(No Model.)

4 Sheets—Sheet 1.

R. J. SHEEHY.

PRINTING TELEGRAPH.

No. 370,978. Patented Oct. 4, 1887.

Fig. 1,

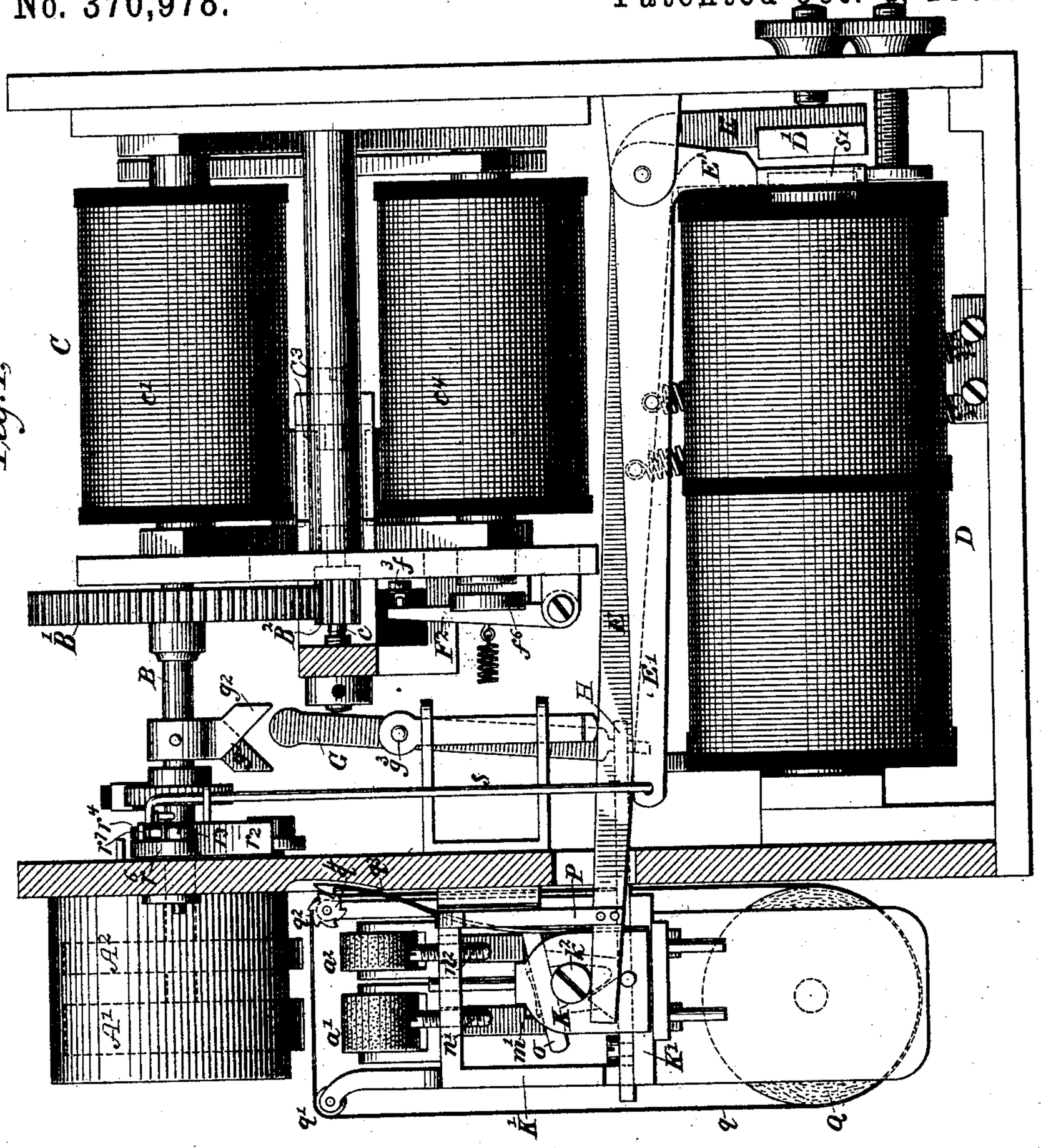
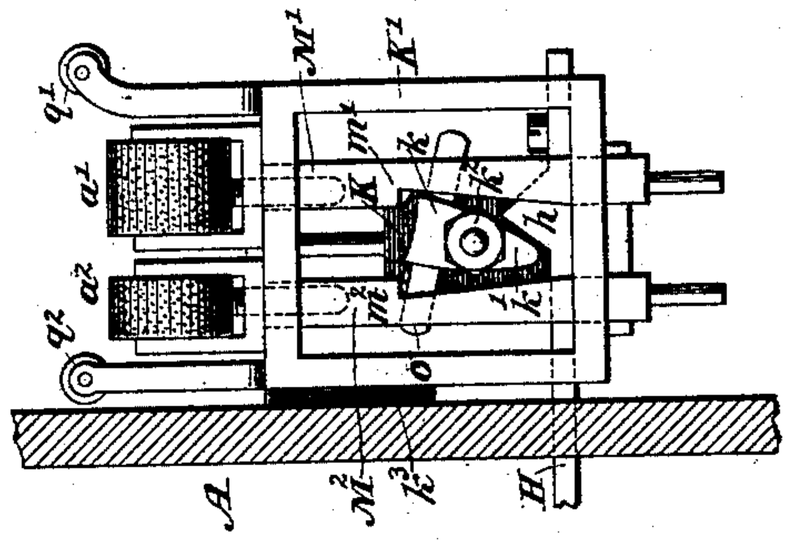


Fig. 3,



Witnesses

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By his Attorney

Pope & Edgecomb

(No Model.) 4 Sheets—Sheet 2.

R. J. SHEEHY.

PRINTING TELEGRAPH.

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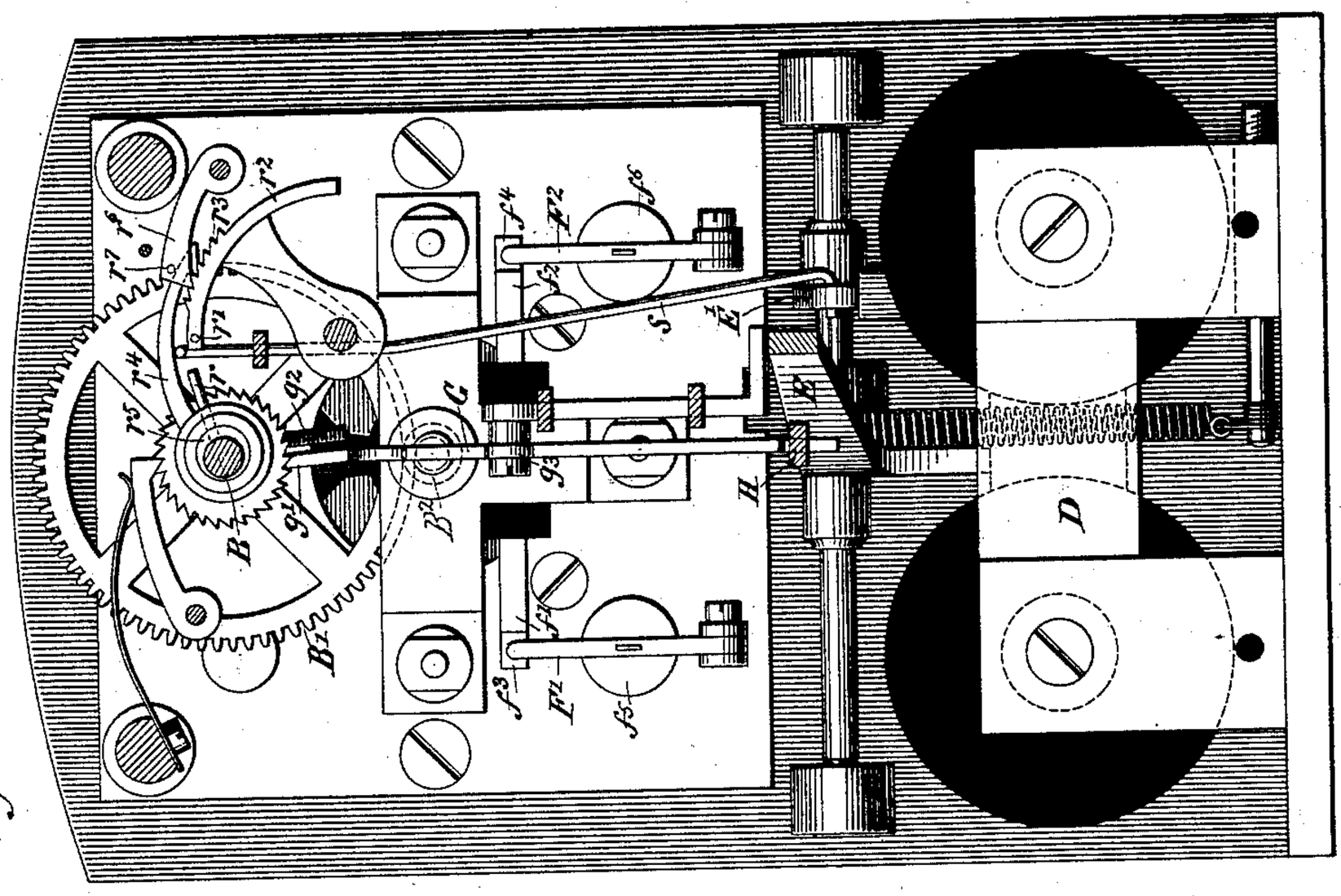

Fig. 2.

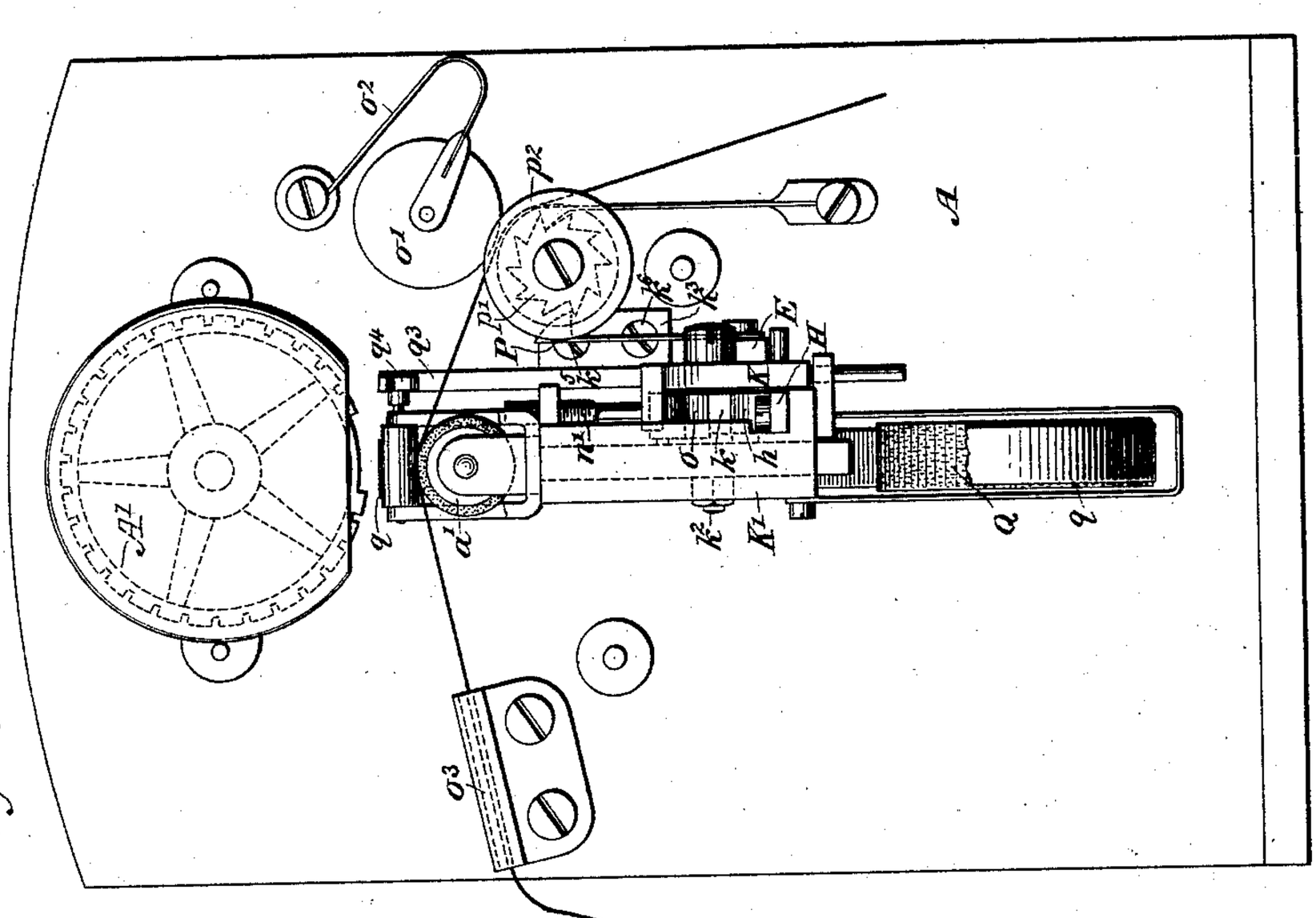

Fig. 4.

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PRINTING TELEGRAPH.

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Fig. 5,

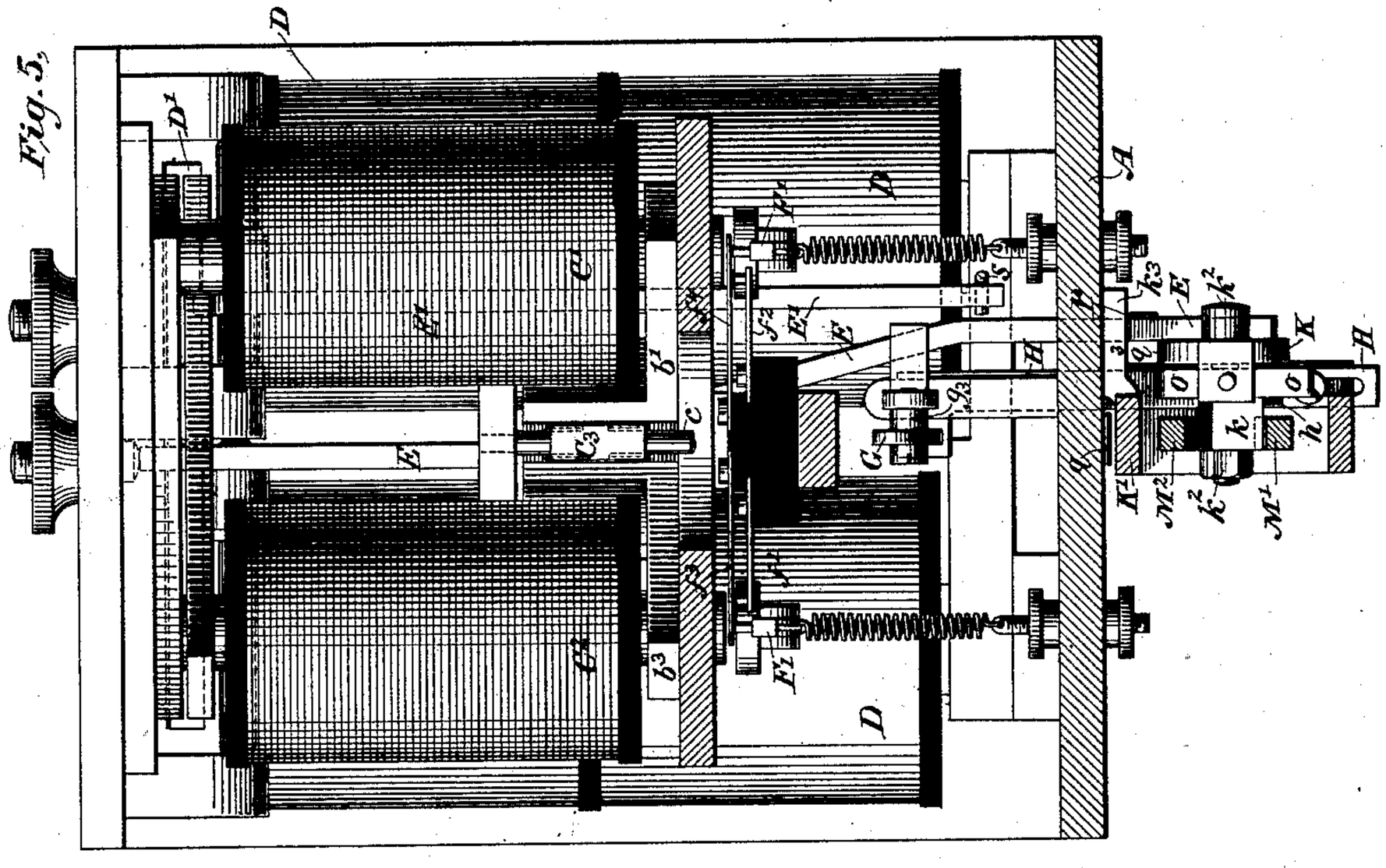
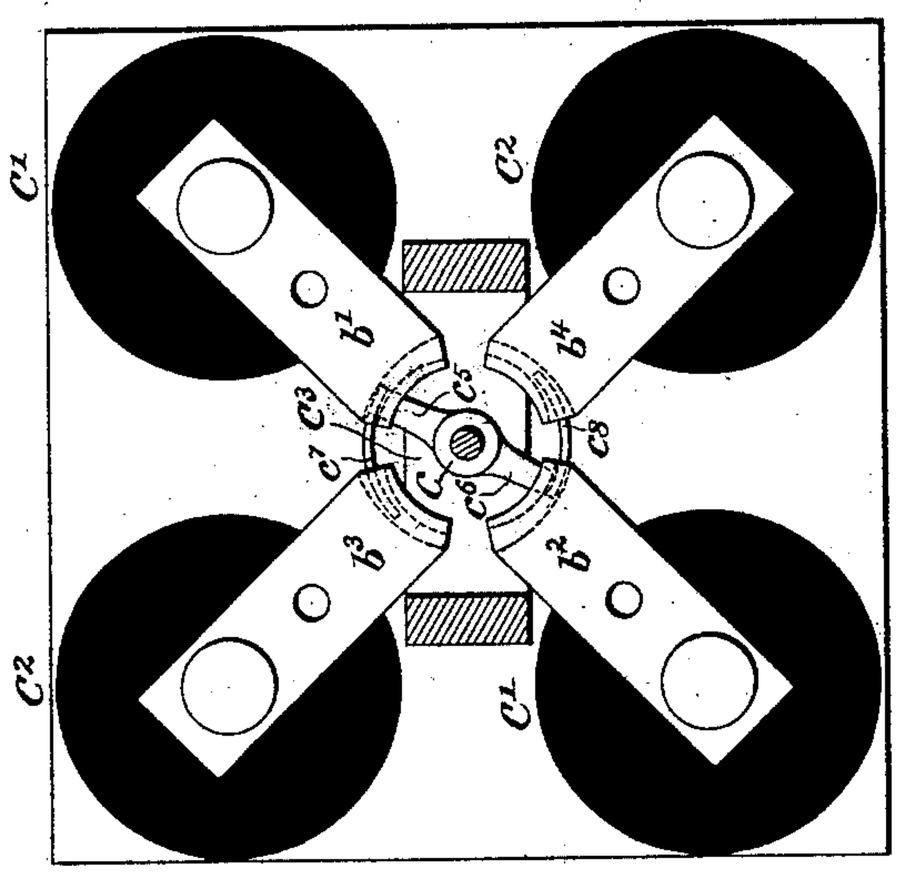


Fig. 6,



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(No Model.)

4 Sheets—Sheet 4.

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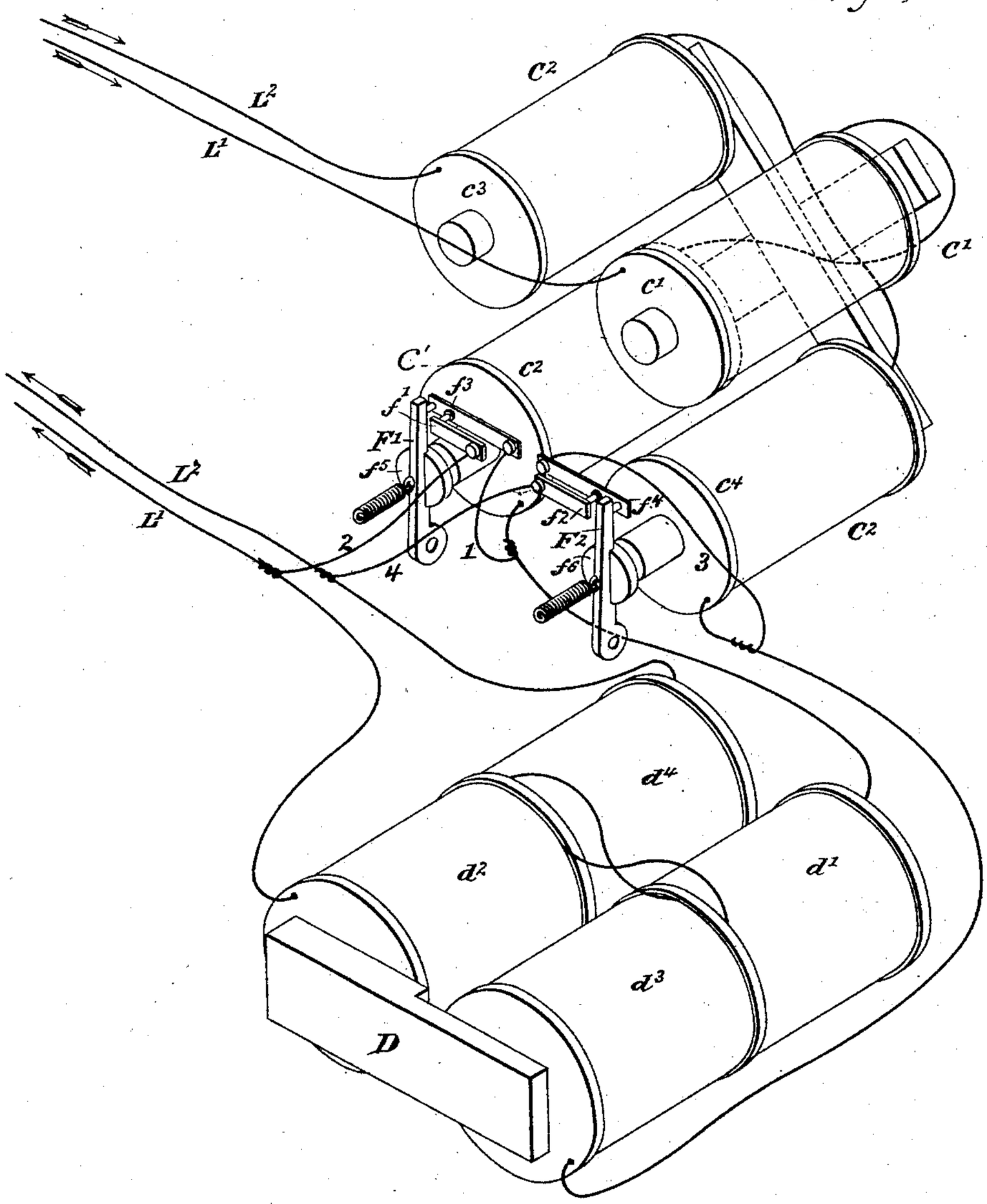
Fig. 7.



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By his Attorneys
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UNITED STATES PATENT OFFICE.

ROBERT J. SHEEHY, OF NEW YORK, N. Y., ASSIGNOR TO THE INDEPENDENT PRINTING TELEGRAPH COMPANY, OF SAME PLACE.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 370,978, dated October 4, 1887.

Application filed December 16, 1885. Serial No. 185,818. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. SHEEHY, a citizen of the United States, residing in the city 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.

The invention relates to the class of apparatus employed for printing messages and dispatches from one or more revolving type-wheels by means of electric currents transmitted from a distant point.

The object of the invention is to provide an efficient, simple, and rapidly-operating instrument, which may be manufactured at a small cost, which is noiseless in its operation, and which entirely dispenses with the use of heavy driving-weights, such as are usually employed in operating printing-telegraph instruments.

The essential elements necessary in organizing a printing-telegraph receiving-instrument are, mechanism for revolving the type-wheels and arresting them in any required position, means for effecting impressions therefrom, means where two type-wheels are used for determining from which an impression shall be taken, a unison device for correcting the position of the type-wheels with reference to the transmitter, and means for supplying the ink necessary for producing the impressions.

This invention contemplates certain improvements in each of these devices, together with certain other improvements in the details of construction.

The invention consists, in general terms, in organizing a printing-instrument upon the following plan: In place of an escapement device driven by a weight or spring which must be wound at intervals, an electric motor is employed for securing the required revolution of the type-wheel shaft. This motor preferably consists of two electro-magnets included in independent line-wires, and having pole-pieces projecting toward a common center and forming a field for a revolving armature. The armature, carried upon a shaft which is geared to the type-wheel shaft, is advanced by the alternate vitalization of the two electro-magnets. In this manner a positive and regulated movement of the type-wheel shaft is secured. Impressions are effected by means of a third electro-magnet. This is provided with two sets of coils, the one set being included in each line-wire. A prolonged current, or a current of increased strength, through either line causes the motor to stop, and thus arrest the type-wheel in a corresponding position, and at the same time the printing-magnet is vitalized and the press-lever operated to effect an impression.

As it is desirable that as little resistance should be included in the main line as possible, it is preferred to normally cause the press-magnet coils to be shunted and to be placed in circuit only when an impression is to be effected. This may be readily accomplished by means of an armature applied to each motor-magnet and responding only to the currents designed for printing. When either is actuated, it serves to interrupt a normally-closed shunt-circuit around the corresponding press magnet coils.

The impressions are effected from either of two type wheels by means of two independently-movable platens, the one or the other of which is impelled against its corresponding type-wheel, according to the position of a platen shifting block which is capable of being placed in either of two positions. Two positions of the type-wheel shaft are devoted to shifting this block. If the shaft be arrested in a given position and the press-lever actuated, the shifting-block will be placed in a position to cause one of the platens to be subsequently actuated, and if the type-wheel shaft be arrested in the second of the two positions and the press lever actuated then the block will be moved into position to operate the second platen. The block does not act directly upon the platens, but serves to place a movable catch in position to engage one or the other of the platens.

For the purpose of at any time securing a unison of the instrument with the transmitter a pawl driven to and fro by the revolution of the type wheel shaft advances a toothed segment step by step, causing a unison-detent to approach the path of a unison-stop moving

with the type-wheel. After a predetermined number of revolutions have been effected without printing, the stop will be in position to intercept the path of the detent.

For the purpose of preventing the unison from arresting the type-wheel during the operation of printing, an arm operated by a special armature applied to the press-magnet, and therefore actuated each time an impression is effected, releases the toothed segment and allows it to carry the detent away from the stop upon the type-wheel shaft.

It has been customary to provide inking-rollers for supplying the ink to the type-wheel. It is preferred in this instance, however, to employ an ink-ribbon, which is advanced between the type-wheels and their respective platens during the operation of printing, and from this ribbon the impressions of the type are made upon the paper which passes between the ribbon and the platens. It has heretofore been proposed to pass an ink-ribbon between the type-wheel and the paper with its length parallel with the plane of the type-wheel. By the present invention, however, the ink-ribbon is carried across the faces of the type-wheels in a direction parallel to their axes.

The invention also involves certain details, which will be hereinafter fully described.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of an instrument embodying the features of the invention. Fig. 2 is a transverse section of the same. Fig. 3 is a detail of the platen-controlling devices. Fig. 4 is an elevation of the front of the instrument. Fig. 5 is a plan view of the instrument, and Fig. 6 illustrates certain details in the construction of the motor. Fig. 7 is a diagram illustrating the circuits.

Referring to the figures, A′ and A² represent two type-wheels, the former of which is designed to carry, essentially, numerals and the latter letters. These are carried upon a shaft, B. The shaft carries a toothed wheel, which meshes with a pinion, B². The pinion is carried upon the shaft *c* of a motor, T. This motor is constructed with two electro-magnets, C′ and C², having their cores parallel. A main line, L′, is connected with the coils c' and c^2 of the magnet C′, and a line, L², through the coils c^3 and c^4 of the magnet C². An armature, C, is placed between the poles of these magnets, and it is revolved by means of the attraction alternately exerted by the poles of magnets C′ and C². The armature consists of two oppositely-projecting arms, c^5 and c^6, which are preferably curved, as shown, and carry forwardly-projecting extensions c^7 and c^8, respectively. The lengths of these extensions are approximately equal to or slightly less than one-fourth of the circumference of the annular field formed by the four projecting pole-pieces, b', b^2, b^3, and b^4, of the electro-magnets. By this construction a portion of the armature will at all times be within the field of each of the electro-magnets. The preponderance of the metal in the arms c^5 and c^6 insures an advance movement of the motor in whatever position it may stand when the succeeding electro magnet is vitalized. The pole-pieces b', b^2, b^3, and b^4 are preferably extended upon both faces of the armature, so that the latter revolves in a more or less inclosed field. Preferably, the metal at the sides of the field converges gradually, so that as the armature advances within the field of any pole its separation therefrom diminishes. The portions of the pole-pieces which the arms c^5 and c^6 of the armature are opposite when it has been advanced to the limit of the attractive force of those pole-pieces are parallel with the confronting faces of the armature—that is to say, the portion beneath and the portion extending over the front of the armature are parallel with the corresponding faces of the armature, while the curved portions are of approximately the same curvature as the armature. The section formed in this curve may be about one-third of each pole-piece, and the sides converge gradually through the other two-thirds, so that the separation of the armature therefrom diminishes as it advances. The position of strongest attraction, therefore, is opposite the edges of the pole-pieces last reached by the arms c^5 and c^6, and the armature tends to stop in such position. In practice it is found that by this construction an advance of the armature will thus always be insured, and also that no dead-point in its revolution exists.

The number of the teeth of the pinion B² are so proportioned with reference to the teeth of the wheel B′ that a quarter-revolution of the armature will cause the type-wheels to advance the distance corresponding to one type. In this manner a movement corresponding to the step-by-step movement secured by the usual form of escapement is obtained; but instead of being an interrupted movement, as is the case with an escapement, it is a practically continuous movement, and the shaft B is arrested only when it is desired to print. By this organization a very rapid revolution of the type-wheels is secured, and when they are once in motion they continue to advance, and there is no loss of power in overcoming inertia. The impulses transmitted alternately through the magnets C′ and C² serve to maintain the armature and type-wheel in unison with the transmitter. When the type-wheels have been arrested by prolonging a current, or a current of increased strength is sent through either electro-magnet, it is necessary that an impression should be effected. This is accomplished by means of a press-magnet, D. This magnet is constructed with two pairs of coils, d' d^2, which are in circuit with the coils c' and c^2, and thus with the line L′, and d^3 d^4, which are in circuit with the coils c^3 and c^4, and thus with the line L². The armature of this electro-magnet D does not respond except when a prolonged impulse or one of increased strength is sent, as the case may be. When such an impulse is sent, the armature D′ is

drawn forward, turning its lever E upon its pivot, and thus impelling one or the other of the platens a' or a^2 against its type-wheel A′ or A².

The coils of the electro-magnet D may be permanently in circuit with the main lines L′ and L²; but usually it is preferred to establish shunt-circuits around the same during the time that the type-wheels are being revolved, thereby removing their resistance from the respective main lines. This may be readily accomplished by connecting the respective conductors 1 and 2, leading across the terminals of the coils d' and d^2, with a contact-point, f', and a spring, f^3, applied thereto, and in like manner connecting the conductors 3 and 4, leading across the terminals of the coils d^3 and d^4, with a contact-point, f^2, and a spring, f^4, respectively. The lever F′ carries an armature, f^5, applied to one pole of the electro-magnet C′, carrying the coils c' and c^2, and the lever F² carries an armature, f^6, applied to one pole of the remaining motor-magnet, C². Normally these levers are held by suitable springs away from their respective contact-springs, and are not drawn forward by the rapidly-recurring impulses employed for operating the motor. A prolonged impulse, however, through either magnet will draw its lever against the corresponding point, thereby separating the spring from its corresponding point and interrupting the shunt-circuit around the coils of the press-magnet D, and the press-magnet will thereupon be vitalized.

For the purpose of effecting an impression from either type-wheel at will the following device is employed: Upon the type-wheel shaft B there are carried two arms, g' and g^2, which are respectively placed in alignment with two open or blank spaces of the type-wheels. A lever, G, projects toward the arm g' or g^2, and if this arm be impelled toward the type-wheel shaft when one of the blank spaces is above the platens, then it will strike against the arm g'; and if the other of the blank type confronts the platen, then the lever G will strike against the arm g^2. The faces of the arms g' and g^2 are beveled in opposite directions, and are intended to turn the lever G upon its pivot g^3 in one direction or the opposite, according as it strikes against one or the other of its arms. The position of the arm G determines the position of a wedge-shaped extension or shifting block, h, carried upon a sliding bar, H. The lever G is coupled with the bar H, and accordingly as the former is turned in one direction or the opposite the bar is carried into position to place the shifting-block h beneath a tilting platen-catch, k, carried upon a movable support or frame, K. The tilting catch is pivoted to the support or plate K, and is constructed with an extension, k', extending below its pivot k^2, and when the lever falls after effecting an impression the extension k' will pass upon one side or the other of the block h. In the drawings, Fig. 1, the parts are shown as having been placed in position by the contact of the lever with the arm g', the press or lever having fallen with the extension k' upon the rear side of the shifting-block h. The tilting detent k is thus turned so that it will engage in a notch, m', upon a bar, M′, carrying the platen a'. When the press-lever is raised, its end engages the bolt or pivot k^2 and the frame K rises, carrying with it the catch k, which engages and lifts the arm M′. The latter is vertically movable within a stationary frame, K′. The upward movement of the frame K will thus carry the platen a' toward the type-wheel A′ and cause an impression to be taken. The parts are, however, so adjusted that the moment the platen strikes against the type-wheel the catch k will be thrown out of engagement with the notch m', allowing the arm M′ to fall. This is accomplished by means of an arm or cross-bar, o, extending from the opposite sides of the catch k. This arm is engaged by two adjustable set-screws, n' and n^2, placed in the frame K′ when the catch is in position to strike the platen a'. Then the moment an impression is taken the bar o will strike the set-screw or limiting-stop n^2, and the further movement of the press-lever and support K will tilt the catch k sufficiently to disengage it from the bar M′. The bar o will then strike against the pin n' also, and be thus set in a horizontal position. Upon the subsequent descent of the platen-frame and press-lever upon the demagnetization of the electro-magnet D the catch k will be engaged by the block h, and it will thus be insured that it will occupy the proper position for engaging the bar M′ upon its next upward movement. The platen, however, will have descended to its normal position of rest before the electro-magnet has been demagnetized, thus securing a quick stroke, and it also results that each impression shall be made with the same pressure, and that there is no opportunity for impressions to become blurred by the movement of the paper across the type-wheels while pressed against the same by the platen. When the lever G has been moved in the opposite direction by being thrust against the arm g^2, then the projection or shifting-block h will be moved backward, and the catch k will be tilted in the opposite direction upon the descent of the frame K. Then the arm M² will be engaged by the catch entering a notch, m^2, and the platen a^2 will be impelled toward its type-wheel at each upward movement of the press-lever. In like manner the bar M² will be released, allowing the platen to fall, when the bar o strikes against the stop n', thus placing it in a horizontal position by reason of its contact with the two stops n' and n^2.

For the purpose of feeding the paper forward after each impression a spring, P, secured to the press-lever E, engages the teeth of a ratchet-wheel, p', secured to the arbor of a drum, p^2, over which the paper passes. A pressure-roller, o', carried by a spring, o^2, holds the paper against the drum, and by the revolution of the latter the paper is fed forward. The

paper passing from the drum extends across the platens a' a^2, and thence through a guide, o^3.

The paper-feed, it should be observed, is placed between the platens and the supply-roll, so that instead of drawing the paper across the platens by the paper-feed it is pushed forward, and the weight of the paper upon the opposite side, together with the forward thrust, secures its advancement. This construction is desired for the reason that the paper is held firmly by the roller o' and drum p^2, so that when the platen falls the paper will slide across the same slightly toward the guide o^3. It is desirable that this movement should be forward rather than backward, as would be the case were the paper to pass through the feed after impressions had been made. The paper-feed is advanced one step at each downward movement of the press-lever, in a manner well understood.

Instead of inking the type upon the type-wheels by means of inking-rollers, as has usually been the custom, it is preferred in this instance to employ an ink-ribbon, q, which passes over an ink-supply roller, Q, and is held in suitable position between the paper passing over the platens and the type-wheels by means of small rollers q' and q^2. The ribbon passes in a direction parallel to the axis of the type-wheels, and it is evident that the faces of the type will effect impressions upon the paper through the type ribbon. The roller Q is suspended upon the ribbon, and its weight maintains the necessary tension. A spring, q^3, attached to the press-lever E, engages a ratchet-wheel, q^4, upon the arbor of one of the rollers, q^2, and each downward movement of the lever will advance the ribbon one step by reason of this pawl and ratchet-wheel, thus causing a fresh surface to be presented to the type. A long ribbon unwound from one roller and wound upon another might be substituted for the endless ribbon shown.

For the purpose of affording convenient access to the various parts of the press mechanism, and for removing and replacing the ink-ribbon, the frame K, together with its supporting-frame K', is secured to a plate, k^3, projecting from one side of this frame and secured to the front plate, A, of the instrument in any suitable manner. This allows the ribbon to be placed back of the support, and whenever it is necessary the entire press mechanism can be readily removed by removing the screws k^5 and k^6, which secure it to the frame.

For the purpose of securing the unison of the instrument the following device is employed: A stop, r, projects from the type-wheel shaft B, and a detent, r', designed to intercept the same, is carried upon a movable toothed segment or arc, r^2. This arc is provided with teeth r^3, which are engaged by a pawl, r^4. The pawl r^4 is carried upon an eccentric or cam, r^5, formed upon the type-wheel shaft. The revolutions of the type-wheel shaft cause the pawl to be driven to and fro, and by reason of this movement it engages the successive teeth of the arc, thus drawing it forward step by step at each revolution of the type-wheel shaft. A dog, r^6, engages the teeth and holds the arc in its successive advanced positions. A predetermined number of revolutions will cause the detent r' to intercept the path of the stop r, and thus arrest the type-wheels at their unison-point. For the purpose of releasing the arc, however, whenever an impression is effected, and thus preventing the instrument from being arrested at unison except when it is desired, the dog r^6 carries a pin, r^7, projecting above the pawl r^4. Each time an impression is effected an arm, s, is raised, throwing the pawl upward, thus disengaging both it and the dog from the path of the arc, which immediately falls back by reason of its weight, or by a spring, if it is so desired, carrying the detent away from the stop r. The upward movement of the arm s is secured in the following manner: A supplemental armature, s', is applied to one pole of the electro-magnet D. The core to which this armature is applied is preferably shorter than the other core of the magnet by an amount equal approximately to the thickness of the armature s', so that when the latter is against the pole it produces a prolongation of the same, being allowed to make magnetic contact therewith. The armature D' is attracted through the armature s'. It is evident that the cores might be of equal length and the face of the armature D' cut away. The armature s' responds only to such currents as are employed for operating the armature D' and lever E. The armature s' is carried upon a lever, E', and to the end of this lever the arm s is attached, so that each time an impression is effected the pawl r^4 is raised and the toothed segment r^2 released.

The currents used for actuating the motor are preferably in the same direction through the lines L' and L^2; but as the current is closed through one line immediately before that through the other line is interrupted the electro-magnet D might not demagnetize quickly enough if two impressions were to be taken one immediately after the other. For this reason it is preferred to connect the coils of the magnet D oppositely with the conductors leading from the motor-magnets, so that a current through the magnet C' will induce a given polarity in the magnet D, and a current through the magnet C^2 will induce the opposite. This construction is not essential when the shunt-circuits around the coils of the magnet D are employed; but it is especially desirable in case such shunts are not used.

It may be here observed that when only one instrument is placed in a line, and it is not necessary to preserve the two lines independent after leaving the motor-magnets, only one coil will be necessary upon the electro-magnet D. The same is true of the last instrument in a series.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a motor consisting of two electro magnets having polar extensions forming a cylindrical field, an armature within said field, consisting of two radial arms, each having a forwardly-projecting extension, a type-wheel, and a mechanical connection between said type-wheel and armature.

2. The combination, substantially as hereinbefore set forth, with a type-wheel and its shaft, of a motor for advancing the same, consisting of two or more electro-magnets having converging pole-pieces, and an armature revolving in a field formed within said extensions and consisting of two radial arms, each having circular projections, the adjacent surfaces of said pole-pieces being formed in two curves, the one coinciding with that of the armature projections and the other in the form of a larger circle cutting the first-named curve.

3. In a printing-telegraph receiving-instrument, a driving-motor consisting of a rotating armature constructed with one or more radial arms, having forward-projecting extensions moving in an inclosing magnetic field formed by two or more electro-magnets having their polar faces gradually approaching the circle of revolution of the armature, substantially as described.

4. In a printing-telegraph instrument, a motor consisting of a Z-shaped armature having its outer arms curved and moving in a magnetic field formed by four magnetic poles, each of which forms a partially-inclosed envelope for the arms of the armature, the sides of which converge, substantially as described.

5. In a printing-telegraph instrument, an electric motor consisting of the electro-magnets C' and C^2, having the converging pole-pieces b', b^2, b^3, and b^4, in which are formed narrowing openings for the arms of the armature, the sides of said openings converging in the direction of the movement of the armature, and being curved to the center of the armature through the portion nearest to the armature.

6. In a printing-telegraph instrument, an electric motor having a revolving armature, a type-wheel, and a mechanical connection between the armature and the type-wheel, whereby each quarter-revolution of the former occasions an advancement of the type-wheel a distance corresponding to one type.

7. In a printing-telegraph instrument, an electric motor having a revolving armature driven by currents transmitted therethrough, a type-wheel shaft, one or more type-wheels carried thereby, and a speed-reducing gear coupling the motor with the type-wheel shaft.

8. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument, of a revolving electric motor, a press-magnet, conductors leading from the motor-magnet to the press-magnet, normally-closed shunt-circuits around the coils of said press-magnet, and an armature applied to the motor-magnets for interrupting said shunt-circuits under the influence of a current employed for printing through the motor-magnet.

9. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument, of a type-wheel, an electric motor for advancing the same, consisting of a revolving armature and two independent electro-magnets, conductors leading from said magnets, a press-magnet having two sets of opposing coils respectively included in the said conductors, two circuit-closing devices normally completing circuit-connections around said sets of coils, and two armatures respectively applied to said motor-magnets and responding to prolonged or increased currents to interrupt said shunt circuits, respectively.

10. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument, of means for advancing the type-wheel and arresting it in any required position, a press-magnet for effecting impressions from the type-wheel, a movable platen operated by said press-magnet, a tilting pawl for engaging said platen, and a stop for disengaging said pawl from said platen when an impression is effected.

11. The combination, substantially as hereinbefore set forth, of two type-wheels, a shaft carrying the same, means for revolving the shaft, a press-magnet, two independently-movable platens, a tilting pawl for operating one or the other of said platens, a shifting-block for determining the position of said pawl, two oppositely-beveled arms carried upon the type-wheel shaft in different radial positions, and a pivoted lever for controlling the position of said block, which lever is moved in one direction or the opposite, accordingly as it strikes against one or the other of said arms.

12. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument, of two independently-movable platens, a tilting pawl for engaging the one or the other of the same, a shifting-block for determining the position of the pawl, two stationary contact-arms, against which said pawl is thrust, thereby releasing the engaging platen and placing said pawl in position to be tilted, so as to engage one platen or the opposite by its contact with said shifting block after an impression has been effected.

13. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument, of a press-magnet, its armature and armature-lever, the movable frame K, the tilting pawl k, the arm o, the platens a' and a^2, the bars M' and M^2, respectively, carrying the same and engaged by said pawl one at a time, means, substantially such as described, for placing said pawl in a horizontal position each time said lever is actuated, and a shifting-block for tilting said pawl when said lever is released by the demagnetization of the press-magnet.

14. In a printing-telegraph instrument, the movable frame K, carrying the tilting pawl k, the stationary support K', secured at one side

to the frame of the instrument, the movable platens a' a^2, their supporting-arms M′ and M², the contact-points n' and n^2, and the arm o, engaged thereby, substantially as described.

15. The combination, substantially as hereinbefore set forth, with the type-wheel of a printing telegraph instrument, of means, substantially such as described, for effecting impressions therefrom, an ink-ribbon, and means, substantially such as described, for passing the same across the face of said type-wheel in the direction parallel to its axis.

16. The combination, substantially as hereinbefore set forth, with the type-wheel of a printing-telegraph instrument and a platen for effecting impressions therefrom, of an ink-ribbon and rollers supporting the same in a line parallel to the axis of the type wheel, substantially as described.

17. The combination, substantially as hereinbefore set forth, in a printing-telegraph instrument with a type-wheel, of an ink-ribbon moving at right angles to the direction of rotation of the type-wheel, and means, substantially such as described, operated by the press-lever, for advancing said ribbon after each impression has been effected.

18. In a printing-telegraph instrument, a unison device consisting of a stop moving with the type-wheel and an arm advanced into the path of the same by the revolution of the type-wheel, and a unison-release consisting of an armature applied to one pole of the press-magnet and constructed to be placed in magnetic contact therewith, and an arm operated by said armature for releasing said unison-detent.

19. In a printing-telegraph instrument, the combination, with the press-magnet and its armature, of a subsidiary armature applied to one pole of said press-magnet and intervening between the press-magnet armature and the pole of the magnet, substantially as described.

20. In a printing-telegraph instrument, the combination, with the press-magnet and its armature, of a subsidiary armature applied to one pole of said press-magnet and intervening between the press-magnet armature and the pole of the magnet, substantially as described, and constituting a prolongation of the corresponding core, whereby the distance of separation of said press-magnet armature from the press-magnet is approximately the same at each pole.

In testimony whereof I have hereunto subscribed my name this 14th day of December, A. D. 1885.

ROBERT J. SHEEHY.

Witnesses:
DANL. W. EDGECOMB,
CHARLES A. TERRY.