:

C. E. Ashley

H. W. Lloyd.

INVENTORS:

Charles L. Buckingham &
Emil Germann.
By their Attorney

D. H. Townsend

(No Model.) 3 Sheets—Sheet 2.

C. L. BUCKINGHAM & E. GERMANN.

TELEGRAPH RECEIVER.

No. 568,513. Patented Sept. 29, 1896.

Fig. 2.

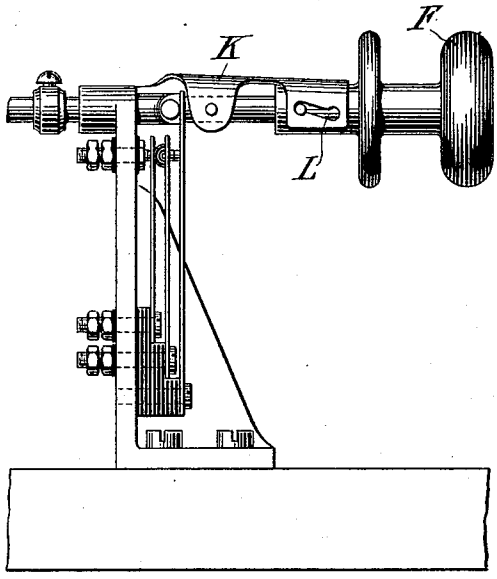


Fig. 3.

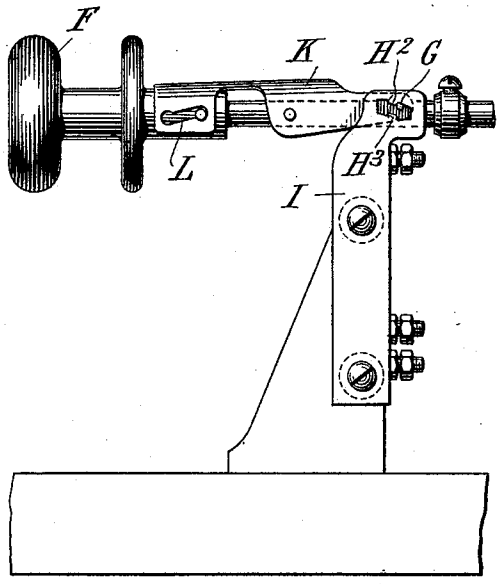
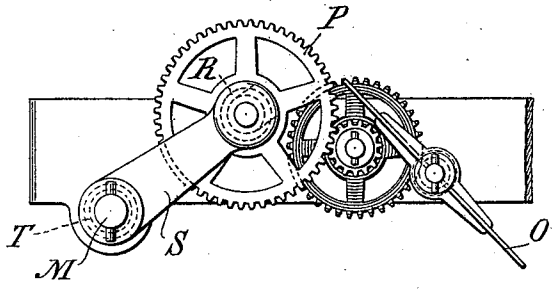


Fig. 4.



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

INVENTORS:
Charles L. Buckingham &
Emil Germann.
By their Attorney
H. H. Townsend

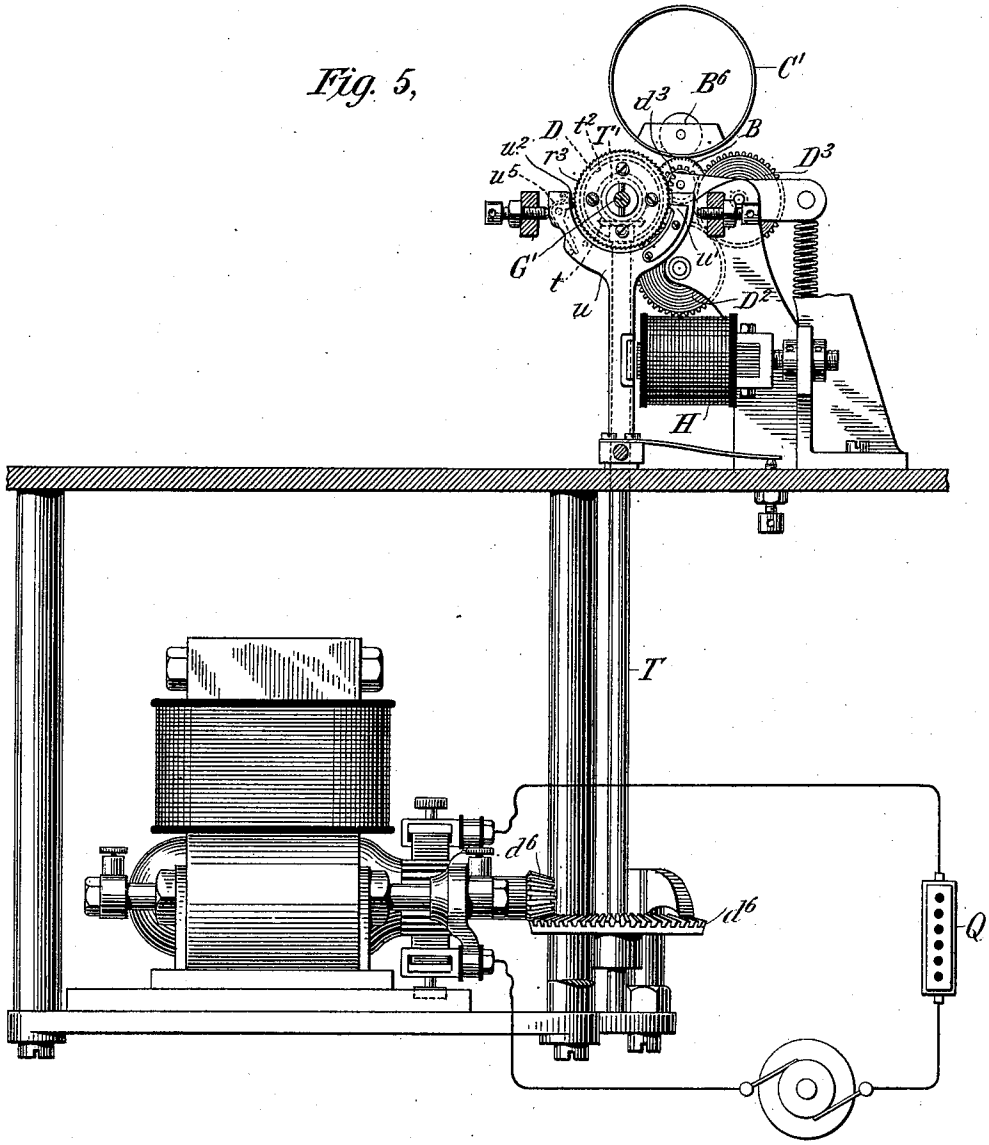
(No Model.) 3 Sheets—Sheet 3.

C. L. BUCKINGHAM & E. GERMANN.

TELEGRAPH RECEIVER.

No. 568,513. Patented Sept. 29, 1896.

Fig. 5,



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

INVENTORS:
Charles L. Buckingham &
Emil Germann.
By their Attorney
D. L. Townsend

UNITED STATES PATENT OFFICE.

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

TELEGRAPH-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 568,513, dated September 29, 1896.

Application filed May 11, 1896. Serial No. 591,050. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. BUCKINGHAM, residing at New York, in the county of New York, and EMIL GERMANN, residing at Brooklyn, in the county of Kings, State of New York, citizens of the United States, have invented a certain new and useful Telegraph-Receiver, of which the following is a specification.

Our invention relates to a type-by-type printing apparatus wherein the paper-feed devices are operated by a suitable driving power which is intermittently released by an escapement or detent mechanism when the feed is to take place, and is designed more particularly as an improvement upon certain devices described in a prior application for patent filed by us January 10, 1895, Serial No. 534,479, patented August 13, 1895, No. 544,346. In that application we described the use of a manually-controlled device, such as a slide bar or rod, which is operated when the mechanism is to be allowed to rotate freely to zero position for beginning a new message, for which purpose it disengages the detent or escapement wheel from its controlling escapement, but leaves the said detent or escapement wheel still connected to the driving power, so that it may rotate quickly until it is arrested by a zero-stop. In the special apparatus described in that application the slide bar or rod operates also upon certain paper-feeding devices, which rotate a cylindrical blank in the printing of a line and also feed it axially for the space between lines in such a way as to remove them from engagement with the paper when the controlling mechanism rotates freely to zero position, this being done to facilitate the application of a fresh blank, but these special devices will be only briefly referred to herein, as the invention which we herein claim relates to the means for locking the slide rod or bar in its two positions and for controlling the movement of the mechanism when running freely to the zero-point.

The first part of our invention consists in the combination, with the manual controller for the feed mechanism, of an automatic positive lock or catch and means operatively connected therewith whereby the pressure or power applied to move the slide will first actuate the said catch or lock to move it, after which the continued application of power will move the slide as required.

The invention also consists in the combination, with the power-train, of a retarding-fly and means for automatically gearing it to the wheelwork when the latter is freed by the operation of the slide for the purpose of allowing it to move freely to zero.

Another part of our invention relates to the manner of adjusting the length of the printed line in the apparatus described in our before-mentioned application wherein the paper blank is formed as a tube and is fed step by step by turning the tube around its circumferential axis. In this apparatus it is necessary that each line of printing should end as near the margin of the paper as possible in order that the space to be covered by the long feed from the end of one line to the beginning of the next should be as short as possible. In constructing the apparatus it is necessary to allow a fixed number of feed-steps for each line, each feed-step being of a determinate length to fill out the whole line. It is obvious that any variation or want of exactness in the length of each step would produce too great or too little length of the whole printed line, and the object of our present invention is to provide a simple and easy adjustment for determining the distance that the paper shall be fed at each step and so fixing or determining the length of the whole line of printing. We have discovered that when the paper is fed step by step under the control of an escapement or similar device which is driven by a motive power and the feed of the paper is produced by a friction-wheel engaging directly with it that we can adjust the length of each step by adjusting the strength of the motive power which drives the escapement.

Our invention consists also in details of construction and combinations of parts, as hereinafter more particularly described and claimed.

In the accompanying drawings, Figure 1 is a general plan view of apparatus embodying our invention. Fig. 2 is a side elevation of the locking device from one side. Fig. 3

is an elevation of the locking device looking from the other side. Fig. 4 is an end view of the mechanism connected with the fly. Fig. 5 illustrates that part of our invention which consists in adjusting the length of printed line by adjusting the strength of the motive power which drives the escapement.

In the plan the supporting-tube for the paper is omitted.

G′ is the main driving-shaft for the paper-feed mechanism. This shaft receives power from an electric motor or other source suitably connected with it and is connected through a wheel D with wheels r^2 r^3, which under the control of a suitable escapement are allowed to rotate step by step to feed the paper strip or blank by the action of a feed-wheel B, the latter being geared with the wheel or wheels r^2 r^3 by a suitable train of wheelwork and being mounted in a rocker-frame by which it may be moved away from the paper when desired.

Wheels r^2 r^3 are connected with the driving-shaft G′ by a spline or feathered connection, whereby they are rotated positively by said shaft but may slide longitudinally thereon for the purpose of disengaging them from the escapement or other device which allows them to rotate step by step. When so disengaged, they revolve freely under the action of the driving power to the zero position, at which point they engage with a zero-stop (indicated at 55) arranged in position to be engaged by pin 56 on the side of the escape-wheel. This zero position of the wheels is coincident with the end of an amplified or enlarged feed-step which, by the peculiar construction of the wheels and their controlling devices, as described in the prior application before referred to, they are allowed to make once in every whole revolution coincidently with the movement of the paper tube by the action of the feed-wheel B to the end of a line of printing. As the special construction of these devices for giving this enlarged movement form no part of our present invention they are not herein more particularly described. It is sufficient to say that the purpose in permitting the escape-wheels to run freely under the action of the motive power to the zero or starting position is in order that when a new blank is put in position for printing on the new page it may begin at the proper point with reference to the margin.

The disengagement of the escapement-wheels for the purpose of permitting them to rotate freely to zero position is produced by the action of a manual controlling device, typified as a slide bar or rod M, having an arm n engaging, by means of a fork, with the hub of the escapement-wheels r^2 r^3, said hub being provided with a circumferential slot with which the ends of the fork engage, whereby the wheels may at all times revolve freely, but may, by means of the said slide-rod, be moved axially on the driving-shaft.

The movement of the manual controlling device from normal position for the purpose of freeing the escapement-wheels is accompanied through the action of suitable mechanism engaging with the rod by a swinging of the frame carrying the feed-wheel B out of position for engagement with the paper, and also by the movement of the parts supporting an axial feed-pad B^2, which operates in such way as to remove the latter from engagement with the paper.

The operation upon the axial feed-pads, as described in our prior application before referred to, is produced by means of cam 66 on the slide M, with which the lever 64 engages, while a movement of the feed-wheel B is produced by means of a pin 61 on the slide-rod engaging with an arm of a lever 62, said lever 62 and also 64 being properly connected with the parts supporting the said feed-wheel and feed-pad, as described in our prior application, so that when the slide or manual controller M is moved back to disengage the escapement-wheels and permit them to rotate freely to zero the feed-wheel and pad will also be thrown out of operative position with relation to the paper. A fresh blank may then be placed in position without interference from the mechanism and the feed-wheels r^2 r^3 will be in position to start a new line of printing at the beginning of a line.

To provide for locking the manual controller M against accidental displacement in either or both of its positions, we have devised the mechanism now to be described.

F is an operating knob or handle which is adapted to slide to a limited extent on the end of rod M, and in so doing to act upon a catch or lock G, which is carried by the slide M, and is adapted to engage with shoulders H^2 H^3 in a lock-plate I, fastened to the base of the machine. The catch G is mounted on a lever K, or is otherwise suitably mounted thereon, so that it may move out of engagement with the shoulders H^2 H^3. K is a lever supporting said catch G and operatively connected with the movable handle F through an inclined slot and pin, (indicated at L,) the pin being upon the knob F and the slot in the end of the lever K, as shown. The limited movement of the knob F with reference to the slide may be secured by engagement of the pin with the ends of the slot. The slot is inclined for the purpose of moving the catch G upward to disengage it from the shoulder H^3 when the knob is moved in one direction and downward to disengage it from the shoulder H^2 when the knob is moved in the opposite direction for the purpose of reversing the movement of the slide. The ends of the slot at L, as will be seen, have a slight lateral enlargement to automatically lock the pin at the end of the slot. When the pin is in either of its extreme positions, the lever K is under strain by the pin, and being a spring-lever the strain of said spring holds the catch G down in position to lock

upon the shoulder H^2 or H^3, according to the position of the pin and knob F.

In the normal position of the slide M the knob F is pushed in and the escapement allows a step-by-step feed in the operation of printing the letters type by type through the control of suitable devices not necessary here to describe. The knob or handle F is in position pushed in with the pin of said knob located at the upper end of the slot L, or in such position as to hold the lever K in position with the catch G, engaged at H^2. Only by the exercise of some power upon the knob F or pulling upon it to move the slide M will the latter be unlocked. When such power is applied to the knob F, the pin thereon is freed from the notch at the end of slot L, and riding upon the upper side of the inclined slot subjects the spring-lever K to a force which disengages the catch or lock G from the shoulder H^2. This movement of the knob F takes place, however, freely without any action upon the slide M, until finally the pin engages the extreme right-hand end of the slot in the lever K, and the continued movement then pulls the slide M out to release the escapement-wheel and perform the other actions before mentioned. It will be noticed that the slot in the lock-plate I between the shoulders H^2H^3 is also inclined and the catch G, therefore, in the movement following the engagement of the pin with the end of slot L, rides up the incline in approaching the shoulder H^3, but finally on passing the end of the inclined springs down into engagement with the shoulder H^3, and the devices are thereby locked with the slide M drawn out, and will remain so locked until the application of some positive force to the knob F. When the operator pushes on the knob F, the pin rides upon the inclined lower side of the slot L, thereby swinging the lever K in a direction to disengage the catch G from the shoulder H^3, so that when the pin reaches the end of the slot the continued application of power will result in throwing the slide M, and with it moving the catch G longitudinally over the incline between the shoulders H^2 and H^3, and to position where it will spring up to position to lock with shoulder H^2, in which position it is held by the pin which is now at the upper end of the slot L.

In order that the mechanism while moving freely to zero position when the escapement-wheels are disengaged may not move so rapidly as to injure the apparatus, we propose to employ a retarding-fly which is automatically geared to the wheels when they are freed from the escapement by the action of the slide M or other manual controller. In our prior patent, before referred to, we have described the use of a brake for this purpose, but a fly is found in action to be more satisfactory.

O indicates the fly, rotating on a spindle projecting from the frame of the machine and carrying a pinion which gears with a wheel and pinion, in turn gearing with a wheel P, which carries one member of a clutch R, the other member of which is placed upon the end of the shaft G′, or is otherwise suitably connected with the driving power.

The wheel P rotates freely upon an extension on shaft G′, and is connected to an arm S, which is supported upon the end of the slide-rod M, and is moved by said slide in a direction to cause the members of the clutch R to engage when the slide is operated for the purpose of disengaging the escapement-wheels r^2 r^3 from their escapement. When, therefore, the latter rotate freely, they are by means of the clutch R and fly O permitted to do so only with the retarded movement produced by the fly. The arm S is yieldingly connected with the slide-rod or other manual controller M, so that after the latter has brought the two members of the clutch into solid engagement, it may continue to move for the purpose of freeing the escapement-wheels r^2 r^3 from their escapement or controlling device. By this means the fly O will be engaged with the mechanism before the latter can begin to rotate freely.

The yielding connection described is secured by means of a suitable coiled spring T, interposed between the arm S and the collar on the end of the rod M. The arm S is carried by a sleeve surrounding the rod M, as indicated.

As will be seen, in the normal position of the parts, that is, when the slide M is pushed in, the clutch R is disengaged and the wheels r^2 r^3 may rotate under the control of their escapement for the purpose of producing a step-by-step feed and without interference from the fly O. When the slide M is pulled, the first effect is to move the members of the clutch R into engagement, thus coupling the fly with the train of wheels, immediately after which the wheels r^2 r^3 are disengaged from their escapement and rotate with a quick movement, controlled, however, by the action of the fly.

In order to prevent damage to the parts from sudden stoppage of the fly O, we propose to yieldingly connect it with the mechanism, so that, although the train of wheels driving it may stop, the fly O may continue to move a slight distance. For this purpose we prefer to connect it frictionally with the spindle upon which it is supported. This frictional connection may be obtained by using a spring-hub V. Any other yielding connection which would permit movement to be communicated to the fly O from the train, but would nevertheless permit slight movement after stoppage of the train, would serve the purpose.

We do not limit ourselves to any particular construction of wheelwork connecting the fly and the driving power, nor to any particular construction of clutch or to mounting the members of the clutch upon any particular part of the mechanism.

It will also be obvious that the clutch might

be actuated from the slide M or manual controller by other means without departing from the invention.

For adjusting the length of feed of the paper we use the following devices: Referring to Fig. 5, we have illustrated in skeleton view the parts of the mechanism involved in carrying out this part of our invention. The paper blank is shown as a tube mounted on tubular support C′ and as grasped between the feed-wheel B and an idler friction-wheel B^6 within the tubular support. The wheel D gears with the wheel D^2, which in turn gears with a wheel D^3, the latter gearing with a pinion d^3 on the shaft-carrying feed-wheel B. As before explained, the escapement-wheels r^2 r^3 are fixed on the shaft G′. An anchor escapement-lever u, vibrated by the operation of a magnet H, whose armature is secured to said lever, allows the escapement-wheels to rotate one step at a time, the anchor having two pallets engaging, respectively, with wheels r^2 r^3. One pallet, u', engages with wheel r^3 and the other, u^2, with wheel r^2. The latter is pivoted on one prong of lever u^2 and is provided with a spring u^3, bearing against the tail of the pallet. This construction of escapement permits a movement of the escapement-wheel only on the forward movement of the anchor when the pallet u' frees said wheel. The driving power herein shown is an electric motor, but any other driving power might be employed. This motor imparts power to the shaft G′ through bevel-gears d^6, shaft T, bevel gear-wheel t, meshing with gear T′, that is loose on the main shaft G′. Wheel D is keyed to or fastened to a barrel t^2, containing a spiral spring, one end of which is fastened to the barrel and the other to the bevel gear-wheel loose on the shaft G′. The motor keeps the spring under strain or tension, and it is obvious that the power of said spring will depend upon the strength of the motor. As a means of varying the power we may employ a rheostat, typified at Q, or any other suitable device. We find that by increasing the power of the motor the length of each feed-step of the paper produced by the feed-wheel B may be slightly increased so as to produce a line of the desired length, and on the other hand that by descreasing the power the length of each feed-step will be a little shortened. This affords an easy and convenient adjustment of the feed, which it would be difficult to produce, excepting by complicated or delicate construction or adjustment of the mechanism.

As the escapement-wheel is organized to move a fixed distance, determined by the distance between its teeth, it would not at first sight be supposed that any variation of the motive power would affect the extent to which the paper would move by the action of the feed-wheel B; but we have discovered that such is not the case and that on the contrary by merely varying the power, although the action of the escapement seems to be the same, there is nevertheless a variation in the length of the feed-steps.

It will be obvious that this part of our invention is not limited to any particular kind of power or means for varying the strength of the same or mechanism for conveying the power through a step-by-step feed mechanism to the paper.

What we claim as our invention is—

1. The combination with the step-by-step feed, of the manual controller, a positive lock or catch, and means operatively connected therewith for actuating the said catch by the power applied to move the controller.

2. The combination, substantially as described, with the manual controller for the paper-feed mechanism, of an operating knob or handle having a limited lost movement, and a catch or lock connected to said handle, as and for the purpose described.

3. The combination with the manual controller, of an operating knob or handle having a limited lost or free movement thereon, and a pivoted catch mounted on the controller and engaged by the knob or handle.

4. The combination with a manual controller, of an operating knob or handle movable thereon, a lock or catch mounted on a spring-lever engaged by the knob or handle, a stationary tube carrying a sheet of paper, an impelling-wheel for moving said sheet of paper, a vibrating shaft carrying said wheel, an escapement-wheel and pallet for controlling the rotation of said impelling-wheel, and means for engaging and disengaging the impelling-wheel from the paper tube and for also disengaging the escapement-wheel from its pallets, as and for the purpose set forth.

5. The combination with the movable controller, of a catch or lock, a knob or handle having a limited movement with reference to said controller, a spring-lever supporting the catch and connected with the handle by a pin and inclined slot, and a catch-plate having two locking-shoulders, as and for the purpose described.

6. The combination with the manual controller and the step-by-step feed mechanism, of a fly, and means for operatively connecting the fly to the said feed mechanism when the controller frees the latter to allow it to rotate to zero.

7. The combination with the manual controller for the feed mechanism, of a fly, and a coupling device yieldingly connected with the manual controller to allow the latter to move after coupling the fly to the driving power.

8. The combination with a paper-feed mechanism, a driving power therefor, a wheel rotating freely under the action of said power, against a fixed stop, and a fly for retarding such movement yieldingly connected to the mechanism, as and for the purpose described.

9. The combination of a step-by-step feed mechanism, a ratchet or other suitable means for controlling said step-by-step action, a

power-driving mechanism, means for disengaging said step-by-step controlling devices and at the same time making connection with a retarding-fly frictionally secured to its shaft, and a stop for arresting the train of said feed mechanism, substantially as set forth.

10. The combination with the manual controller and driving power for the escapement, of a fly and train one member of which is mounted on a support connected with the manual controller through a spring and provided with a clutch whereby it may be connected to the driving power.

11. The combination in a step-by-step printer, of a stationary carrier for supporting a tube of paper, means for rotating said tube of paper circumferentially for feeding the same from one letter position to the next, a suitable motive power for actuating the same, means for releasing the motive power intermittently to effect the feed, and means for varying the strength of the motive power to adjust the length of feed from one letter to the next, to the end that a predetermined number of letters or characters may be printed upon each line on said tube.

12. The combination, substantially as described, of a paper blank in tube form, a carrier for supporting said blank, a feed-wheel gearing with said blank, a motive power for actuating the same and feeding the paper from one letter position to the next step by step, an intermittent train of wheels containing a detent-wheel, means for allowing said wheel to rotate step by step, means for varying the strength of the motive power to vary the distance from one letter to the next in each line, whereby a predetermined number of characters may be printed upon each line of the tube, and means for feeding said tube lengthwise whereby one line after another may be printed thereon.

13. In a page-printing telegraph, the combination of a feed-wheel for carrying a sheet of paper, an escapement-wheel for controlling a step-by-step movement of said feed-wheel, a motor for driving said escapement and feed wheel, means for detaching the escapement-wheel from its pallets thus leaving the feed-wheel free to rotate rapidly under the action of the motor, a stop for arresting the feed-wheel in an initial position, and a fly apparatus which is engaged with the feed-wheel to modify its motion upon disengagement of the escapement-pallets.

Signed at New York, in the county of New York and State of New York, this 7th day of May, A. D. 1896.

CHARLES L. BUCKINGHAM.
EMIL GERMANN.

Witnesses:
WM. H. CAPEL,
JOHN C. SANDERS.