

(No Model.)

2 Sheets—Sheet 1.

C. L. BUCKINGHAM.

PRINTING TELEGRAPH.

No. 350,615.

Patented Oct. 12, 1886.

Fig. 1.

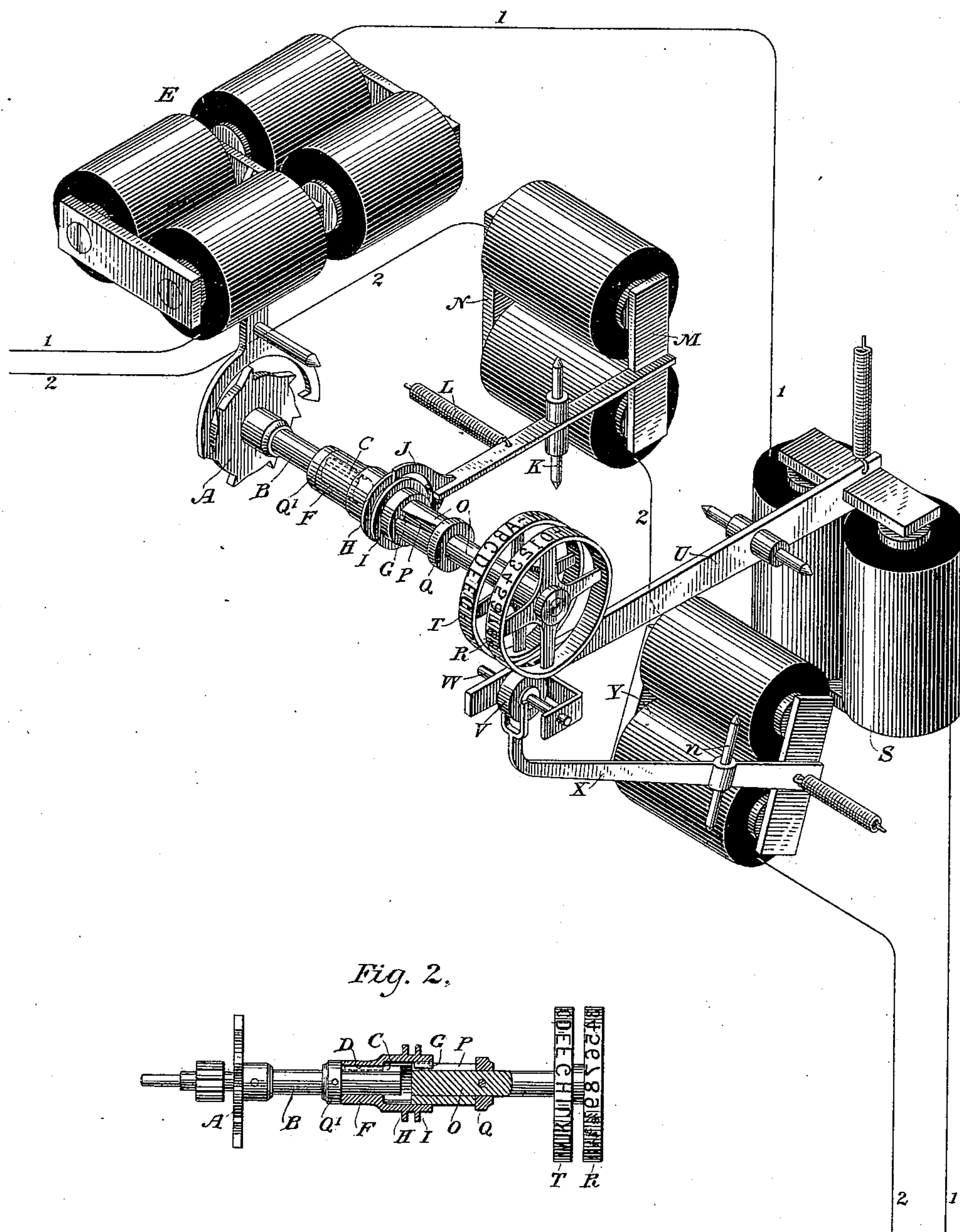
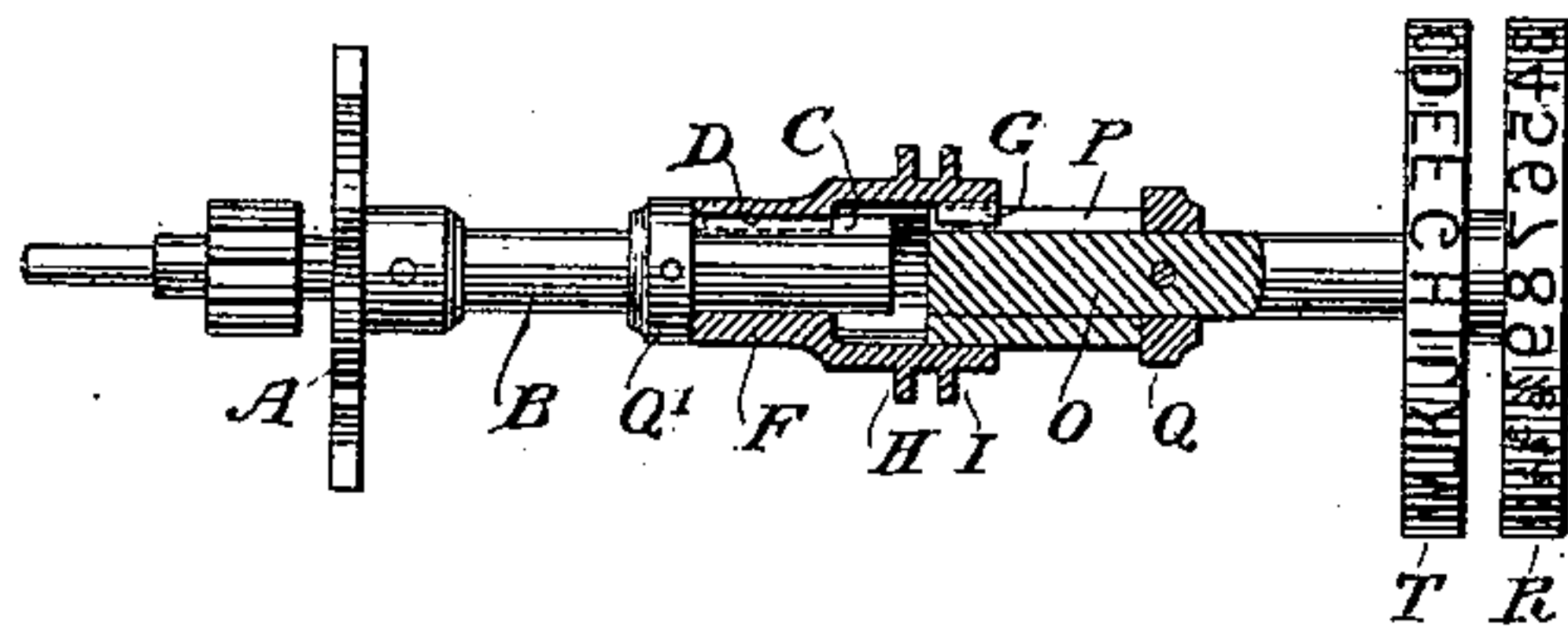


Fig. 2.



Witnesses

Geo. W. Breck.
Carrie C. Ashley

Inventor

C. L. Buckingham

(No Model.)

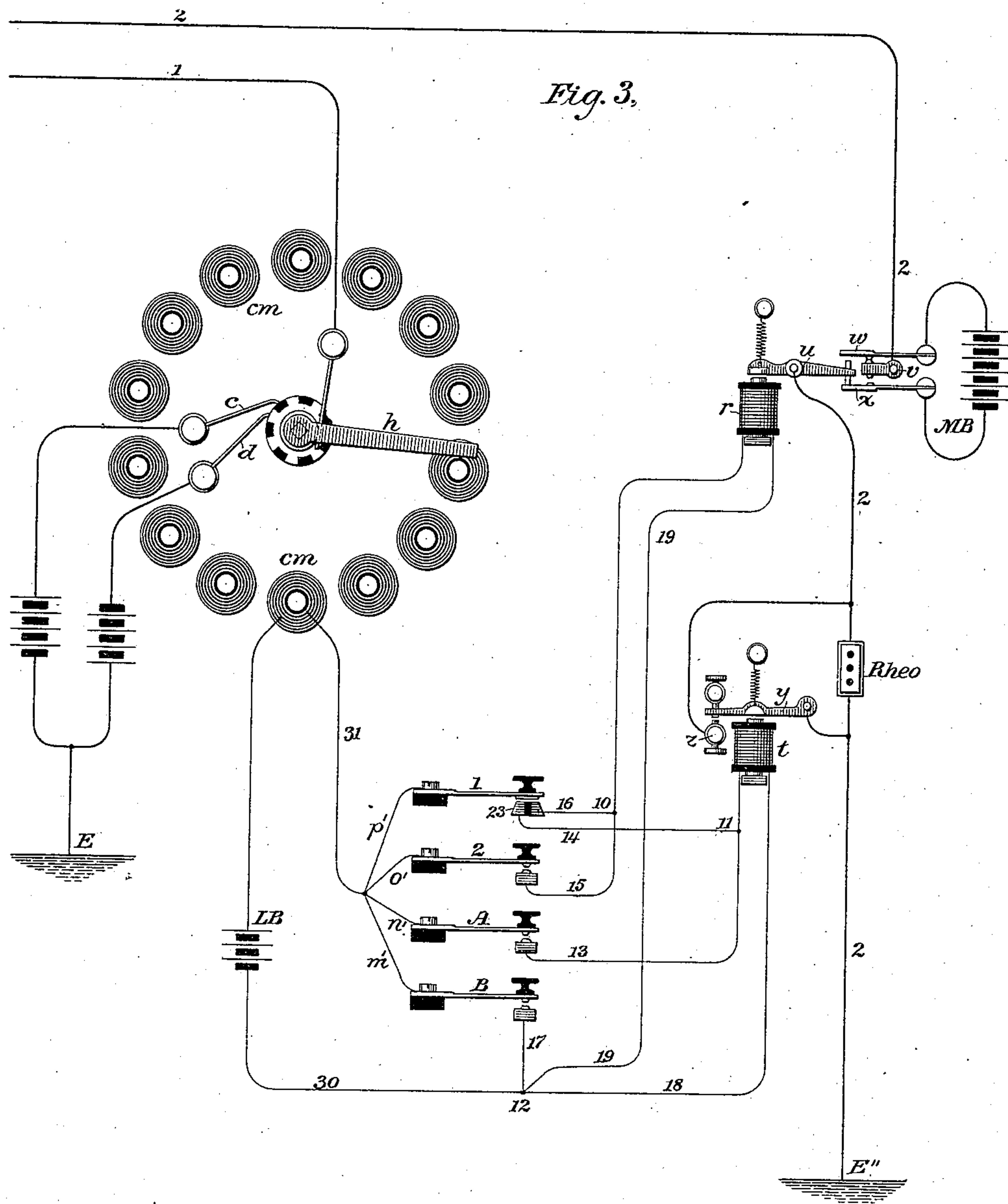
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UNITED STATES PATENT OFFICE.

CHARLES L. BUCKINGHAM, OF NEW YORK, N. Y.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 350,615, dated October 12, 1886.

Application filed October 24, 1884. Serial No. 146,361. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. BUCKINGHAM, of the city, county, and State of New York, a citizen of the United States of America, have made a new and useful Improvement in Printing-Telegraphs, of which the following is a specification.

In printing-telegraphs as usually constructed the type-wheel is rotated step by step by means of a motor and an escapement, and to effect one rotation of the type-wheel the escapement is vibrated as many times as there are characters upon the type-wheel. Thus to advance the type-wheel the space of one character one vibration of the escapement is necessary. With my improvement the type-wheel at each vibration of the escapement is rotated or advanced the space of two characters, and if the characters were alphabetically arranged around the periphery of the type-wheel the first alternate set of characters would normally be brought at the end of the successive vibrations of the escapement above the paper strip in the order of b d f h, &c. The first vibration, the type-wheel starting from the zero-point, rotates it to present the letter b, and too far to present the letter a to the paper strip. The second vibration rotates the letter c beyond the paper strip, thus bringing letter d over it, and in like manner at each step of rotation a letter is carried past and beyond the paper strip before the type-wheel is arrested. To print the second set of alternate characters, as a c e, &c., which under normal conditions are left beyond the paper strip at the end of successive vibrations, I employ an electro-magnet controlled by a second main line, which, as the type-wheel is being set to print, retards or withholds the type-wheel from being rotated as far as it otherwise would be by the space of one character. If thus retarded or withheld for one space, it is obvious that when arrested the type-wheel will present one of the second set of alternate characters above the paper strip, which would normally be carried beyond said strip. After an impression has been taken the apparatus which served to withhold the type-wheel in turn serves to advance it the space of one character independently of its rotation due to the step-by-step escapement. The type-wheel is

withheld and in turn advanced the space of one character as follows: The escapement-wheel is fixed upon a feathered shaft, and upon said shaft a sleeve is arranged which, by virtue of the feather, rotates with said shaft, but is free to be moved longitudinally thereon, and is so moved by the electro-magnet in the second line. Said sleeve carries a pin or key, which rests in a spiral groove in the periphery of the shaft upon which the type-wheel is mounted. The escapement-wheel and type-wheel cannot be moved along their axes, in consequence of which fact, upon the sliding of the sleeve along its axis, the pin in the sleeve in moving along the groove in the type-wheel shaft will, in respect to the escapement wheel, cause the type-wheel to rotate through the space of one character.

Other apparatus than that I have indicated may be employed to advance or withhold the type wheels; and I do not desire to limit my invention specifically thereto. The direction of this rotation is opposite to the rotation due to the escapement when setting the type-wheel to print; but the two independent and contemporaneous rotations during the adjustment of the wheel to again present the first set of alternate characters to the paper strip, are in the same direction, and thus, after an impression, the type-wheel is rotated ahead as much as it was before withheld.

My invention also includes means for adapting the above-described feature to two type-wheels, one provided with letters to print the name of an article in one line, and the other wheel figures to print its price in figures in a second line on one strip of paper. To this end, by means of one line I employ short electrical pulsations to rotate the type-wheels and a prolonged current to cause impressions. A second main line is employed having at the receiving-instrument a neutral electro-magnet to rotate the type-wheels the space of one character, and a polarized electro magnet to shift a press-roller under one wheel or the other, according as it is desired to print letters or figures. Normally, a current, say, of positive polarity, flows over the second main line, in which case the press-roller is held under the letter-wheel ready to print the first set of alternate letters, b d f. To print the first alter-

nate set of figures, the current on the second line is reversed at the transmitting-station, throwing the press-roller under the figure-wheel without rotating the type-wheels. To
 5 print any one of the second set of alternate letters, the current on the second line is merely increased, thus rotating the type-wheel one space in respect to the escapement-wheel, and leaving the press-roller under the letter wheel.
 10 To print any one of the second alternate set of figures, the transmitting-operator both increases the strength and reverses the polarity of current on the second line, thereby rotating the type-wheels the space of one character in
 5 respect to the escapement-wheel, and moving the press-roller under the figure-wheel.

From the foregoing it is seen that either of two letters and either of two figures may be brought to a position to be printed by a single
 10 vibration of the escapement-pallets, with the assistance of the devices above described, which are controlled by the second main line.

I will now describe my invention by reference to the accompanying drawings.

5 Figure 1 is a perspective view of those features of the receiving-instrument to which my invention relates. Fig. 2 is a sectional view of the connection between the escapement-shaft and type wheel shaft. Fig. 3 is a diagrammatic view of the transmitting apparatus and
 10 circuits.

E is a polarized electro magnet placed in line 1, controlling the step-by-step escapement-wheel A, having one-fourth as many teeth as
 15 there are characters on either type-wheel, and which is mounted upon a shaft, B, said shaft having a feather, C.

F is a hollow sleeve having a groove, D, into which the end of shaft B and its feather C
 20 respectively slide. The opposite end of the sleeve F is provided with a lug or key, G, which radially projects from the inner surface of the hollow cylinder.

T R are two type-wheels, one provided with
 25 letters and the other with figures, rigidly connected together and to shaft O. The opposite end of shaft O is provided with a spiral groove, P, within which lug G slides when the end of shaft O is thrust within the sleeve F. The
 30 spiral groove P, as shown, may extend diametrically through shaft O, and instead of a short lug, G, a key extending diametrically across the opening in the sleeve and supported in the diametrically-opposite sides of the sleeve
 35 may be employed.

Q and Q' are two collars forming portions of the journal-bearings of the escapement-wheel and type-wheel shafts, to prevent said wheels from being pushed in the direction of their
 40 axes. Sleeve F, however, is free to slide in an axial direction, but is rotated by and with shaft B. Shaft O is also, through sleeve F, rotated by shaft B, though the relative positions of the type-wheels and of the escapement-wheel change according to the longitudinal position of sleeve F. When said sleeve is in
 45 such a position that lug G is near the end of

shaft O in groove P, the type-wheels will occupy an angular position the space of one character in advance of the position they will have
 70 after lug G has been forced some distance toward the opposite end of groove P. Sleeve F is moved to and fro along its axis by means of a forked armature lever, J, pivoted at K, whose prongs rest in a circumferential groove be-
 75 tween collars I H. Normally, armature M is firmly held in a retracted position by spring L—that is, when only a weak current is flowing over line 2—in which case sleeve F is held
 80 in an extreme left position, and the type-wheels are so adjusted as, at the termination of vibrations of the escapement, to present any one of the first set of alternate letters, as b d f, &c., and any one of the first alternate set of
 85 figures, as 2 4 6, &c., to the paper strip. When, however, the current on line 2 is strengthened, electro-magnet N attracts its armature, throwing sleeve F to the extreme right position, thereby adjusting the type-wheels to present
 90 the second alternate sets of letters and figures—that is, a c e, &c., and 1 3 5, &c.—to the paper strip, it being understood that a is abreast of 1, b abreast of 2, c abreast of 3, &c., on the type-wheels. Whether a letter or figure shall
 95 be printed is determined by polarized electro-magnet Y, which controls a forked armature-lever, X, pivoted at n, which slides a press-roller, V, mounted on a spindle, W, from one side to the other. When a current, say, of
 100 positive polarity, is flowing on line 2, press-roller V is held under the letter type-wheel T, and when of a negative polarity said press-roller is held under the figure-wheel R. Whether the press-roller is held under one wheel or
 105 the other is dependent wholly upon the polarity of current on line 2, and in no way upon its strength.

S is a neutral electro-magnet in line 1, which is unaffected by the short impulses which set the type-wheels, but which, upon a prolonga-
 110 tion of an impulse, raises armature-lever U, and causes impression roller V to strike that type-wheel under which it is placed by armature-lever X.

At the transmitting-station line 1 is pro-
 115 vided with a rotating current-reverser consisting of a wheel having insulating and conducting spaces alternately arranged upon its periphery, and said circuit-breaking wheel is provided with as many conducting-spaces as
 120 there are teeth upon the escapement-wheel of the receiving-instrument, and with an equal number of insulating-spaces. Spring c d, connecting with the zinc and copper poles of two main-line batteries whose opposite poles are
 125 connected to earth, E, rest upon the periphery of the circuit-breaking wheel, as shown, so that while one spring rests upon a conducting-space the other is in contact with an insulating-space.
 130

h is a rotating arm fixed to the same shaft with the rotating circuit-breaker, and c m is a series of circularly arranged electro-magnets having axial armatures whose ends may be

projected into the path of rotating arm *h* to arrest the same. There are one-half as many conducting-spaces on the circuit-breaking wheel as there are stop-magnets *cm*, and there are one-half as many stop-magnets *cm* as there are characters on each type-wheel of the receiving-instrument. Each stop-magnet *cm* is in a local circuit having four normally-open branches, *m' n' o' p'*, and each branch is provided with a finger-key. The branch of key B includes wire 17, wire 30, and wire 31. The branch of key A includes wire 13 to point 11, magnet *t*, wire 18 to point 12, wire 30, local battery magnet *cm*, wire 31, and *n'*. The branch of key 2 includes wire 15 to point 10, magnet *r*, wire 19 to point 12, wire 30, local-battery *cm*, wire 31, and *O'*. The branches of key 1 include, first, wire 16 to point 10, magnet *r*, &c., as before, and, second, wire 14 to point 11, and thence through magnet *t*. Key 1 closes two branches, respectively, through the magnets *r* and *t*. The parts of anvil 23, to which wires 14 and 16 separately connect, must be insulated from each other; otherwise upon closing key A a circuit would be closed through both of the magnets *t* and *r*, as would also be the case upon closing key 2. The local branch which includes key B and is closed thereby only serves to actuate the armature of *cm* and arrest arm *h*. The local branch including key A actuates the armature of the same stop-magnet *cm* as does key B, and said branch also includes an electro-magnet, *t*. Thus upon closing the key A magnet *t* will cause armature-lever *y* to close on contact-stop *z* and short circuit Rheo in main line 2, and thereby increase the current strength on said line. The local branch including key 2 embraces an electro-magnet, *r*, as well as stop-magnet *cm*. Electro-magnet *r* controls an armature-lever, *u*, which controls an ordinary pole-changer.

v is a stationary conducting-post, to which the main line 2 is connected, and *w x* are two conducting-springs connected to the opposite poles of a battery, M B, from which it is seen that the poles of battery M B are reversed in respect to line 2, both when armature-lever *n* is attracted and when retracted.

It is seen from the foregoing that upon depressing key 2 arm *h* is arrested by magnet *cm*, and that the current upon line 2 is reversed. The local branches which include key 1, also respectively include electro-magnets *r* and *t*, as well as the stop-magnet *cm*. Thus, upon depressing key 1, arm *h* is arrested, and the current on line 2 is both increased and reversed. Arm *h* is arrested in the same position, and by the same stop-magnet *cm* upon depressing any one of the keys A B 1 2. Upon depressing key B, arm *h* is merely arrested without affecting the current of line 2, and letter *b* of the first alternate set of letters on the letter-wheel is printed. Upon depressing key A arm *h* is arrested, and the current of line 2 is increased, and letter *a* of the second alter-

nate set of letters on the letter-wheel is printed. Upon depressing key 2 arm *h* is arrested, and the current of line 2 is merely reversed, and figure 2 of the first alternate set of figures on the figure-wheel is printed. Upon depressing key 1 arm *h* is arrested, and the current of line 2 is both reversed and increased, and figure 1 of the second alternate set of figures on the figure wheel is printed.

While arm *h* is rotating, short pulsations are being sent to line, and when arrested the last pulsation transmitted is prolonged into a continuous current. Upon depressing a finger-key the arm *h* will continue to rotate until it reaches the corresponding stop-magnet, and the prolonged current for raising the press-lever is consequently delayed some time after the key is depressed; but at the instant of depressing a key the current on line 2 is increased, reversed, or both increased and reversed, as the case may be. Thus line 2 prepares the receiving-instrument for any one of four different impressions some time in advance of the act of taking the impression.

I have referred to an alphabetical and numerical arrangement of letters and figures on the type-wheels. In practice, however, I should prefer to include all of the frequently-occurring letters, as *a i e t*, &c., in the first alternate set of letters on the letter-wheel. The printing of the majority of letters could then be effected without calling the second main line into operation.

I have described electro-magnet N as a neutral electro-magnet and Y as a polarized electro-magnet. N however might be polarized and Y neutral, though I prefer the arrangement above described.

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

1. The combination of escapement-wheel A and shaft B, sleeve F, type-wheel shaft O, and electro-magnet N, for moving said sleeve longitudinally to rotate the type-wheel, substantially as and for the purpose set forth.

2. In a printing-telegraph, the combination of an escapement electro-magnet in one line, and an escapement for effecting a step-by-step rotation of two characters at each step, and devices, substantially as described, controlled by an electro-magnet in a second main line, for rotating the type-wheel the space of one character.

3. In a printing-telegraph, the combination of a main line including an escapement and an impression electro-magnet, a second main line including two electro-magnets, one to determine from which of two alternate sets of characters impressions shall be taken, and the other to determine from which of two wheels impressions shall be taken.

4. In a printing-telegraph, an escapement controlled by one line for rotating the type-wheels the space of two characters at a step, and a second main line and two electro-magnets therein for determining which of four

characters upon the two type-wheels shall be printed after each vibration of the escapement, as and for the purpose set forth.

5 5. The combination of type-wheel shaft O, having a spiral groove, P, or its equivalent, hollow sleeve F, having a lug, G, or its equivalent at one end, and a groove, D, at its other end, escapement-shaft B, having a feather, C, and escapement-wheel A, having one-half as
10 many teeth as there are characters on the type-wheel.

15 6. In a printing-telegraph transmitter, a main-line pulsator for operating the type-wheels by one line, four transmitting-keys, all of which arrest the main-line pulsator in the same position to take the impressions at the receiving-instrument, and a pole-changing device, and means for increasing the current in

the second main line, the same being operated by said transmitting-keys, substantially as described. 20

7. In a printing-telegraph transmitter, the combination of a series of stop-magnets, *c m*, for arresting arm *h*, separate local branch circuits completed through each stop-magnet, 25 said branches including transmitting-keys and a pole-changing magnet, *r*, and short-circuiting magnet *t*, arranged to reverse, increase, or to both reverse and increase, the current of line 2, substantially as described.

Signed this 1st day of October, 1884.

CHARLES L. BUCKINGHAM.

Witnesses:

JOHN D. VAN HORNE,
WM. ARNOUX.