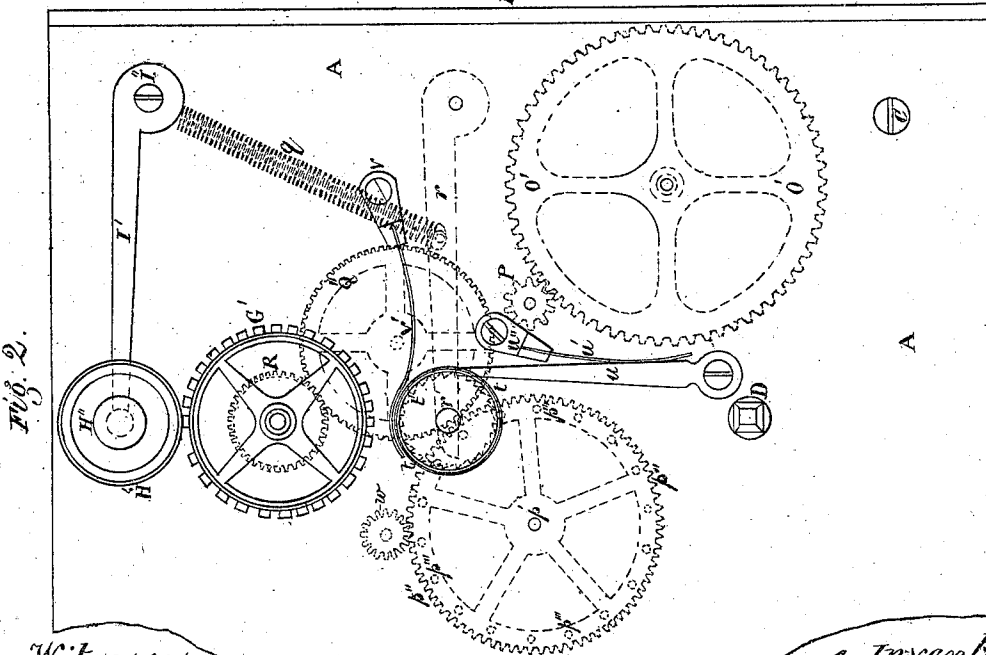
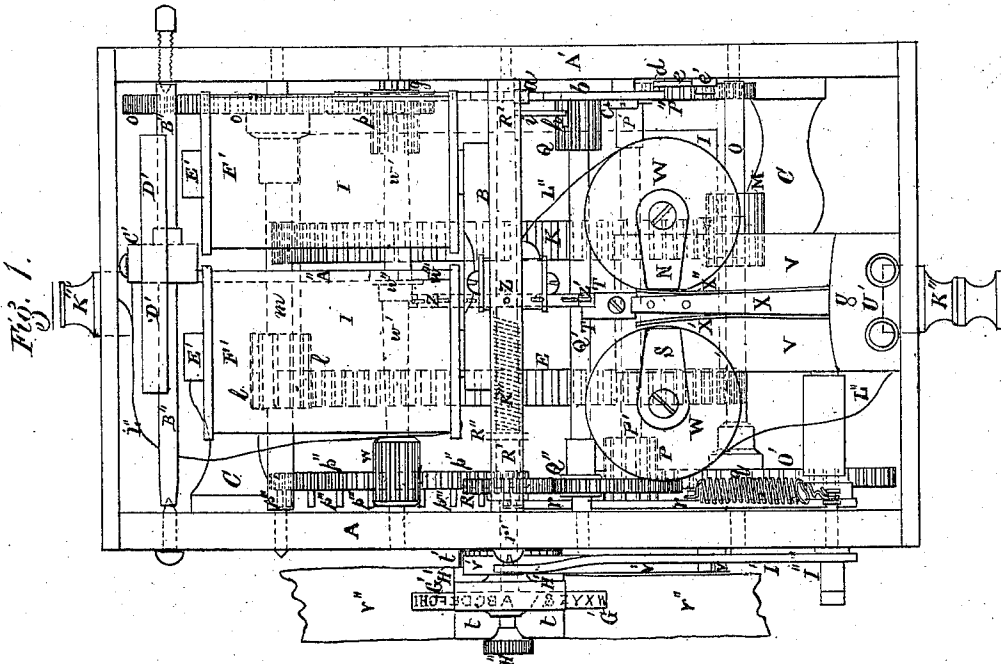


G. L. ANDERS.
Printing-Telegraphs.

No. 144,045.

Patented Oct. 28, 1873.



Witnesses,
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Jesse F. Wheeler

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by his atty-
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Fig. 3.

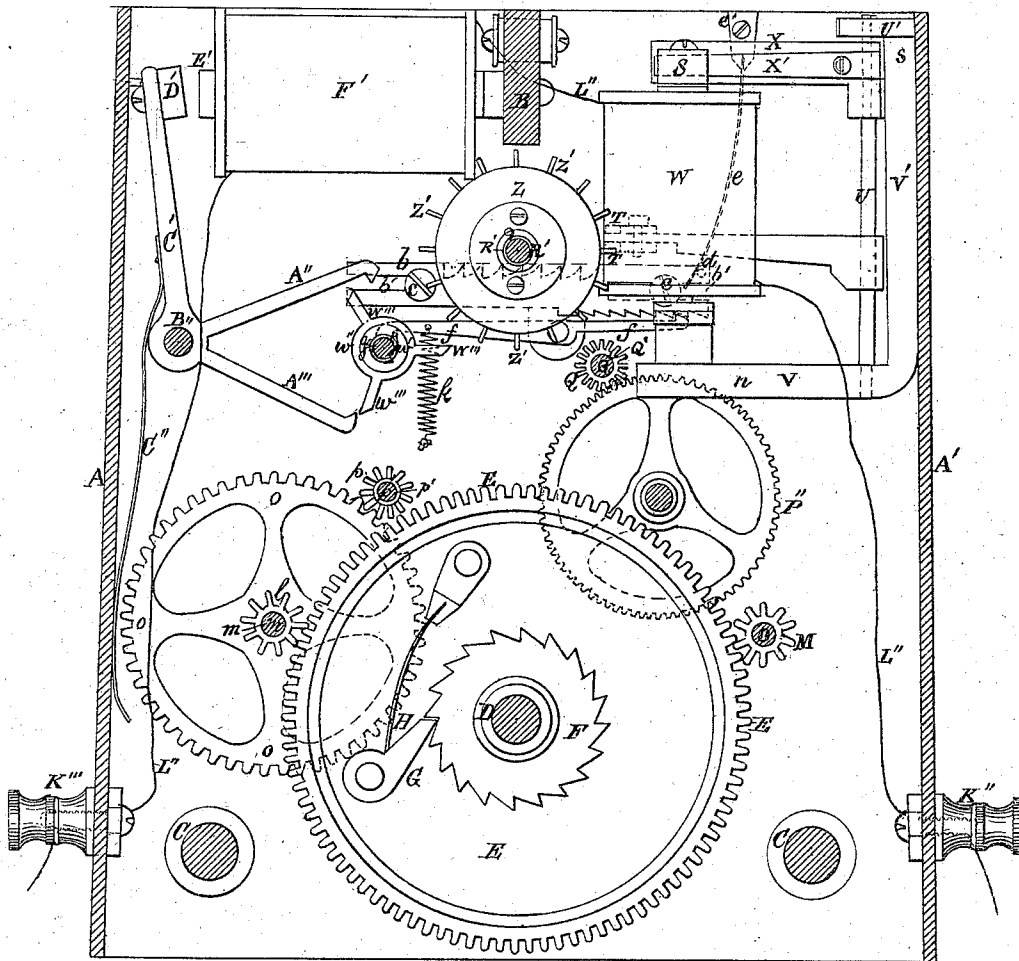


Fig. 4.

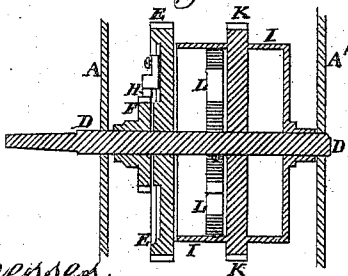


Fig. 5.

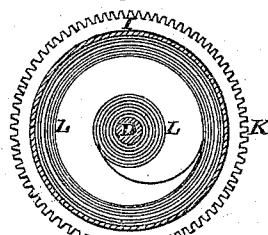
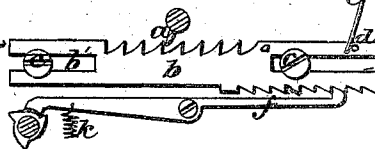


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, ASSIGNOR TO E. B. WELCH, OF CAMBRIDGE,
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IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **144,045**, dated October 28, 1873; application filed
December 18, 1872.

To all whom it may concern:

Be it known that I, GEORGE L. ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Printing-Telegraph Instruments, of which the following is a specification:

In the accompanying drawings, Figure 1 is a top view. Fig. 2 is an exterior view of one side, showing, by dotted lines, a portion of the interior mechanism. Fig. 3 is a vertical longitudinal section through one side, looking toward the opposite side; and Figs. 4 and 5 are parts in detail of my improved printing-telegraph instrument.

The present invention relates to certain new and useful improvements in printing-telegraph instruments of that class known as the "automatic step by step" instruments, and has for its principal object the production of an instrument that shall be reliable and rapid in its operation. My improvements consist mainly in a series of mechanical devices arranged and operating, as will be hereinafter more fully described, in combination with an electro-magnet and polarized magnet, under certain electrical conditions and in such a manner that each of the magnets shall release an escapement, the polarized magnet releasing the type-wheel escapement, and the electro-magnet that of the press mechanism; also, in the manner of actuating these escapements separately by two trains of wheels impelled by one main-spring.

In the drawings, A A' represent the sides of a telegraph-instrument case, connected at the top by a central transverse plate or bar, B, and at the bottom by transverse rods or bars C at each end. Supported by, and turning in, the lower portion of the sides A A' is a central arbor, D, provided with a gear-wheel, E, having on its outer face a ratchet-wheel, F, with which engages a pawl, G, pivoted to the wheel E, and receiving on its top the end of a bent spring, H, the other end of which is held by a clamp, or otherwise secured to the face of the wheel E. Connected with the arbor D is a cylinder or drum, I, having an outer projecting gear-rim, K, and having attached to its inner periphery one end of a main or coiled spring, L, the other end of said spring being

attached to the arbor D. Engaging with the gear-rim K is a pinion, M, connected with an arbor, O, that has on its other end a gear-wheel, O', that engages with a pinion, P, of an arbor, P', provided on its opposite end with a gear-wheel, P'', that engages with a pinion, Q, of an arbor, Q', to the opposite end of which is connected a gear-wheel, Q'', that engages with a gear-wheel, R, connected with an arbor, R', having in the center, or in the required position, an escapement-wheel, Z, provided on its periphery with projecting pins Z' that engage with the ends of pallets T, connected with a vertical rod, U, whose top turns in a projecting plate, U', attached to the vertical portion V' of a right-angled magnetized standard, V, the bottom or horizontal portion of which receives the bottom of the rod U, and supports the lower portion of a vertical polarized electro-magnet, W, between the poles N S of which extends the end of an armature, X, connected, so as to be turned to and fro laterally, with the upper portion of the rod U. Attached to one end and extending along each side of the armature X, and between it and the poles N S, are bent springs X' X'', of brass or other non-magnetic material and of suitable strength and thickness. Engaging with a gear-wheel, p'', is a pinion, w, attached to an arbor, w', that has near the center or in the required position an escapement-wheel, w'', provided with radiating arms w''', beveled or otherwise suitably formed on the ends that are held and released by the toothed ends of arms or pallets A'' A''' radiating from a hub of an arbor, B'', turning in the ends of the sides A A'. Extending up from the hub of the arbor B'' is a vertical arm, C', that supports a horizontal transverse armature, D', situated opposite the poles E' of an electro-magnet, F', arranged longitudinally, or in any other suitable position in the instrument, to the cross-bar B of which it is attached. Connected with the vertical arm C' is one end of a bent spring, C'', that extends downward and impinges against the inside of one end of the instrument-case. The arbor R' extends through the side A, and is provided on the outside with a type-wheel, G', arranged on its periphery with suitable letters, &c., and having on its

other end, in the interior of the case A', a latch, *a*, that engages with teeth formed in the upper edge of a unison bar, *b*, arranged with slots *b'* to slide on screw-stems *c* connected with the side A', and provided with a stem, *d*, against which abuts one end of a bent spring, *e*, the other end of which is held by a clamp, *e'*, attached to the side A'. The under side of the unison bar *b* is formed with teeth, engaging with which is the toothed end of a pivoted click or lever, *f*, whose other end is formed to connect with a cam, *g*, attached to the end of an arbor, *w'*. Projecting inward from the upper portion of the bar *b* is a stop, *h*, with which engages the end of an arm, *i*, radiating from the arbor R', which is provided at the other end with a flange or collar, R'', to which is attached one end of a spiral spring, R''', the other end of which is connected with the escapement-wheel Z, so as to allow the pins Z' to fall rapidly on the pallets T. To the pivoted lever or click *f* is attached one end of a spring, *k*, the other end of which is connected with the side A' of the case. Engaging with the gear-wheel E is a pinion, *l*, attached to an arbor, *m*, that is provided at its opposite end with a gear-wheel, *o*, that engages with a pinion, *p*, of an arbor, *p'*, that has on its opposite end a gear-wheel, *p''*, provided with pins *p'''*, projecting outward from the side of its rim, and with which pins *p'''* one end of a lever-arm, *r*, pivoted to the side A, is arranged to engage, a spring, *q*, being attached to the lever-arm *r* and the side A for the purpose of regulating the tension of the feed-roller. Projecting at a right angle from one end of the lever-arm *r* is an arbor, *r'*, that extends through the side A, and is provided on the outside with a feed and press roller, *t*, having on its inner face ratchet-teeth *t'*, with which engages the end of a vertical arm, *u*, pivoted to the side A, and kept in proper position by a bent spring, *w'*, bearing against its side, the upper end of the spring *w'* being held by a clamp, *w''*, or otherwise secured to the outside of the case A. Secured to the outside of the case A is a clamp, V, that holds one end of a bent spring, V', the other end of which passes over, and is curved so as to bear upon and hold the paper slip V'', that is fed along between it and the roller *t*. Over the type-wheel G' is an ink-roller, H', connected by a thumb-screw, H'', with one end of a lever-arm, I', whose other end turns on a pivot, I'', connected with the exterior of the side A. Near the bottom of each end of the case is a screw-cup or binding-screw, K'' K''', from one of which, K'', extends a wire, L'', that connects with the coils of the polarized magnet W, and thence continues to the coils of the electro-magnet F', and down to the binding-screw K'''.

The operation of my invention is as follows: The power necessary for actuating the two escapements Z and *w''* is obtained from the tension of one main or coiled spring, L, one end of which is attached to the arbor D that operates the gear-wheel E and the train con-

necting therewith, thereby operating the escapement-wheel *w''* and press mechanism. The other end of the spring L being attached to the drum I, which is operated by the same arbor D, actuates, by means of the gear-rim K, the train operating the escapement Z and type-wheel mechanism, both escapements being thus operated by one spring, and independently of each other.

Power being applied to the mechanism when a number of electrical pulsations alternating in their direction are passed through the electro-magnet F' and polarized magnet W simultaneously, the armature D' of the electro-magnet F' is drawn up and held to the poles E', while the armature X of the polarized magnet W feels the attractive force of the pulsations alternately on opposite sides, and is kept vibrating laterally, thus releasing the type-wheel escapement Z, and giving a discontinuous motion to the type-wheel G'. As soon as a cessation of these pulsations occurs the armature D' of the electro-magnet is drawn back by the spring C'', the press mechanism is released, and an impression is taken, the type-wheel G' now being at rest.

It will be seen that the two magnets F' and W, with their respective releasing mechanism, being in the same circuit, the combined effect is such that, when one of the alternating electric pulsations is passed through them, the armature X of the polarized magnet W is attracted to the opposite pole, and remains there, while the armature D' of the electro-magnet F' is attracted to the poles E' of the same, and, as soon as the attractive force of the electro-magnet has ceased, it is withdrawn by the spring C'', thus operating the escapement Z and press mechanism so as to give an impression of the letter on the paper strip.

When two or more pulsations are passed through the magnets F' and W the polarized magnet W admits the advance of a corresponding number of letters on the type-wheel G'; and, when the pulsations are suspended a sufficient length of time for the spring C'' to withdraw the armature D' of the electro-magnet F', the press mechanism is released and an impression taken; and so on till the desired word or message is printed.

When a number of these instruments are connected upon one circuit the unison of the type-wheel G' is obtained by the unison stop or bar *b*, with whose upper teeth the latch *a* engages, so as to carry the bar *b* along one tooth at each revolution of the type-wheel G', and is there held by the click or pivoted lever *f*, one end of which engages with the under teeth of the bar *b*, and its other end engages with the cam *g* of the press mechanism, so as to release the bar *b* at the operation of the press. The bar *b* is then drawn back to its original position by the spring *e*, the pivoted lever or click *f* being regulated in its action against the cam *g* and the teeth of the bar *b* by the spring *k*.

When the type-wheel G' makes three revolu-

tions, or feeds along three of the upper teeth of the bar *b* without being released by the press mechanism, the stop *h* will engage with the arm *i*, and bring the wheel *G'* to rest at a standard point.

The springs *X' X''* on each side of the polarized armature *X* have an important function in the operation of the armature *X*; first, by being of suitable thickness and of non-magnetic material, they prevent the armature *X* coming in contact with the poles *N S* of the polarized magnet *W*; and, in the second place, they aid the armature *X* in freeing itself from one pole while it is being, and is, neutralized by the current, thus carrying it within the influence of the superior attractive force of the opposite pole.

It will be seen from the foregoing description that the operation of the electro-magnet, so arranged as to release the printing mechanism at the cessation of the momentary impulses transmitted simultaneously through it in conjunction with the polarized electro-magnet which releases the type-wheel mechanism, does not, in any way, resemble that of the electro-magnet and polarized electro-magnet as shown and described in the patent granted to Frank L. Pope and Thomas A. Edison, dated April 26, 1870.

Having thus fully described my improvement, what I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. A polarized electro-magnet for releasing,

in a step-by-step motion, the type-wheel impelled by mechanical power, by passing currents alternating in their polarity rapidly through it, in combination with an electro-magnet controlling the printing mechanism, and placed in the same circuit with the polarized electro-magnet and excited by the same currents, and arranged to attract and hold its armature until a sufficient interval between the pulsations occurs to release the same, and allow the press mechanism to operate and effect an impression, substantially as described.

2. In a printing-telegraph, the combination, with the printing mechanism and the type-wheel mechanism, of the one mainspring actuating both, substantially as and for the purpose set forth.

3. The arrangement of springs *X' X''*, of brass or other non-magnetic material, of suitable strength or thickness, on each side of the polarized armature *X*, for the purposes set forth, substantially as described.

4. The sliding unison bar *B*, having serrated edges, in combination with the latch *a*, pivoted spring-lever *f*, and spring *e*, all arranged and operating substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. L. ANDERS.

Witnesses:

CARROLL D. WRIGHT,
JESSE F. WHEELER.