G. L. ANDERS.

Printing Telegraph.

No. 210,892. Patented Dec. 17, 1878.

Fig. 1.

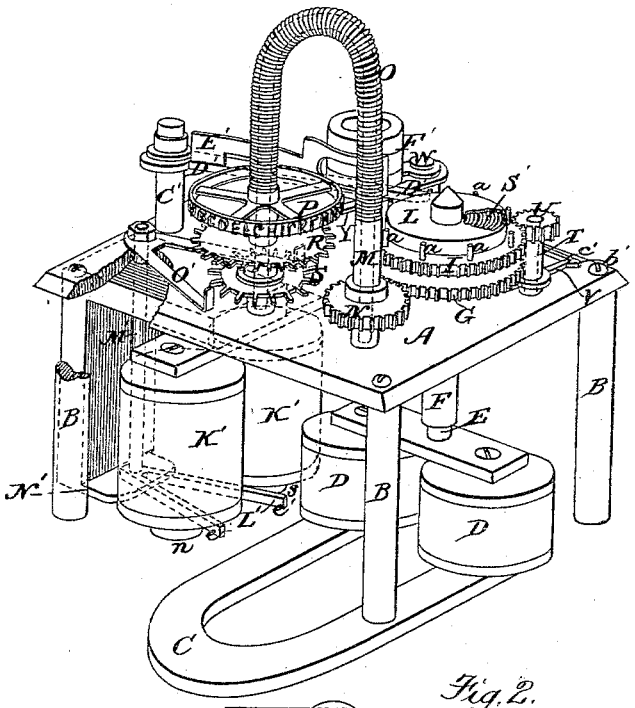
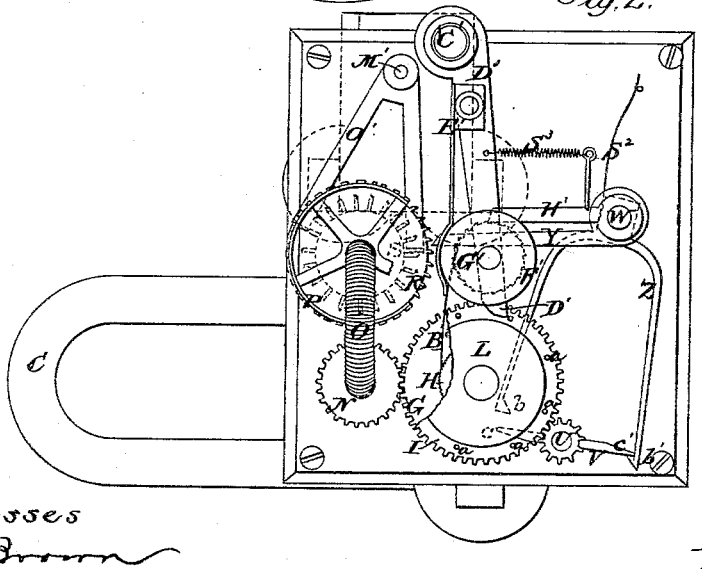


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, ASSIGNOR TO E. BAKER WELCH, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **210,892**, dated December 17, 1878; application filed February 18, 1878.

To all whom it may concern:

Be it known that I, GEORGE LEE ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Printing-Telegraphs, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying and forming part of this specification.

This invention relates to that class of printing-telegraphs in which the type-wheel is released step by step by the action of currents of magneto-electricity; and consists, first, in a printing-telegraph of the class referred to in which the type-wheel is impelled by the same motor which operates the generator of the magneto-electric currents, releasing the type-wheel by an independent motor, such as a train of clock-work, as heretofore, substantially as hereinafter more fully set forth; second, in a printing-telegraph of the class referred to in which the printing is effected when the succession of currents through the type-wheel magnet is interrupted by suitable mechanism actuated by the motor of the generator of the magneto-electric currents releasing the type-wheel, substantially as hereinafter more fully set forth; third, in a printing-telegraph of the class referred to in which the type-wheel is impelled and the press mechanism is actuated by the motor of the generator of the magneto-electric currents releasing the type-wheel, substantially as hereinafter more fully set forth; fourth, in the gearing and mechanism hereinafter described, whereby the type-wheel is impelled and the press mechanism actuated by the motor of the generator of the magneto-electric currents releasing the type-wheel; fifth, in a retarding device for preventing the printing mechanism from being operated except when the succession of currents through the type-wheel is interrupted, consisting of a toothed wheel rotated at a uniform rate by the same motor as that which rotates the type-wheel, but so geared that its rate of rotation is slower than that of the type-wheel, substantially as hereinafter more fully set forth; sixth, in making the polarized armature of a Siemens polarized magnet of such a form that it will have two extremities of the same induced polarity, each of which is influenced by only one pole of the electro-magnet, substantially as and for the purpose hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a perspective view of a printing-telegraph illustrating my invention, and Fig. 2 is a plan view of the same.

In these figures the same letters refer to the same parts.

In Letters Patent No. 144,045, granted to me October 28, 1873, and No. 169,506, granted to me November 2, 1875, a printing-telegraph which is operated by magneto-electric currents is described. In my present improvement I use the same form of type-wheel magnet as is shown and described in these patents. Also, in an application for Letters Patent for an improvement in printing-telegraphs having a type-wheel moving step by step, filed by me January 23, 1877, and now pending, I have shown and described mechanism consisting of an escapement and retarding device, by means of which, when the succession of currents through the type-wheel magnet, which effect the step-by-step movement of the type-wheel, is interrupted and the rotation of the type-wheel ceases, the power actuating the printing mechanism is allowed to become operative and the impression of a letter is effected, the retarding device acting while the type-wheel is rotating to prevent the printing mechanism from being actuated during the short intervals between each current.

In my present improvement I use escapement mechanism substantially the same as that shown and described in the application referred to, and I combine it with a retarding device in substantially the same manner and for the same purpose as in said application; but instead of the retarding device therein described, which consists of a toothed wheel retarded by a pendulous escapement, I use as a retarding device a toothed wheel rotated at a uniform rate by the motor actuating the type-wheel, but at a slower rate than that of the type-wheel.

Referring to the drawings, A is a plate of metal, supported upon pillars B B above a suitable base-board, which plate supports the

type-wheel and press mechanism. C is a permanent horseshoe-magnet under the plate A, supported by the base-board; and just over the poles of this magnet is a pair of coils, D D, which are rotated by any suitable motor, and by said rotation generate the currents of magneto-electricity which effect the step-by-step release of the type-wheel. This form of magneto-electric generator is well known, and any other suitable form of magneto-electric generator may be used for producing the magneto-electric currents. E is the arbor of these rotating coils, which serve as the armature of the generator, and this arbor is inclosed in a sleeve, F, and extends through the plate A. Upon this arbor above the plate is a gear-wheel, G, fixed to said arbor. This gear-wheel G engages with a smaller gear-wheel, N, attached to a sleeve on one arm of the U-shaped rod M, secured to the plate A perpendicularly to it. Attached to this sleeve by friction is a spiral spring, O, which surrounds the rod M, and is attached to another sleeve upon the other arm of the rod M, to which sleeve is fixed the type-wheel P, a toothed wheel, R, and the escape-wheel S. This escape-wheel, in connection with an escapement, O′, vibrated by the polarized magnet K′ K′, causes the type-wheel to have a step-by-step movement, while by the connection made with the type-wheel and its motor by the spiral spring O the escapement is enabled to hold the type-wheel without arresting the movement of its motor. H is a small ratchet-wheel, rigidly fixed upon the arbor E above the wheel G, and rotates with it at a slower rate than that of the wheel R and type-wheel. Sleeved upon a standard, W, fixed upon the plate A, is an arm, Y, one end of which engages with the teeth of the wheel R, and the other carries the U-shaped escapement Z. By the engagement of the teeth of the wheel R with the end of the arm Y, upon the rotation of the said wheel the said arm, as each tooth passes its end, is suddenly moved from its normal position against the force of a spring, S^2, attached to the said arm and to the plate A; but the return movement of the arm Y, caused by the spring S^2 as each tooth of the wheel R escapes from the end of the arm, is so retarded by the engagement of a spring-pawl, B′, attached to the arm Y, with the slow-moving ratchet-wheel H that the arm Y has not time to return to its normal position while the wheel R is rotating before its end is struck by the next succeeding tooth of the wheel R.

T is a standard fixed upon the plate A, carrying a sleeve; and fixed to said sleeve is a cross-piece, V, the arms *c c′* of which engage with the ends *b b′* of the arms of the U-shaped escapement Z, which ends are of hooked form. Upon the sleeve which carries this cross-piece is fixed a small pinion, U, which engages with a gear-wheel, I, attached to the arbor E by friction and a coiled spring, S^1, inclosed within the cylinder L. Upon this gear-wheel are pins *a a a*, which engage with the extremity of an arm D′, sleeved upon a standard, C′, fixed upon the plate A. The arm D′ carries the printing-roller F′ and a suitable spring, E′, for holding the paper strip against the roller. This printing-roller rotates upon a suitable arbor, and fixed to the roller is the ratchet-wheel G′. H′ is a pawl attached to the standard W, which pawl at each reciprocation of the arm D′ engages with the ratchet-wheel G′ and rotates it the distance of one tooth. The printing-roller, to which said ratchet-wheel is attached, consequently rotates correspondingly, and a feed of the paper strip a proper distance after each impression is thus effected. The arm D′ is retracted after each impression by a suitable spring, S^3.

K′ K′ is the type-wheel magnet, of the form known as the "Siemens polarized magnet;" and L′ is its polarized armature, which is made of a bifurcated form. This armature is attached to a shaft, M′, which is stepped into the permanent magnet N′ and extends through the plate A. The escapement O′ is attached to this shaft M′.

The operation of the above-described mechanism is as follows: On the rotation of the armature of the magneto-electric generator and of the gear-wheel G, a tendency to rotate is communicated by means of the small gear-wheel N and spiral spring O to the type-wheel P, toothed wheel R, and escape-wheel S; and consequently on the vibration of the escapement O′, caused by the action upon the type-wheel magnet of the alternate currents produced by the generator, the said type-wheel and toothed wheel R rotate step by step. The teeth of the wheel R strike successively against the end of the arm Y and move it against the retracting force of the spring S^2, attached thereto; but for the reason that the ratchet-wheel H, with which the spring-pawl B′, attached to the arm Y, engages, rotates more slowly than the toothed wheel R, there is not time for the arm Y to return to its normal position before its extremity is again struck by the next succeeding tooth of the wheel R. The U-shaped escapement Z, which is carried by the arm Y, is thus kept in such a position against the force of the spring S^2 that the hook *b′* engages with the arm *c′* of the cross-piece V, and holds said arm so to prevent the rotation of the gear-wheel I. When, however, it is desired to print, the succession of currents through the type-wheel magnet is interrupted by short-circuiting or otherwise without arresting the movement of the motor of the magneto-electric generator, and the escapement O′ holds the type-wheel and wheel R, without preventing the rotation of the arbor E, owing to the frictional elastic connection. The spring S^2 is now able to retract the arm Y and escapement Z. The hook *b′* is withdrawn from the arm *c′*, and the wheel I, being free to turn with the arbor E, at once commences to rotate until further rotation is arrested by the engagement of the hook *b* of the escapement Z with the arm *c* of the cross-piece V. This rotation is, however, sufficient,

by the engagement of one of the pins *a a a* with the end of the arm D′, to effect the movement of the said arm and the printing-roller carried thereby, and the consequent impression of a letter. At the same time the engagement of the pawl H′ with the ratchet-wheel G′, on the movement of the arm D′, effects a proper feed of the paper strip by the rotation of the printing-roller.

Instead of the herein-described arrangement of gearing for effecting the rotation of the type-wheel and for actuating the printing mechanism by the motor of the generator of the magneto-electric currents releasing the type-wheel, other arrangements for accomplishing this result may be adopted without departing from the principle of my invention, as it will be obvious to those skilled in the art to which the invention appertains that this principle may be carried into effect in many different ways and by other arrangements of mechanism.

The escapement mechanism used in connection with the retarding device for preventing the action of the printing mechanism except when the rotation of the type-wheel ceases also admits of modification; and I may use other arrangements than that described, and I also may use other devices than those described for effecting the movement of the arm carrying the printing-roller. I therefore do not confine myself to the devices and arrangement of mechanism herein described for carrying my invention into effect. Moreover, many of the devices herein described are not of my invention, which devices it is not necessary to specify, as they are well known to those skilled in the art to which this invention appertains.

The vibrating armature of the Siemens polarized magnet used as the type-wheel magnet is of such a form that it will have two extremities of the same induced polarity, each of which is influenced by only one pole of the electro-magnet. This may be accomplished by simply bifurcating the ordinary Siemens armature, as shown. Important results are obtained by this form, which will now be stated.

When the armature is of the usual form and is resting against one pole of the electro-magnet K′ K′, a change in the polarity of the current often causes magnetism of opposite polarity to be induced in the extremity of the vibrating armature, which will cause it to continue attracted instead of being repelled, as should be the case; but if the armature is bifurcated, as shown, and one of the arms is resting against one of the poles of the magnet, the influence of the magnetism induced in the said arm upon a change in the polarity of the current will not prevent the other arm from being attracted by the other pole, and consequently if the armature is of this form it will vibrate promptly in response to the changes in the polarity of the current.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In a printing-telegraph, a type-wheel driven from a continuously-rotating shaft, on which are supported the coils of an electro-magnet, and mechanism, substantially as described, whereby the type-wheel is released with a step-by-step motion regulated by the currents generated on the rotation of said coils.

2. In a printing-telegraph having a type-wheel released step by step by magneto-electric currents, the combination, with the type-wheel, of the continuously-rotating armature of the generator of the magneto-electric currents releasing the type-wheel, and suitable gearing connecting the type-wheel to the said rotating armature, substantially as and for the purpose set forth.

3. In a printing-telegraph, a retarding device consisting of a toothed wheel rotated at a uniform rate by the motor rotating the type-wheel, but at a slower rate than that of the type-wheel, substantially as and for the purpose set forth.

4. The combination of the oscillating arm Y, the spring S^2, or its equivalent, for retracting said arm, the spring-pawl B′, the toothed wheel R, and the toothed wheel H, rotated by the same motor that rotates the wheel R and the type-wheel, but at a rate slower than that of the type-wheel and wheel R, substantially as and for the purpose set forth.

5. The combination, with the continuously-rotating armature of the generator of the magneto-electric currents releasing the type-wheel, of an arbor rotating with said armature, a type-wheel and escapement-wheel connected to said arbor by an elastic frictional connection, and an escapement vibrated by the magneto-electric currents produced by the generator, substantially as and for the purpose set forth.

6. The combination, with the rotating armature of a generator of magneto-electric currents, of the arbor E, gear-wheel G upon said arbor, pinion N, connected to said gear-wheel and type-wheel P, toothed wheel R, and escapement-wheel S, connected to said pinion by an elastic frictional connection, substantially as and for the purpose set forth.

7. The combination of the pinion N, U-shaped rod M, helical spring O, and sleeve carrying the type-wheel P, substantially as and for the purpose set forth.

8. The combination, with the continuously-rotating armature of a generator of magneto-electric currents, of the arbor E, the gear-wheel G, the gear-wheel I, connected to said arbor E by a spring, S^1, or its equivalent, as described, and having thereon a series of pins, *a a a*, or their equivalents, the arm D′, carrying the printing-roller, and an escapement, which holds the wheel I and prevents it from being rotated by the arbor E when the type-wheel is rotating, and releases said wheel and allows it to rotate with the arbor E sufficiently

to permit one of the pins *a a a*, or its equivalent, to pass the end of the arm D′ when the rotation of the type-wheel is arrested, substantially as and for the purpose set forth.

9. The combination, with the continuously-rotating shaft E, of the arm Y, the pawl B, the toothed wheel H upon the arbor E, the spring S^2, or its equivalent, and the escapement holding and releasing the printing mechanism, substantially as and for the purpose set forth.

10. The combination of the gear-wheel I, the pinion U, cross-piece V, having arms *c c′*, and rotating with the pinion U, the escapement-arm Z, having hooks *b b′*, arm Y, and spring S^2, or its equivalent, substantially as and for the purpose set forth.

11. The combination of the rotating coils D D, arbor E, gear-wheel G, gear-wheel I, connected to the arbor E by the spring S^1, and provided with pins *a a a*, or their equivalents, pinion U, cross-piece V, escapement-arm Z, arm Y, spring S^2, arm D^1, carrying the printing-roller, pinion N, U-shaped rod M, spiral spring O, type-wheel P, toothed wheel R, escapement-wheel S, toothed wheel H, spring-pawl B′, escapement O′, vibrating armature L, and the polarized type-wheel magnet, substantially as and for the purpose set forth.

12. An armature for a Siemens polarized magnet having two arms or extremities, each magnetized by induction to the same polarity, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand on this 23d day of January, 1878.

GEORGE LEE ANDERS.

Witnesses:
VINCENTZ BERTSCH,
CHAS. W. HOBART.