(No Model.) 3 Sheets—Sheet 1.

R. J. SHEEHY.

PRINTING TELEGRAPH.

No. 307,231. Patented Oct. 28, 1884.

Fig. 2,

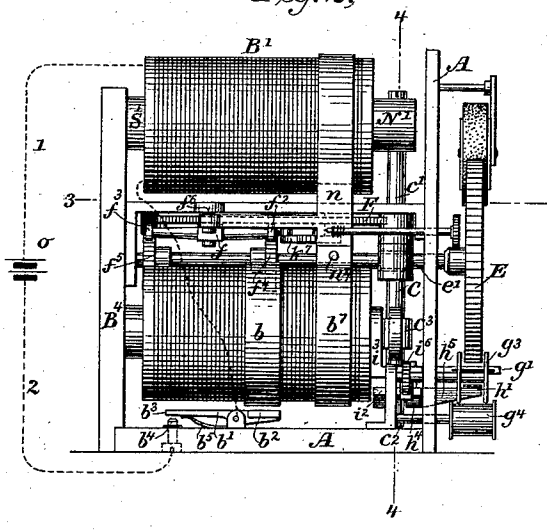


Fig. 1,

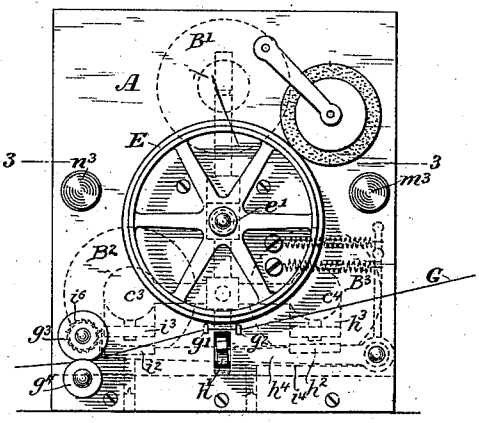


Fig. 3,

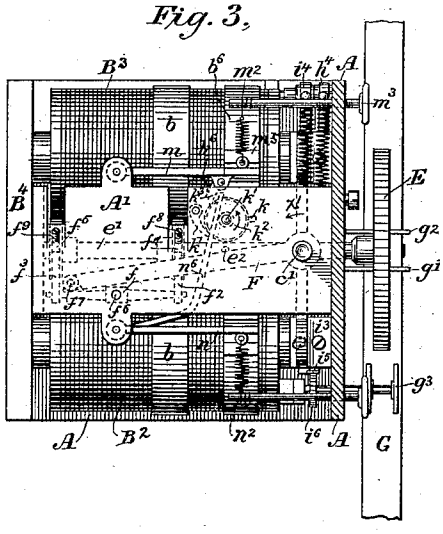
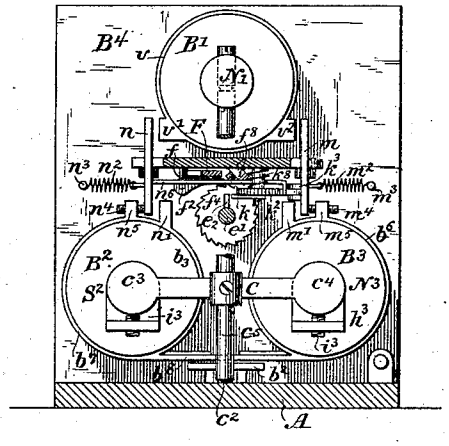


Fig. 4,



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(No Model.)

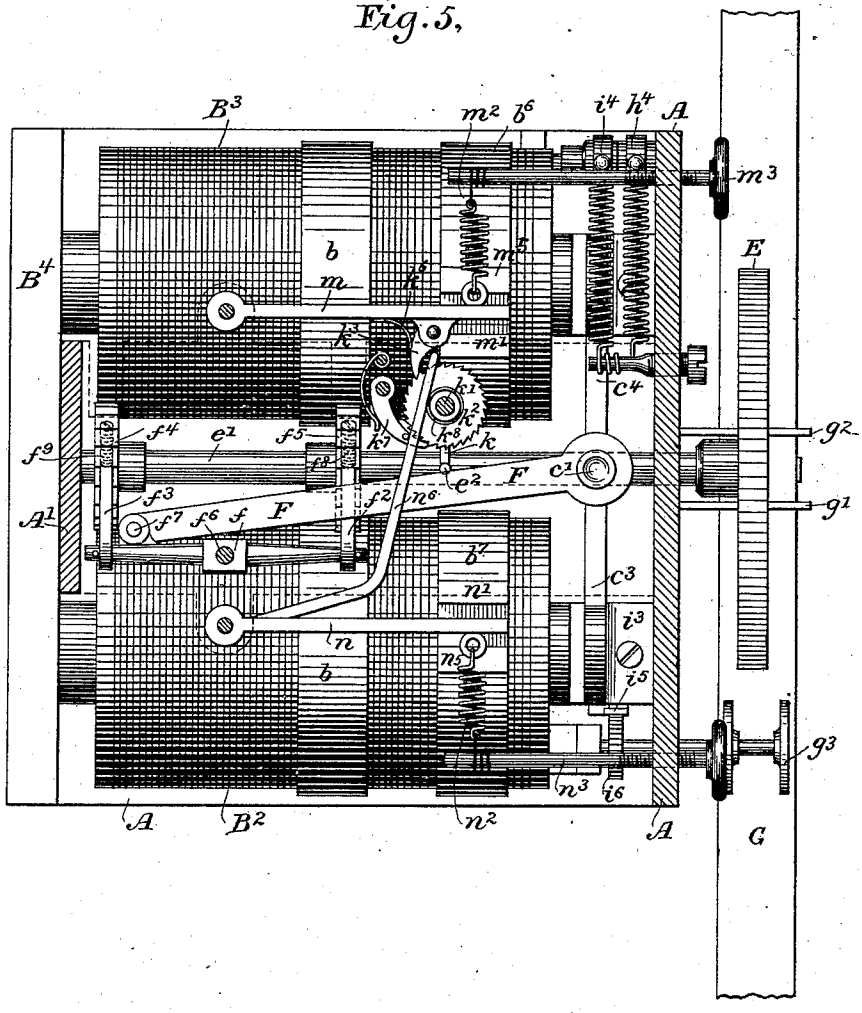
3 Sheets—Sheet 2.

R. J. SHEEHY.

PRINTING TELEGRAPH.

No. 307,231. Patented Oct. 28, 1884.

Fig. 5.



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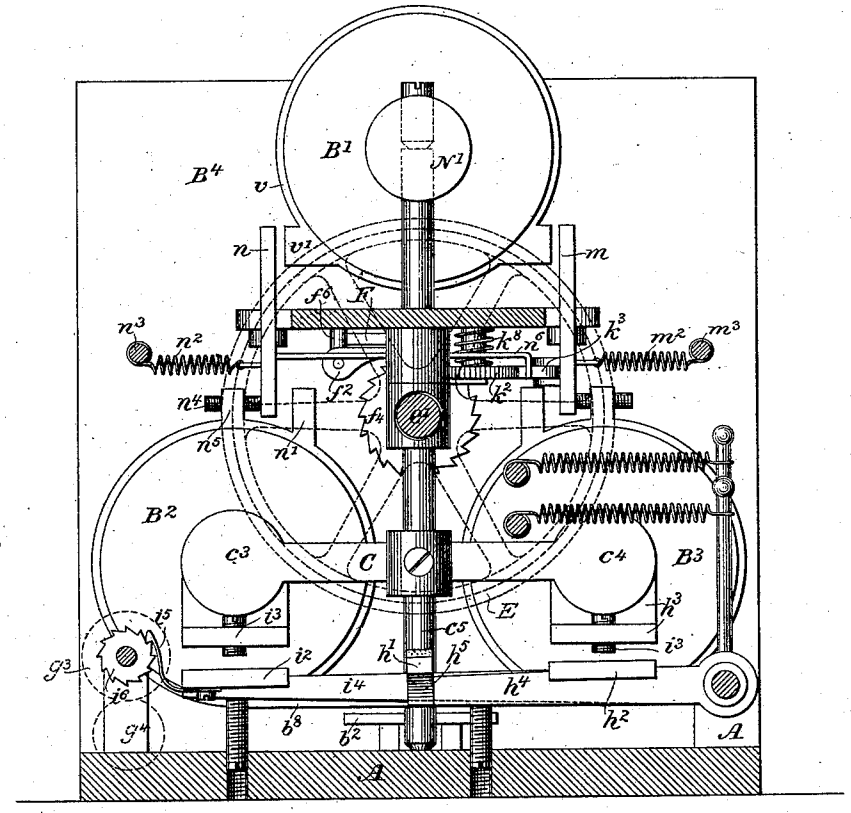
PRINTING TELEGRAPH.

No. 307,231. Patented Oct. 28, 1884.

Fig. 6,



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UNITED STATES PATENT OFFICE.

ROBERT J. SHEEHY, OF NEW YORK, N. Y.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 307,231, dated October 28, 1884.

Application filed November 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. SHEEHY, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Printing-Telegraphs, of which the following is a specification.

My invention relates to the construction of apparatus for revolving the type-wheel of a printing-telegraph receiving-instrument, by means of electric impulses of alternating polarity, devices for automatically effecting impressions therefrom, and for maintaining the type-wheel in unison with the instrument employed for transmitting the impulses thereto.

The object of the invention is both to simplify the construction of such an instrument and to render it more responsive to variations in the character and strength of the currents transmitted thereto.

The invention consists in organizing the apparatus in substantially the following manner: The type-wheel is revolved by the movements of an armature which is of peculiar construction. This armature is polarized by induction, and responds to reversals in the polarity of the electric currents or impulses transmitted upon the main line. An independent armature, responding to currents of whatever character, is employed for completing the circuit-connections of a local battery through the coils of the inducing electro-magnet. A neutral armature, responding only to prolonged impulses, is employed for effecting impressions from the type-wheel, and a similar armature, responding subsequently to the printing-armature, causes the paper tape, upon which the impressions are received, to be fed forward. The unison of the type-wheel with the transmitting-instrument is effected by means of a detent carried upon an arbor, which is revolved step by step through the action of an armature especially designed for the purpose, and responding to the alternating electric impulses caused to traverse the main line. When the detent has been thus advanced to the limit of its movement, it stands in the path of a stop carried upon the type-wheel shaft. The revolution of the type-wheel shaft will thus be arrested and the type-wheel will be brought to rest in a predetermined position. For the purpose of preventing the type-wheel from being thus arrested during the process of printing, an armature responding to the prolonged impulses which are employed for actuating the printing-armature is employed for releasing the detent-arbor and permitting it to return to its starting-point. A retractile spring is employed for effecting such a return when the arbor is released. When, however, a sufficient number of impulses are transmitted to the instrument without the intervention of a prolonged current, the detent will be brought into its advanced position, and will arrest the type-wheel in the manner described.

In the accompanying drawings, which illustrate my invention, Figure 1 is a front elevation of the complete instrument, and Fig. 2 is a side elevation of the same. Fig. 3 is a plan view, as seen along the plane 3 3, Fig. 1, and Fig. 4 is a front elevation along the plane 4 4, Fig. 2. Fig. 5 is an enlarged plan view of the instrument through a lower plane than that shown in Fig. 3. Fig. 6 is an enlarged front elevation of the complete instrument.

Referring to these figures, A represents the frame-work for supporting the various parts of the instrument, and B' B^2 B^3 represent two electro-magnets, which are supported in this frame, and which are provided with a back plate, B^4, of soft iron, common to both. The coils of the electro-magnet B' are included in the circuit of a local battery, *o*. A conductor, 1, connected with one pole of this battery, say the positive, leads through the coils of the electro-magnet B' to an armature-lever, *b'*. This armature-lever is designed to be controlled by the electro-magnetism generated by the impulses transmitted from the distant station through the coils of the electro-magnet B^2. The armature-lever carries at one extremity an armature, b^2, which extends into proximity to a soft-iron band, *b*, encircling the coils of the leg B^2, of the electro-magnet B^2 B^3, in a manner hereinafter described. At the other extremity of the armature-lever is carried a contact-point, b^3, which is normally held away from the corresponding contact-stop, b^4, by means of a suitable retractile spring, b^5. When, however, the electro-magnet B^2 B^3 is vitalized by the alternating currents traversing its coils, the armature b^2 is held in its forward position, the tension of the spring b^5 being insufficient to withdraw it during the

successive changes of magnetization. For the purpose of insuring that the armature shall not fall away from the band *b* during the time the polarity of the latter is being reversed it is desirable to so construct the armature that its inertia shall be comparatively great. This may be accomplished either by making the armature large or by weighting it with non-magnetic metal. The contact-point b^3 will thus be caused to rest upon the stop b^4, which serves thus to complete the connections of the battery *o* from the armature-lever *b'* through a conductor, 2, to the negative pole of the battery, so long as the impulses of any character whatever are transmitted through the electro-magnet $B^2 B^3$. The extension of the armature-lever *b'*, which carries the contact-point b^3, is preferably made flexible, for the purpose of insuring a continuous contact between the point b^3 and the stop b^4 when the armature is in its forward position, even though it be caused to vibrate slightly on account of the changes in the polarization of the electro-magnet. The circuit of the battery *o* being in this manner completed through the electro-magnet B', whenever the instrument is being employed for printing that magnet will be constantly vitalized, one pole, say N', being of north polarity and the opposite pole of south polarity. In front of the pole N' and in magnetic connection therewith is supported one extremity of a triangular soft-iron armature, C. This armature consists of the upright portion *c'*, the lower end of which is pivoted at a point, c^2, from which project two lateral arms, c^3 and c^4, constituting an armature for the electro-magnet $B^2 B^3$. The portion c^5, however, of the arm *c'*, which is below the point of attachment of the lateral arms c^3 and c^4, is preferably of non-magnetic material—such, for instance, as brass. When, therefore, the electro-magnet B' is vitalized, the upper extremity of the arm *c'* receives by induction a polarization similar to that of the pole N'—that is to say, north. The extremities of the arms c^3 and c^4 accordingly receive a polarization of the same character. The electro-magnet $B^2 B^3$ is included in the main-line circuit and is wound in the manner of an ordinary electro-magnet, so that a current of the character required to render the pole N^3 north, will render the corresponding pole, S^2, south, and vice versa. When, therefore, the pole N^3 is thus rendered of north polarity, the arm c^4, which is, by induction, of north polarity also, will be repelled and the arm c^3 will be attracted toward the corresponding pole, S^2. When the polarizations of the electro-magnet $B^2 B^3$ are reversed, the arm c^3 will be repelled from the pole S^2, and the arm c^4 attracted toward the pole N^3. Thus, by transmitting alternating currents through the electro-magnet the armature C will be turned to and fro upon its axis *c'*. The movements of the armature thus occasioned are caused to advance a type-wheel, E, by means of an arm, F, secured to and moving with the arbor *c'*. The arm F acts through a double or centrally-pivoted lever, *f*, to alternately cause two pawls, f^2 f^3, to engage two corresponding ratchet-wheels, f^1 and f^5, which are secured to the type-wheel shaft *c'*. The lever *f* is pivoted at a point, f^6, to a portion of the frame A, while the arm F is pivoted between the points f^6 and one extremity of the lever, as shown at f^7. It will be seen thus that when the armature C is moved in the direction indicated by the arrow *x'*, the pawl f^2 will, by engaging a tooth upon the wheel f^1, cause the type-wheel to be advanced a corresponding distance. Likewise, when the movement of the armature is in the opposite direction the pawl f^3, by engaging the wheel f^5, will cause another advancement of the type-wheel, and at the same time the pawl f^2 will be withdrawn so as to engage a succeeding tooth upon the wheel f^1. The alternate movements of the armature C will thus cause the type-wheel E to be advanced step by step.

For the purpose of adjusting the movements of the pawls f^2 and f^3, suitable banking-screws, f^8 and f^9, are provided for limiting their movements, respectively. When the type-wheel has in this manner been advanced to the proper place for printing, an impression is effected upon a paper tape, G, by means of a printing-platen, *h'*, above which the desired type has been caused to stand. The tape G is led through suitable guides, *g'* and g^2, and between suitable friction-rollers, g^3 and g^4. The type-wheel may be caused to stand in any desired position by interrupting the series of alternating impulses, by means of which it is advanced, and if the impulse last transmitted be prolonged, sufficient magnetism will be induced in the core of the electro-magnet to cause an armature, h^2, to be drawn toward a polar extension, h^3. The armature h^2, however, will not respond to the series of alternating impulses which are employed for advancing the type-wheel, but only to prolonged impulses. The armature h^2 is carried upon a lever, h^4, pivoted to the frame A, and at its extremity is carried an arm, h^5, upon which is supported the platen *h'*. The movement of this armature in response to the increased magnetism of the electro-magnet $B^2 B^3$, causes the platen *h'* to be carried against the paper tape G at a point between the guides *g'* and g^2, and the paper is thus forced against the particular type on the periphery of the type-wheel E, which has been caused to confront the same.

A second armature, i^2, similar to the armature h^2, is provided for effecting the advancement of the paper when an impression has been made. This armature is applied to a polar extension, i^3, of the electro-magnet $B^2 B^3$, similar to the extension h^3, but it is preferably adjusted to respond less quickly than does the armature h^2. This may be effected by supporting the armature i^2 upon the extremity of a

lever, i^4, which is pivoted in the same axial line with the lever h^4. The armature will thus act through a longer leverage and its movements will be less rapid. Advantage may also be taken of the fact that, after the armature h^2 has been brought into proximity to its electro-magnet B^2 B^3, the strength of magnetism manifested at the point i^3 will be intensified because of the magnetic circuit thus partially completed through the respective cores and the back plate, B^4.

At the extremity of the armature-lever i^4 is carried a hooked pawl, i^5, which acts upon a ratchet-wheel, i^6, carried upon the same arbor with the friction-wheel g^3. The movement of the armature-lever i^4 toward the pole i^3 causes this pawl to engage a tooth upon the wheel i^6, and when the armature is released by the interruption of the prolonged current the movement of the armature-lever from the electro-magnet acts through the pawl to advance the wheel g^3, and thus to advance the paper the proper distance.

For the purpose of effecting a unison between the type-wheel and the transmitting apparatus whenever it is desired, the following means are employed for causing a detent to be thrust at will into the path of a stop carried upon the type-wheel shaft e'. This detent k is carried upon an arbor, k', of a ratchet-wheel, k^2. The ratchet-wheel is caused to advance step by step during the transmission of alternating impulses through the electro-magnet B^2 B^3 by means of a suitable pawl, k^3, which is pivoted upon an armature, m. The armature m is supported upon the frame A', and projects into proximity to an extension, m', on a soft-iron band, b^6, which surrounds the coil of the leg B^3, and is similar to the band b, which has already been referred to in connection with the armature b^2. The armature m is normally held away from the projection or extension m' by means of a suitable retractile spring, m^2, which is rendered adjustable by means of a tension-screw, m^3, and banking-stop m^4, turning in a non-magnetic boss, m^5. The armature is, however, so adjusted that it will respond to each of the alternate impulses of opposite polarity transmitted through the electro-magnet B^2 B^3, and advance the ratchet-wheel k^2 accordingly. A suitable spring, k^6, is employed for pressing the pawl k^3 against the periphery of the ratchet-wheel, and a suitable dog, k^7, pivoted to the frame A', serves to retain the wheel in its advance position in opposition to the force exerted by a coil-spring, k^8. This spring surrounds the arbor k', and tends to turn the wheel in the direction opposite that indicated by the arrow. It will be evident thus that, when a sufficient number of impulses are transmitted uninterruptedly, the detent k will be revolved until it stands in the path of a stop, e^2, upon the type-wheel shaft e'. At this point the further progress of the ratchet-wheel is prevented by means of a suitable stop. If, then, the alternating impulses be continued the stop e^2 will be revolved until it strikes the detent k, and the type-wheel will thus be arrested at its predetermined unison-point.

For the purpose of releasing the type-wheel from engagement with the detent k when it is desired, and also of preventing that detent from being carried into the path of the stop k when printing is being effected continuously from the type-wheel, a second armature, n, similar to the armature m, is applied to the band b^3, which encircles the leg B^2 of the electro-magnet B^2 B^3. This band is similar to the band b, and is provided with a polar extension, n', and boss n^5, similar to the extension m' and boss m^5. A retracting-spring, n^2, adjusting-screw n^3, and banking-stop n^4, similar to the corresponding parts described with reference to the armature m, are applied to the armature n. The armature n is likewise pivoted to the frame A, but it is adjusted so as to respond only to prolonged impulses or currents, such as are employed for actuating the printing mechanism. Both armatures m and n preferably extend into proximity to corresponding lugs, v' and v^2, formed upon a soft-iron band, v, surrounding the electro-magnet B'. When, however, such a current is transmitted through the electro-magnet B^2 B^3, the armature n will be drawn toward the extension n' and cause a bent arm, n^6, which is secured to the pivoted end of the armature and extends into proximity to the pawl k^3 and detent or dog k^7, to engage the same and throw them out of engagement with the ratchet-wheel k^2. This wheel is then turned, by virtue of the spring k^8, in the direction opposite that indicated by the arrow, and the detent k is thus carried out of the path of the stop e^2. Each time, therefore, that the printing of a character is effected or the tape is advanced a space, the ratchet-wheel and detent will be carried to their starting-point, from which they will be immediately again advanced by the alternating impulses.

In practice I prefer to so adjust the parts that a sufficient number of impulses for advancing the type-wheel through, say, three revolutions shall be required to move the detent k from its resting-point to the position required for engaging the stop e^2.

Any well-known form of apparatus adapted to transmit electric impulses of the required character and duration may be employed as a transmitting-instrument for the apparatus described.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of an electro-magnet, a type-wheel, and type-wheel shaft, an armature responding to electric impulses of alternating polarity traversing the coils of said electro-magnet, a centrally-pivoted lever caused by the movements of said armature to advance said type-wheel step by step, an independent armature applied to one pole of said electro-magnet and responding only to prolonged

electric impulses, a printing-platen actuated by said independent armature, a second independent armature applied to the remaining pole of the electro-magnet and also responding only to prolonged impulses, and a paper-feeding device actuated by the last-named armature.

2. The combination, substantially as hereinbefore set forth, of two electro-magnets, and an armature applied to one of said electro-magnets and polarized by the remaining electro-magnet, when said electro-magnet is vitalized through the agency of a battery, the circuit of which is completed through the action of the first-named electro-magnet when that electro-magnet is vitalized.

3. The combination, substantially as hereinbefore set forth, of two electro-magnets, an armature polarized by induction from one of said electro-magnets and applied to the remaining electro-magnet, and a local battery the circuit of which is completed through the coils of the first-named electro-magnet through the agency of an armature applied to the remaining electro-magnet, which armature responds to the electro magnetism induced in the electro-magnet to which it is applied by electric currents traversing its coils.

4. The combination, substantially as hereinbefore set forth, of two electro-magnets, an armature applied to one of said electro-magnets, and normally polarized by induction through the action of the remaining electro-magnet, a local circuit for vitalizing the last-named electro-magnet, a main-line conductor traversing the coils of the other electro-magnet, and a type-wheel caused to revolve through the action of electric impulses of alternating polarity traversing said main line.

5. The combination, substantially as hereinbefore set forth, of an electro-magnet, an armature for said electro-magnet, a type-wheel caused to advance step by step through the agency of said armature in response to electric impulses of alternating polarity traversing the coils of said electro-magnet, a stop carried upon the type-wheel shaft, and a detent for arresting said type-wheel in a predetermined position, a toothed wheel upon which said detent is carried, means, substantially such as described, for causing said detent to be moved step by step into a position to intercept the said stop, and an independent armature applied to one of said electro-magnets and acting in response to prolonged electric impulses, to permit said detent to be withdrawn from the path of said stop.

6. The combination, substantially as hereinbefore set forth, of the type-wheel and type-wheel shaft, a vibrating armature, a centrally-pivoted lever, two ratchet-wheels applied to said type-wheel shaft, and two driving pawls, respectively applied to said ratchet-wheels and mounted upon said lever, by the movements of which pawls said type-wheel is caused to advance.

7. The combination, substantially as hereinbefore set forth, with a type-wheel and its shaft, of two ratchet-wheels carried upon said shaft, two driving-pawls respectively applied to said ratchet-wheels, a centrally-pivoted lever upon the opposite extremities of which said pawls are respectively carried, and means, substantially such as described, for causing said pawls to alternately engage the respective ratchet-wheels to which they are applied.

8. The combination, substantially as hereinbefore set forth, with an electro-magnet, of a band of magnetic material surrounding the same, an armature applied to said band, a pawl, a ratchet-wheel advanced step by step by the movements of said pawl, and means, substantially such as described, for releasing said ratchet-wheel from said pawl.

9. The combination, substantially as hereinbefore set forth, of an electro-magnet, an armature applied thereto, which armature is caused, by means of a current of given polarity traversing the coils of said electro-magnet, to be repelled from one pole and attracted toward the other pole of said electro-magnet, and by means of a current of the opposite polarity to be attracted toward the first-named pole and repelled from the other, and two independent armatures applied to said electro-magnet and responding only to currents of greater duration than required for actuating the first-named armature.

10. The combination, substantially as hereinbefore set forth, of a type-wheel, means, substantially such as described, for advancing said type-wheel, a printing-platen, an electro-magnet and its armature for causing said printing-platen to effect the impressions from said type-wheel, an independent armature applied to said electro-magnet, and a paper-feeding device actuated by said independent armature.

11. In a printing-telegraph receiving-instrument, the combination, substantially as hereinbefore set forth, with a type-wheel, an electro-magnet, its armature, and means, substantially such as described, actuated thereby for advancing said type-wheel and for effecting impressions therefrom, of a paper-feeding device, and an independent armature for actuating said device, which armature is applied to said electro-magnet.

In testimony whereof I have hereunto subscribed my name.

ROBERT J. SHEEHY.

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