(No Model.) 2 Sheets—Sheet 1.

R. J. SHEEHY.

PRINTING TELEGRAPH.

No. 307,233. Patented Oct. 28, 1884.

Fig. 1.

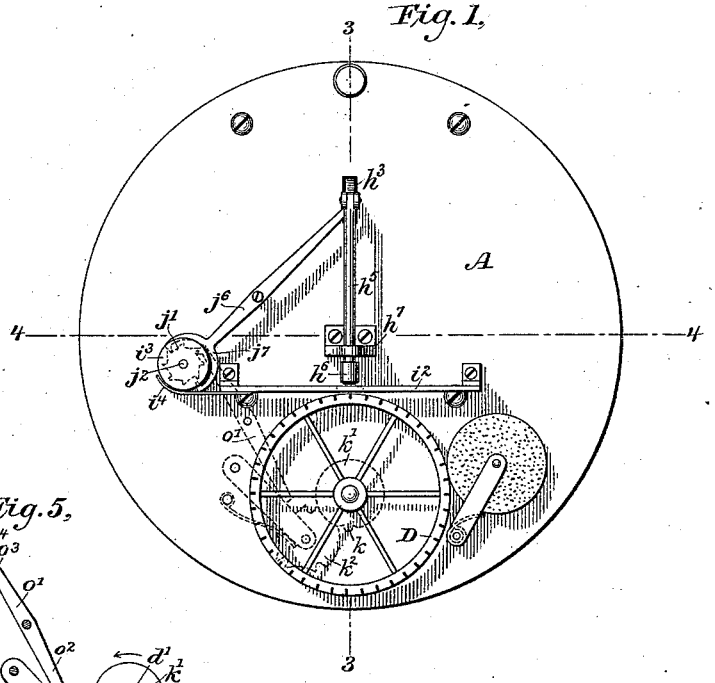


Fig. 5.

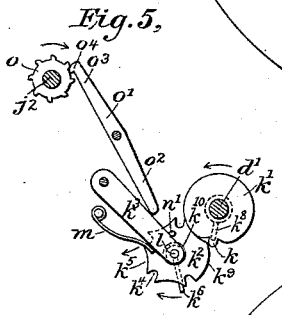
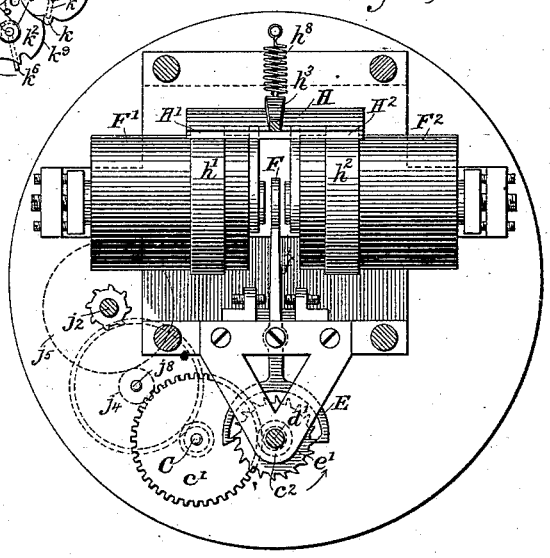


Fig. 2.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

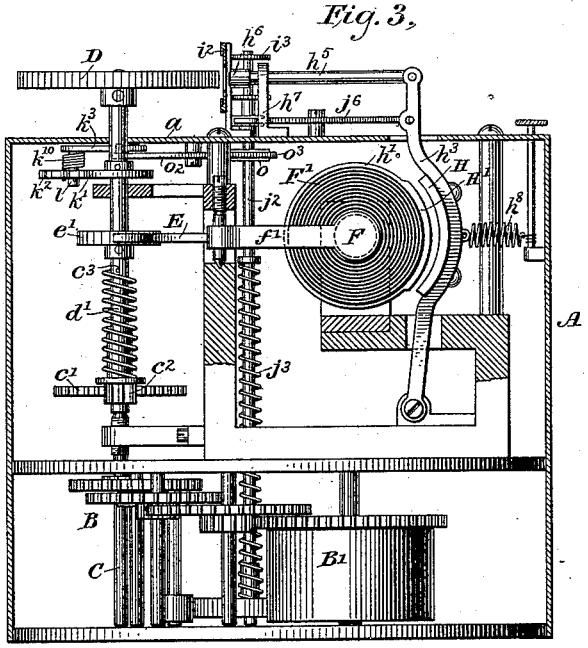
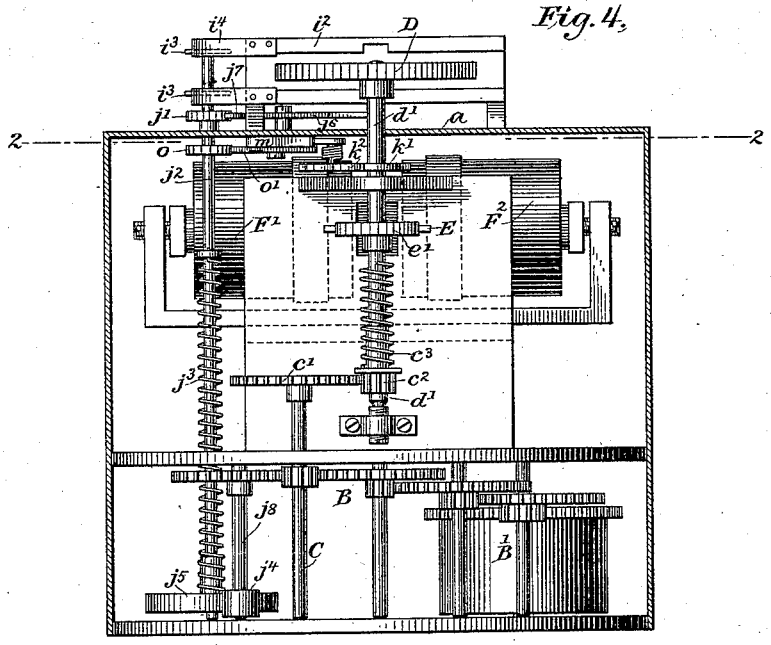


Fig. 4.



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PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 307,233, dated October 28, 1884.

Application filed November 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. SHEEHY, a citizen of the United States, residing in 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 class of apparatus employed for recording the messages or dispatches which are transmitted over a single telegraphic main line or conductor in the form of electric impulses by means of characters impressed upon a paper tape from a revolving type-wheel.

The object of the invention is to provide simple and efficient means for actuating a type-wheel in response to electric impulses of a given character, effecting impressions therefrom by means of a second class of electric impulses or currents, and securing a unison between the position of the type-wheel and the apparatus employed for transmitting the currents or impulses at will.

The invention consists in constructing the apparatus in substantially the following manner: Two electro-magnets are supported with their poles of opposite character confronting, and between these poles extends a polarized armature capable of moving to and fro between the same in response to electric impulses of alternating polarity which are caused to traverse the coils of the electro-magnets. The armature is supported upon a pivoted lever which carries an escapement adapted to permit a step-by-step advancement of a scape-wheel, which is impelled in a given direction through the influence of a spring or weight and a train of wheels. A type-wheel is supported upon the same shaft with the scape-wheel, and is thus caused to advance step by step in response to electric impulses of alternating polarity. Impressions are effected from this type-wheel by means of an armature which is supported upon an independent lever, and which extends into proximity to the outer surfaces of the coils of both electro-magnets. Two soft-iron bands surround the coils of the respective electro-magnets, and serve to attract this second armature when the electro-magnets are vitalized by currents of sufficient duration. The alternating electric impulses by means of which the escapement of the type-wheel is actuated are not of sufficient length to so magnetize the soft-iron bands, but a simple prolongation of any one of these currents will secure such a result. The armature will thereupon be drawn toward the surface of the coils and impel the platen toward the periphery of the type-wheel, thus effecting upon a paper tape designed to receive the message an impression of the particular character which has been caused to stand before it. The advancement of the paper tape is occasioned by means of suitable paper-feeding wheels, which receive their motion from the train of gear-wheels through a yielding frictional connection and a coiled spring which is placed under sufficient tension for that purpose by the movement of the train of wheels. The advancement of the friction-rollers is prevented, however, during the advancement of the type-wheel by means of an escapement-anchor acting upon a scape-wheel. This escapement is actuated by the printing-lever, and permits it to advance during the movement of the platen away from the type-wheel after an impression has been effected. The unison of the type-wheel is secured by means of a Geneva stop, which is applied to the type-wheel shaft, and which is adapted to cause the same to be arrested in a predetermined position when the type-wheel is caused to revolve continuously a given number of times. For the purpose, however, of releasing the stop and preventing it from so arresting the type-wheel during the continuous operation of printing, and also for disengaging the type-wheel shaft after the type-wheel has been brought to unison, I apply to the paper-feeding device a releasing device which operates each time an impression is effected from the type-wheel, and the paper is advanced to disengage the stop and to prevent it from locking the type-wheel until the latter has again performed the entire number of revolutions.

In the accompanying drawings, which illustrate my invention, Figure 1 is a plan view of the instrument, and Fig. 2 is a like view taken through the plane 2 2, Fig. 4. Fig. 3 is a transverse section through the plane 3 3, Fig. 1. Fig. 4 is a side elevation, the case being shown in section. Fig. 5 illustrates certain

details of the construction of the unison device.

Referring to these figures, A represents a suitable case, which is preferably cylindrical in form, for inclosing certain parts of the mechanism. A suitable train of gear-wheels, B, is inclosed within the lower portion of the case A, and driven by means of a spring, B′, or by means of a weight. This train imparts to a shaft, C, a revolution, which in turn is communicated, through a gear-wheel, c', and pinion c^2, to a type-wheel shaft, d'.

Surrounding the shaft d' is a coiled spring, c^3, one end of which is secured to the shaft, while the remaining end is attached to a sleeve carrying the pinion c^2. The tension of the spring c^3 is sufficient to advance the shaft d', and thus the wheel c', in the direction indicated by the arrow, as far as the latter is permitted to revolve, by an escapement-anchor, E. When the scape-wheel is brought to rest by the anchor E, the force exerted by the train of gear upon the pinion c^2 causes the latter to advance against the tension of the spring. By means of this device I avoid arresting the train of gear abruptly. During the rapid vibration of the escapement, and, in fact, even when an impression is being made, the train B continues to move, and much less power is therefore required to impel the instrument at a given speed, since the type-wheel will respond at once when the scape-wheel is released.

The required movements of the anchor-escapement E are occasioned by means of a polarized armature, F, and its lever f', which constitutes one arm of the lever supporting the escapement. The polarized armature F extends between the confronting poles of an electro-magnet, F′ F². The coils of these magnets are wound in the usual manner, so that the magnetism induced in the confronting poles by a current traversing the coils of the two will be of the opposite character. The two coils are connected in series, in the usual manner, and are designed to be included in the main-line conductor. A current of one polarity will impel the armature F in one direction by reason of the attractive force exerted by one of the electro-magnets and the repulsive force existing between the armature and the other electro-magnet. A current of the opposite polarity will impel the armature in the opposite direction in the same manner. Thus by means of currents or impulses of alternating polarity the escapement E is actuated and the shaft d' permitted to advance step by step. The shaft d' projects above the top a of the case A, and carries at its extremity a type-wheel, D, the periphery of which is engraved with suitable characters, in a manner well understood.

The paper tape upon which the impressions are to be effected is led through a guide, i^2, and between a suitable feed-roller, i^3, and pressure or tension spring i^4. The impressions are effected from the type-wheel upon this tape by means of a printing-platen, h^6, which is carried upon an arm, h^5, extending through a guide, h^7, secured to the top a of the frame A. The arm h^5 is pivoted to the extremity of an armature-lever, h^4, carrying an armature, H. This armature is parallel with the two magnets F′ and F², and projects beyond their confronting poles outside their coils. The coils are respectively surrounded by soft-iron bands h' and h^2, and are preferably extended or thickened along the portions H′ and H² beneath the respective extremities of the armature H. This armature is preferably made in the form of a section of a cylinder for the purpose of conforming to the surface presented by the extensions H′ and H². A suitable retractile spring, h^8, normally holds the armature away from the surface of the coils, and prevents it from responding to the magnetism induced in the bands h' and h^2 by the electric impulses of short duration employed for actuating the escapement. When, however, any one of these impulses is prolonged, sufficient magnetism is induced in the bands h' and h^2 to overcome the retractile force of the spring h^8, and the armature is therefore drawn toward the coils of the magnets. The platen h^6 is thereby thrust toward the type-wheel, causing an impression of the character which has been caused to stand in front of the paper tape to be effected upon the same. In this manner the type-wheel may be arrested at any desired point, and an impression of any required character upon the type-wheel may be effected.

For the purpose of actuating the friction-roller i^3 and advancing the paper tape after each impression, this roller is carried upon a shaft, j^2, which is caused to advance by means of two friction-rollers, j^4 and j^5, connecting the same with a shaft, j^3. The shaft j^3, which is represented as being geared with the arbor C, may be any suitable arbor employed in the train mechanism B. A spring, j^9, Fig. 4, preferably connects the wheel j^4 with the shaft j^2, in a manner similar to that described with reference to the scape-wheel e' and the shaft d'. There will thus be continually stored up in the spring j^9 sufficient energy to revolve the paper-feeding wheel i^3 the required distance each time the shaft j^2 is released by the action of an escapement, j^7, acting upon the scape-wheel j', which is secured to the shaft. The escapement-anchor j^7 is connected with the lever h^5 of the printing-platen by means of a link or pivoted lever, j^6, and each to and-fro movement of the arm h^5 during the process of printing causes this lever to be actuated, thereby permitting the scape-wheel j' to advance one tooth and the friction-wheel j^3 to revolve the required distance. The scape-wheel and escapement-anchor are preferably so constructed that this advancement will occur during the movement of the platen-rod h^5 away from the type-wheel.

For the purpose of securing a unison be-

tween the receiving-instrument and the instrument employed for transmitting the requisite electric impulses and currents thereto, it is necessary to provide some device for arresting the type-wheel in a predetermined position whenever desired. For this purpose I apply to the type-wheel shaft d' a device known as a "Geneva stop." This device consists of a primary or locking wheel, k', having a single tooth, k, formed upon its periphery, and engaging a wheel, k^2, carried at the free extremity of a pivoted arm, k^3. The periphery of the wheel k' fits into successive hollow teeth or concave faces k^5, which are formed in the periphery of the secondary wheel k^2. Once in each revolution of the wheel k' the tooth k enters a corresponding space or opening, k^4, intervening between the successive concave faces k^5, and advances the wheel k^2 one tooth.

Upon the wheel k^2 is carried a pin, k^6, which is normally out of the path of a corresponding arm, k^8, carried upon the wheel k'. The successive revolutions of the wheel k' cause the pin k^6 to approach more nearly into the path of the arm k^8, and after this wheel has described a predetermined number of revolutions—say four—the stop or pin k^6 will be in the path of the arm k^8, and will arrest the type-wheel shaft, and thus the type-wheel, at a predetermined unison-point. At the same instant the tooth k strikes against a convex portion, k^9, of the wheel k^2, in the usual manner of a Geneva stop. It is evident that the pin or stop k^6 and arm k^8 may be dispensed with; but usually I prefer to employ them for relieving the tooth k from undue strain in arresting the type-wheel shaft.

For the purpose of preventing the type-wheel from being thus arrested during the process of printing continuously, and also for the purpose of unlocking the device after it has been arrested, the wheel k^2 is, as already mentioned, mounted upon the pivoted arm k^3. A post, l, serves as the axis of the wheel, and it is connected therewith by means of a coiled spring, k^{10}, in such a manner that a force is normally exerted upon the wheel to revolve it in the direction opposite that indicated by the arrow. Normally, however, the periphery of the wheel k' prevents it from revolving in that direction, and causes it to retain the successive advanced positions which it assumes by reason of the engagement of the tooth k. A tension-spring, m, normally holds the arm o', and thus the wheel k^2, toward the wheel k'. It is evident, thus, that when it is desired to release the wheel k^2 from engagement with the wheel k' it is necessary only to force the arm k^3 backward against the tension of the spring m. This is accomplished by means of a lever, o', one arm, o^2, of which extends in front of the arm k^3, while the other arm, o^3, extends toward a toothed wheel, o, which is mounted upon the arbor of the scape-wheel j', which feeds the paper. A beveled tooth, o^4, formed at the extremity of the arm o^3, rests against the periphery of this toothed wheel, and each time the scape-wheel is advanced the passage of one of its teeth beneath the tooth o^4 causes this end of the lever to be thrown outward. The arm o^2 is thus caused to force the pivoted arm k^3 backward, thereby causing the wheel k^2 to be released from the wheel k'. The wheel k^2 will thereupon be revolved by the action of the spring k^{10} until it is arrested in the position shown in Fig. 5 by means of a pin, n', which projects from the face of the wheel k^2 and strikes against the supporting-arm k^3. If the arm k^3 be then again released, as it immediately will be by the passing of the tooth of the wheel o from beneath the beveled tooth o^4, the wheel k^2 will be again engaged by the wheel k'. The subsequent revolutions of the type-wheel shaft will cause the wheel k^2 to be again advanced in the manner already described. It will be seen thus that each time the paper-feed is actuated during the operation of printing continuously from the type-wheel the wheel k^2 will be permitted to return to its starting-point. When, however, the required number of revolutions of the type-wheel—say four—occur without interruption, the type-wheel will be arrested at its unison-point in the manner described.

I am aware that it has been proposed to actuate the press-levers of printing-instruments by means of armatures applied to extensions of the pole-pieces of the escapement-actuating electro-magnets. The bands or plates which are applied to the exterior of the electro-magnets, and which I employ for the purpose of actuating the printing-lever, are not polar extensions; but they are entirely independent thereof. This organization is desired for the convenience and compactness of construction which it affords, and for the reason that the mass of metal presented to the escapement-armature is less and its speed of operation is increased.

I am also aware that it has been proposed to apply a single cog or tooth to a type-wheel shaft, and by means thereof to advance a toothed wheel constructed to serve as a unison-stop against the tension of a retracting-spring once in each revolution of the type-wheel shaft. It has been necessary, however, in such an organization to employ not only the tension-spring to prevent the undue advancement of the wheel, but also a detent or retaining-pawl to prevent the wheel from returning to its normal position when the cog has passed out of engagement with the teeth of the wheel. By the use of the Geneva stop which I employ the locking in both directions is effected by the primary wheel, and it is not necessary to employ either a retracting-spring or a locking-pawl. The useless expenditure of force in overcoming the tension of the retracting-spring during the continuous operation of the instrument, when it is not desired to secure a unison, is thus obviated; and in every way the device which I employ is more

certain in its operation, more simple in its construction, and less liable to become out of order.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, with a type-wheel and means, substantially such as described, for actuating said type-wheel, of an escapement for controlling the movements of the same, a polarized armature for actuating said escapement, located between the confronting poles of an electro-magnet, a printing-platen, a soft-iron armature for actuating the same, and two soft-iron plates applied to the exterior of said electro-magnet for attracting said armature.

2. The combination, substantially as hereinbefore set forth, with a type-wheel and means, substantially such as described, for actuating said type-wheel step by step, of an electro-magnet, one or more soft-iron bands surrounding said electro-magnet, and an armature applied to said bands and acting in response to electric impulses of a given character to effect impressions from said type-wheel.

3. The combination, substantially as hereinbefore set forth, of a type-wheel, means, substantially such as described, for actuating the same, an armature actuated in response to electric currents of a given character to effect impressions from said type-wheel, a paper-feeding device, a frictional connection between said paper-feeding device and the impelling mechanism of said type-wheel, and an escapement device actuated by the movements of said printing-armature for permitting an advancement of said paper-feeding device.

4. The combination, substantially as hereinbefore set forth, with a type-wheel and means, substantially such as described, for actuating and effecting impressions from the same, of a paper-feeding device, a frictional connection between said device and the actuating-power of said type-wheel, a yielding spring normally placed under tension by the action of said frictional connection, an escapement for normally retaining said paper-feeding device against the tension of said spring, and means, substantially such as described, for actuating said escapement and permitting said device to respond to the tension of said spring when an impression is taken from said type-wheel.

5. The combination, substantially as hereinbefore set forth, with a type-wheel, a type-wheel shaft, and means, substantially such as described, for actuating the same, of a unison device consisting of a Geneva stop applied to said type-wheel shaft.

6. The combination, substantially as hereinbefore set forth, with a type-wheel, a type-wheel shaft, and means, substantially such as described, for actuating the same, of a Geneva stop applied to said shaft, an arm moving with said shaft, and a detent caused by the action of said Geneva stop to be periodically placed, by the revolution of said type-wheel, in the path of said arm.

7. A unison device for printing-telegraph receiving-instruments, consisting of the two wheels of a Geneva stop, the one of which is applied to the type-wheel shaft of the instrument, while the other is engaged thereby, and means, substantially such as described, for separating said wheels from engagement with each other.

8. The combination, substantially as hereinbefore set forth, with the type-wheel shaft of a printing-telegraph receiving-instrument, of the primary wheel of a Geneva stop, mounted upon said shaft, the secondary wheel of said stop, and means, substantially such as described, whereby said shaft is arrested in a predetermined position when said secondary wheel has been brought into a given position through the agency of said primary wheel.

9. The combination, substantially as hereinbefore set forth, with a type-wheel shaft, of a locking-wheel carried upon said shaft, a wheel periodically advanced by the action of said locking-wheel, means, substantially such as described, tending to hold the last-named wheel in engagement with said locking-wheel, an electro-magnet, a paper-feeding device actuated by said electro-magnet, and means, substantially such as described, for causing said paper-feeding device to throw said wheels out of engagement with each other each time it is actuated.

In testimony whereof I have hereunto subscribed my name this 17th day of November, A. D. 1883.

ROBERT J. SHEEHY.

Witnesses:

DANL. W. EDGECOMB,

CHARLES A. TERRY.