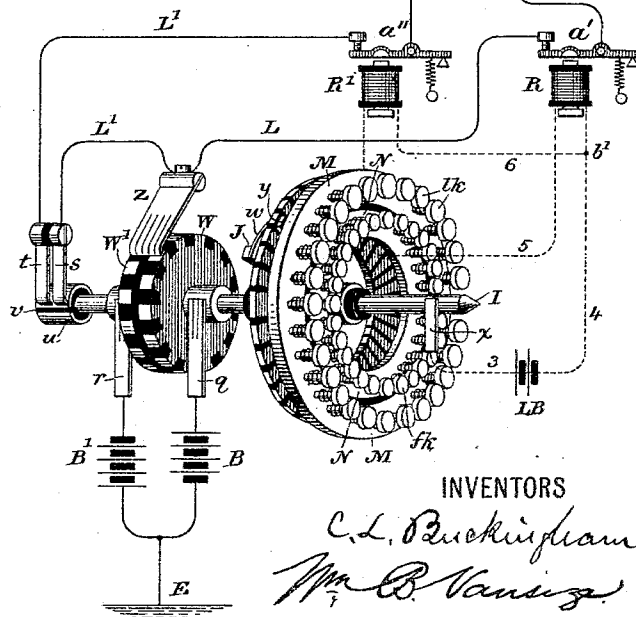


C. L. BUCKINGHAM & W. B. VANSIZE.

No. 300,341.

Patented June 17, 1884.

Wm A. Link.
Geo W. Breck.



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UNITED STATES PATENT OFFICE.

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PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 300,341, dated June 17, 1884.

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To all whom it may concern:

Be it known that we, CHARLES L. BUCKINGHAM, of the city, county, and State of New York, and WM. B. VANSIZE, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Printing-Telegraphs, of which the following is a specification.

Our invention relates to that class of printing-telegraph instruments having two type-wheels whose rotation is effected by a motor, such as a clock-work and an electro-magnetic escapement controlled by short electrical impulses.

Hitherto, and prior to our invention, others had employed two type-wheels in printing-telegraph instruments—one having letters upon its periphery and the other figures. To enable the printing of letters to the exclusion of figures, and vice versa, complicated apparatus was necessarily employed—such, for instance, as that for the shifting of the two type-wheels longitudinally upon their axis to bring one type-wheel over the strip of paper, and to move the other from above the strip. Also, a shield had been used which could be interposed between the paper strip and either type-wheel. Again, the press-pad had been laterally moved under one type-wheel or the other. In all of these cases it was necessary, as a condition precedent to the shifting of the printing from one wheel or the other, to first rotate the type-wheels to a predetermined or zero position.

The object of our invention is to enable the printing from either of the two wheels, which are rigidly fixed upon the same shaft, without using intricate devices for determining upon which type-wheel an impression shall be taken, and without consuming time incident to the operation of first rotating the type-wheels to a predetermined or zero position. To this end we use two main lines which extend from the transmitting-station to one or more receiving-stations, the two main lines respectively embracing two multiple-arc coils wound in the same direction upon the core of the escapement electro-magnet, and each of said main lines embraces the coils of an independent press-magnet. Each press-magnet

controls an independent press-lever. Thus, for printing from each type-wheel, we employ an independent platen, press-lever, electro-magnet, and main line. To set the type-wheels in position to print any desired character, a predetermined number of electrical impulses, as electrical reversals, (though mere makes and breaks might be used,) are transmitted over the two main lines, and to print a character that one of the lines is broken which operates the platen of the type-wheel upon which it is not desired to print, while the other line is closed, and the impulse last transmitted is prolonged thereon, and the press-magnet on said line which was irresponsible to the short impulses employed to control the rotation of the type-wheels is now energized sufficiently to attract its armature, and the press-lever connected therewith to take an impression. The other press-lever, which was, during the transmission of short electrical impulses, held in a retracted position by a suitable retractor—as a spring—is also retained in a retracted position after its corresponding main line is broken. When the type-wheels have been set in any particular position, a letter may be printed from one, or a figure from the other, by closing the line of that wheel from which it is desired to print, and by breaking the line of the other wheel.

The unison apparatus which we employ consists of an armature-lever which is normally held in position by a retracting-spring, and is adapted to arrest a radial arm upon the type-wheel shaft, if not in unison, at each revolution. The unison armature-lever is periodically attracted at the precise instant to permit the continued rotation of the type-wheels, providing they are not out of unison. The attraction of the unison armature-lever is effected by an electro-magnet whose coils form parts of the two main lines, said coils being differentially wound on its core. While impulses are flowing over both of the main lines simultaneously, magnetic effects in the differential unison-magnet are neutral; but if there be a momentary cessation of current in one line, the core of the differential magnet immediately becomes magnetized and its armature-lever is

attracted. We effect a periodic cessation of current upon one of the two lines automatically at each rotation of the transmitter by means of a circuit-breaking disk placed upon the shaft of the transmitter, and a spring bearing upon said disk.

We will now describe our invention by reference to the accompanying drawings, in which Figure 1 is a perspective of our complete invention, and Fig. 2 a detail view thereof.

The two main lines *L L'* at each receiving-instrument respectively embrace the two parallel multiple-arc coils of the type-wheel or escapement electro-magnet *M* and the differentially-wound coils of the unison electro-magnet *U*. The line *L* embraces the coils of an independent press-magnet, *G*, and line *L'* the coils of a second independent press-magnet, *H*. Electrical impulses of the same polarity are simultaneously transmitted over both main lines, and upon each impulse the escapement-wheel *D* upon the type-wheel shaft is given a single step of rotation. The currents upon the two lines conspire with each other to actuate the escapement-armature, although an impulse upon either line alone would operate said escapement. Short impulses upon lines *L L'* which are sufficient to actuate the escapement apparatus are inadequate to cause the attraction of the press-levers *m n*. When, however, the impulse last transmitted upon one of the main lines is prolonged, its press-magnet will be energized and the armature-lever thereof will be attracted, thereby causing an impression upon its associated type-wheel. For example, if it be desired to print a letter, the current must be prolonged upon line *L*, while line *L'* must be broken. If, instead, it be desired to print a figure, the current upon line *L'* must be prolonged and line *L* broken. A prolonged current upon either line serves to lock the escapement apparatus and the type-wheels in the desired position for printing, as well as to effect the movement of the desired press-lever. The unison armature-lever *l* is normally held in position by its retracting-spring *i* to arrest the radial arm *p*, and thereby the type-wheels *F F'*, in a unison position at each revolution. However, at each revolution of arm *p*, and just at the instant to avoid the same, providing the type-wheels are rotating in unison with the transmitter, armature-lever *l* is attracted, owing to the momentary cessation of current in main line *L'*. If the type-wheels be not in unison with the transmitter, it is obvious that arm *p* will be arrested and the type-wheels held at unison until the transmitter has completed its next rotation and has again arrived at the unison-point. It is apparent that upon the printing of each character of a message the unison armature-lever will be attracted; but this can have no influence to derange the operation of the instrument, as the radial arm *p* will be out of unison position. Reverse impulses are transmitted to the main lines *L L'* from batteries

B B', through springs *q* and *r*, respectively, through break-wheels *W W'*, each having alternate conducting and non-conducting spaces, which are so arranged that the conducting-spaces of one are opposite the non-conducting spaces of the other, and through a spring, *Z*, connected to the ends of said lines *L L'*. A radial stop-arm, *Y*, together with a sunflower-arm, *J*, and the wheels *W W'*, are rigidly fixed upon a common rotating shaft, *I*. The arrangement of the insulating and conducting spaces of the two wheels *W W'* in respect to spring *Z*, whose free end bears upon both in common, is such that nearly at all times while spring *Z* is upon a conducting-space of wheel *W* it will rest upon a non-conducting space of wheel *W'*. By this means a copper current is transmitted from battery *B* to lines *L L'*, and after its termination a zinc impulse is transmitted from battery *B'*.

The transmitter is provided with two concentric rings, *M* and *N*, in which are set, respectively, two series of arresting-keys, *l k* and *f k*, representing all of the characters upon the type-wheels of the receiving-instruments. Each transmitting-key is provided not only with means for arresting the radial rotating stop-arm *Y* of the transmitter, but also with an anvil for forming an electrical contact to close a local circuit at one point thereof at the instant of arresting the said radial arm. As shown in Figs. 1 and 2, line *L* is provided with a relay, *R*, and line *L'* with a relay, *R'*. Relay *R* is controlled by a local battery, *L B*, whose circuit extends by wire 4 to point *b'*, thence through the coils of said relay, wire 5, to the inner concentric series of transmitting-keys, which are set in ring *N*, thence to anvil *m'*, which is set in one of the radial contact-strips, *k'*, of the sunflower, through a trailing sunflower-finger, *w*, sunflower-arm *J*, transmitter-shaft *I*, spring *x*, and wire 3, back to the opposite pole of the local battery. In like manner relay *R'* is controlled by the same local battery, and has its circuit over wire 4 to point *b'*, thence by wire 6 through the coils of said relay electro-magnet to the outer concentric series of transmitting-keys, *l k*, which are set in the annular ring *M*, thence to anvil *w'*, set in a radial conducting-strip of the sunflower, trailing sunflower-finger *w*, sunflower-arm *J*, shaft *I*, spring *x*, and wire 3, to the opposite pole of the local battery. Each sunflower-section is provided both with an anvil, *w'*, and an anvil, *m'*, and in the same radial line therewith are two keys—one of each concentric series. There are as many sunflower-strips as there are transmitting-keys in each concentric series. It will now be seen that if it be desired to print any character, as any letter, one of the keys of the series *l k* (shown in Fig. 2) will be depressed into contact with anvil *w'*, thus closing the local circuit of relay *R'* at one point, but leaving said local broken at another point—to wit, between the sunflower-arm and the sunflower-strip to which the branch is connected. When, however, the transmitter and the sunflower-arm

are rotated into such position that finger *w* rests upon the sunflower-section in which anvil *w'* is situated, the local circuit will be completed, and at the same time the radial stop-arm Y will be arrested by the key *l'*. The depression of key *l'*, therefore, serves to close one of two open points in the local circuit, and to then arrest the sunflower-arm in a position to close the other point of the local circuit. When this has been accomplished, relay R' actuates its armature *a''* and breaks the main line L'. At the same time, however, main line L remains closed, and since the transmitter is arrested a continuous current will flow thereon to the receiving-instrument, thereby locking the escapement-yoke, and causing an impression to be taken upon the letter-wheel. If, instead of depressing a key of the annular ring M, a key of ring N be operated, stop-arm Y will be arrested in exactly the same radial position, but will cause the circuit of the local battery to be closed through the relay R. The necessity for arresting the transmitter-arm Y and the sunflower-arm J in the same position both by a letter and a figure key is obvious from the fact that a letter upon the type-wheel is abreast or in the same line with a figure upon the other type-wheel. Thus, if the type-wheels are brought to a certain position, there must be a means of determining from which of these type-wheels an impression shall be taken, and this is accomplished by the devices just described, or by breaking one main line and closing the other, and vice versa. Unison is effected by means of a circuit-breaking wheel, *n*, having insulating-space *v*, against which the free ends of springs *s t* may make contact. Ordinarily circuit L' is completed through spring *s*, conducting portion *u* of the circuit-breaking wheel, and spring *t*; but when the circuit-breaking wheel has been revolved to such a position that the springs rest upon the insulating portion *v*, line L' is momentarily broken, and during that period the armature-lever *l* is retracted from a position to arrest the radial unison-arm *p*.

Instead of employing a polarized electro-magnet, M, and reverse impulses upon lines L L', it is obvious that a neutral escapement-magnet controlled by changes of current, irrespective of changes of polarity, may be employed without departing from our invention. It is also obvious that instead of adjusting the armature-levers *m n* by their respective retractors against the action of the neutral press-magnets G H during the passage of short electrical impulses, armatures *m n* may be so adjusted as to be held to the poles of their electro-magnets, and thereafter printing may be effected by breaking the current, and by permitting an automatic mechanism to throw that one of the armature-levers with which it is desired to print against its type-wheel. These modifications, however, we do not desire to herein claim, but reserve our right to file other applications for patents thereon.

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

1. The combination, in a printing-telegraph, of two main lines, two independent press-magnets respectively placed therein, two type-wheels, and an electro-magnetic device therefor for controlling their rotation.

2. The combination, in a printing-telegraph, of two independent main lines, two independent press-magnets respectively placed therein, two type-wheels connected together, and an escapement device and electro-magnet for controlling their rotation.

3. The combination, in a printing-telegraph, of two main lines including the multiple-arc coils of the escapement or type wheel magnet, and two independent press-magnets whose coils respectively form parts of said main lines.

4. The combination of two independent main lines, an escapement electro-magnet controlled thereby, and two independent printing-magnets whose coils form parts, respectively, of said lines.

5. The combination of two independent main lines, a type-wheel escapement device controlled thereby, a differential unison-magnet, and two independent printing electro-magnets placed in said lines, respectively.

6. The combination of two main lines, an escapement or type wheel electro-magnet therefor, two independent printing electro-magnets, placed in said lines, respectively, and transmitting devices for breaking the circuit of either line at pleasure.

7. Two independent main lines, an escapement or type wheel electro-magnet controlled thereby, a differential unison electro-magnet placed in said lines, two independent printing electro-magnets, and unison transmitting devices for breaking the main circuit through one of said lines to release the unison mechanism.

8. Two independent main lines, commutating devices for simultaneously transmitting thereon short electrical impulses, devices for lengthening an impulse upon one line and for breaking the other line, substantially as described, a multiple-arc type-wheel electro-magnet, and two independent printing electro-magnets in said lines.

9. The combination of the differential unison electro-magnet U, armature-lever *l*, unison-arm *p*, type-wheel lines L L', and a circuit-breaker for periodically breaking line L', substantially as described.

10. The combination, in a printing-telegraph instrument, of a rotating transmitter-arm, a series of transmitting-keys for arresting said arm, circuit-breaking connections for said keys, a sunflower arrangement, as described, two main lines, and relays R R', for breaking the main lines, substantially as specified.

11. The combination, in a printing-telegraph, of a rotating circuit wheel or wheels, a rotating transmitter-arm, and two series of keys for arresting said transmitter-arm, a sun-

flower arrangement, as described, two main lines, and transmitting devices for breaking either of the main lines by its associated series of transmitting-keys, substantially as described. 5

12. In a printing-telegraph, the combination of two independent main lines, each having an independent printing-magnet, two independent press-levers, two type-wheels rigidly

connected together, and transmitting devices for prolonging an electrical impulse upon one line while the other line is broken, and vice versa.

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Witnesses:

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WM. ARNOUX.