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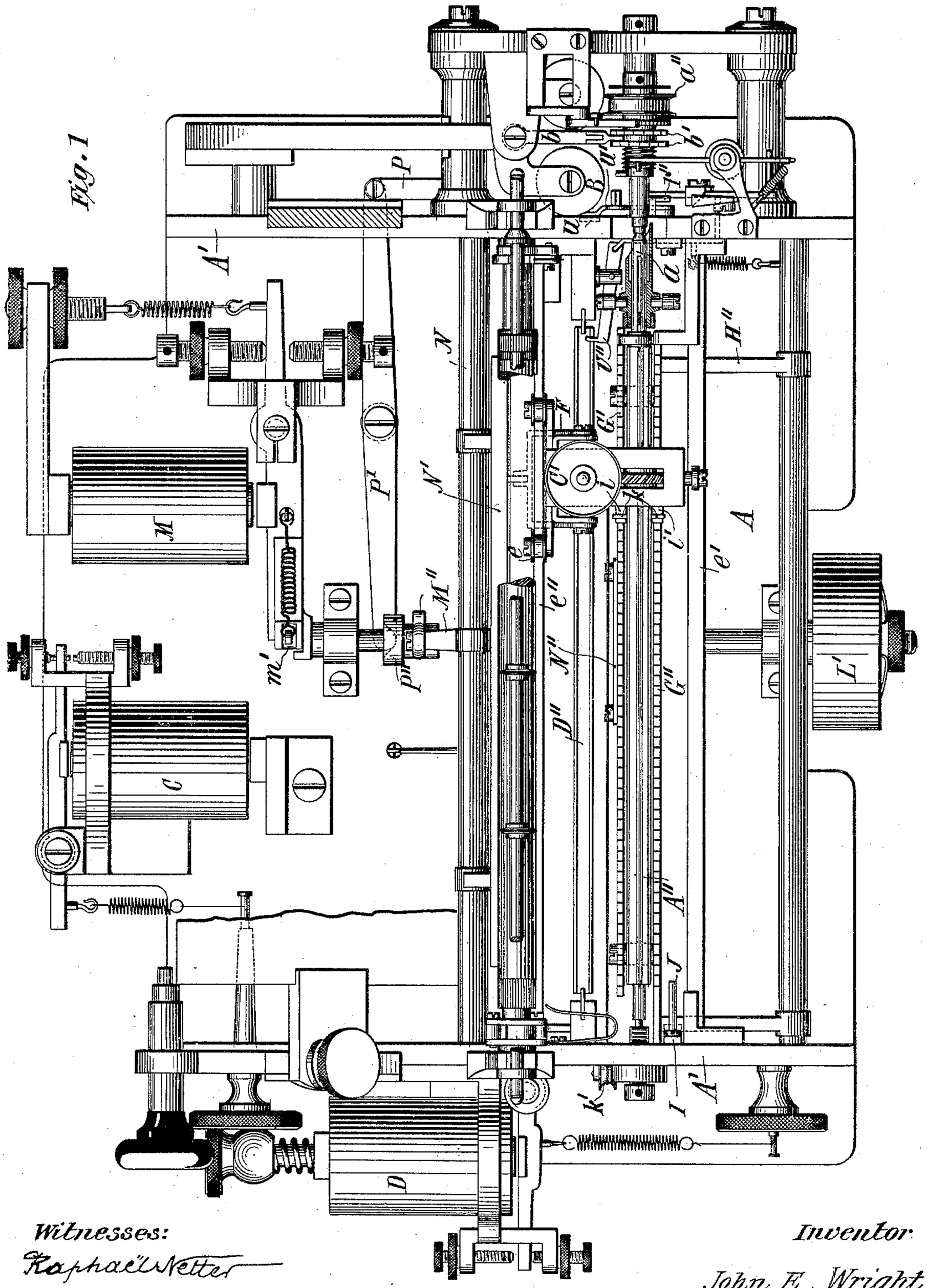
J. E. WRIGHT.

PRINTING TELEGRAPH.

No. 466,858. Patented Jan. 12, 1892.

Fig. 1



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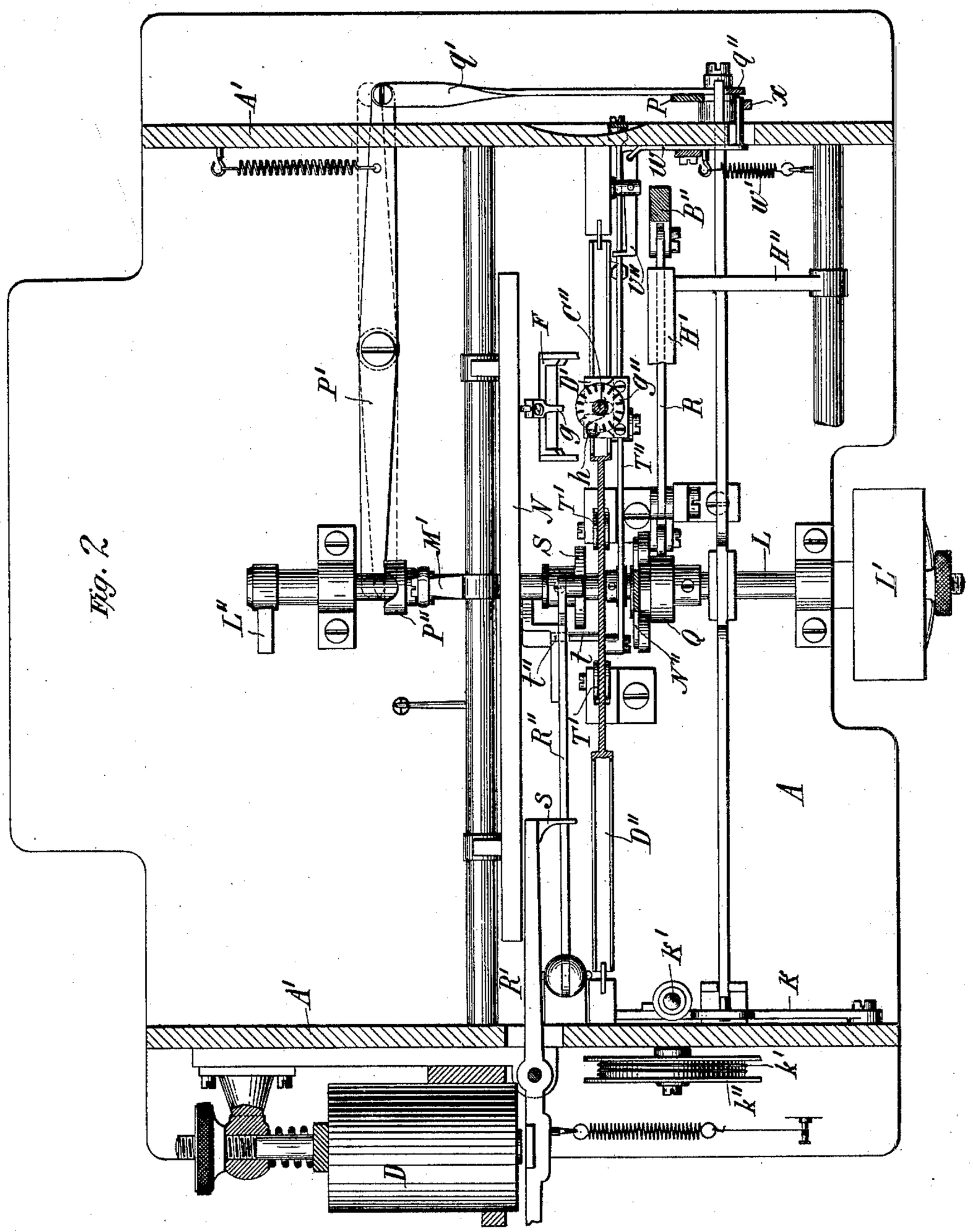

Fig. 2

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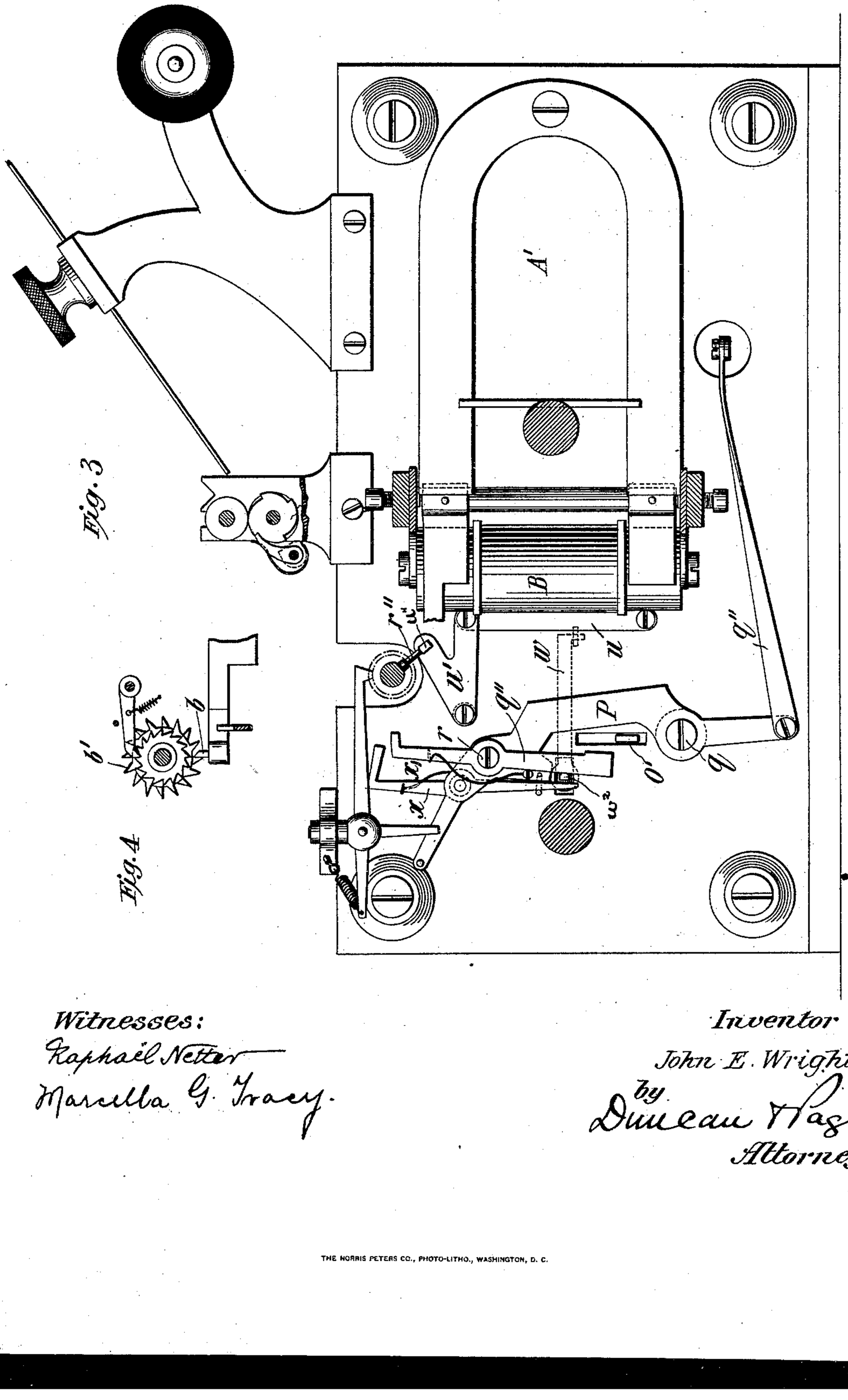

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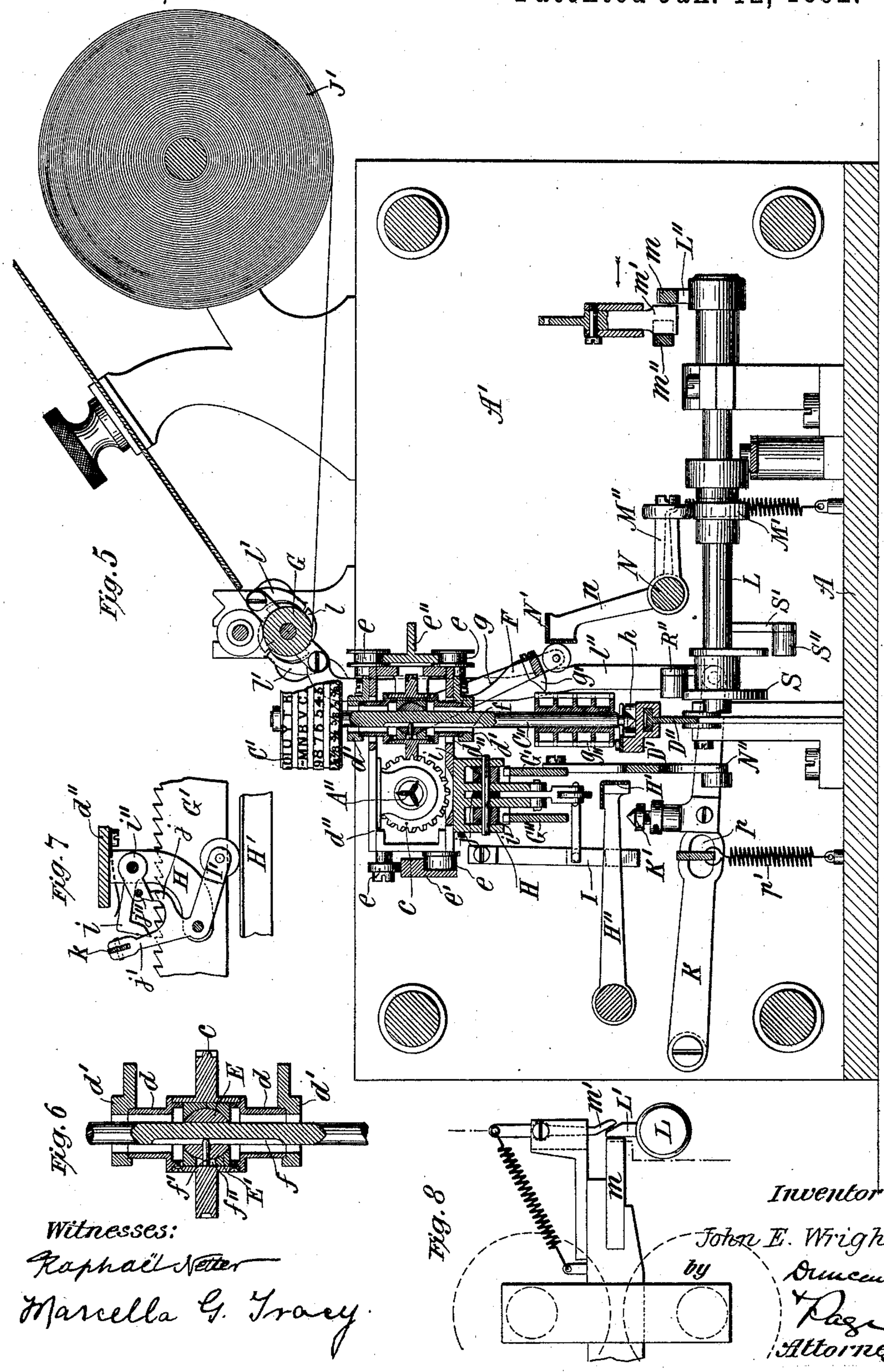

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Fig. 9

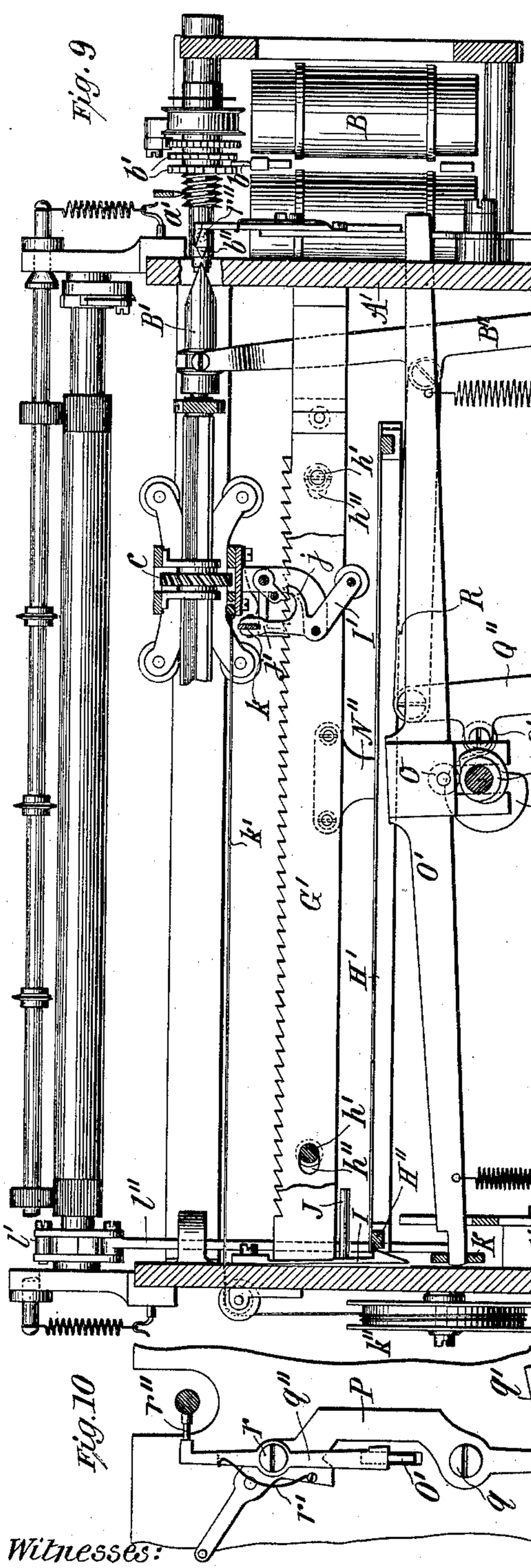
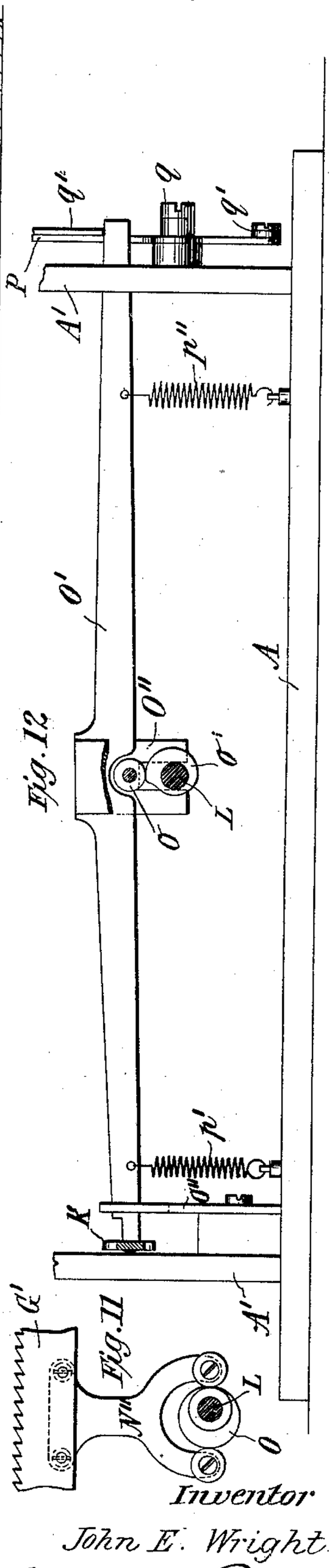


Fig. 10

Fig. 12



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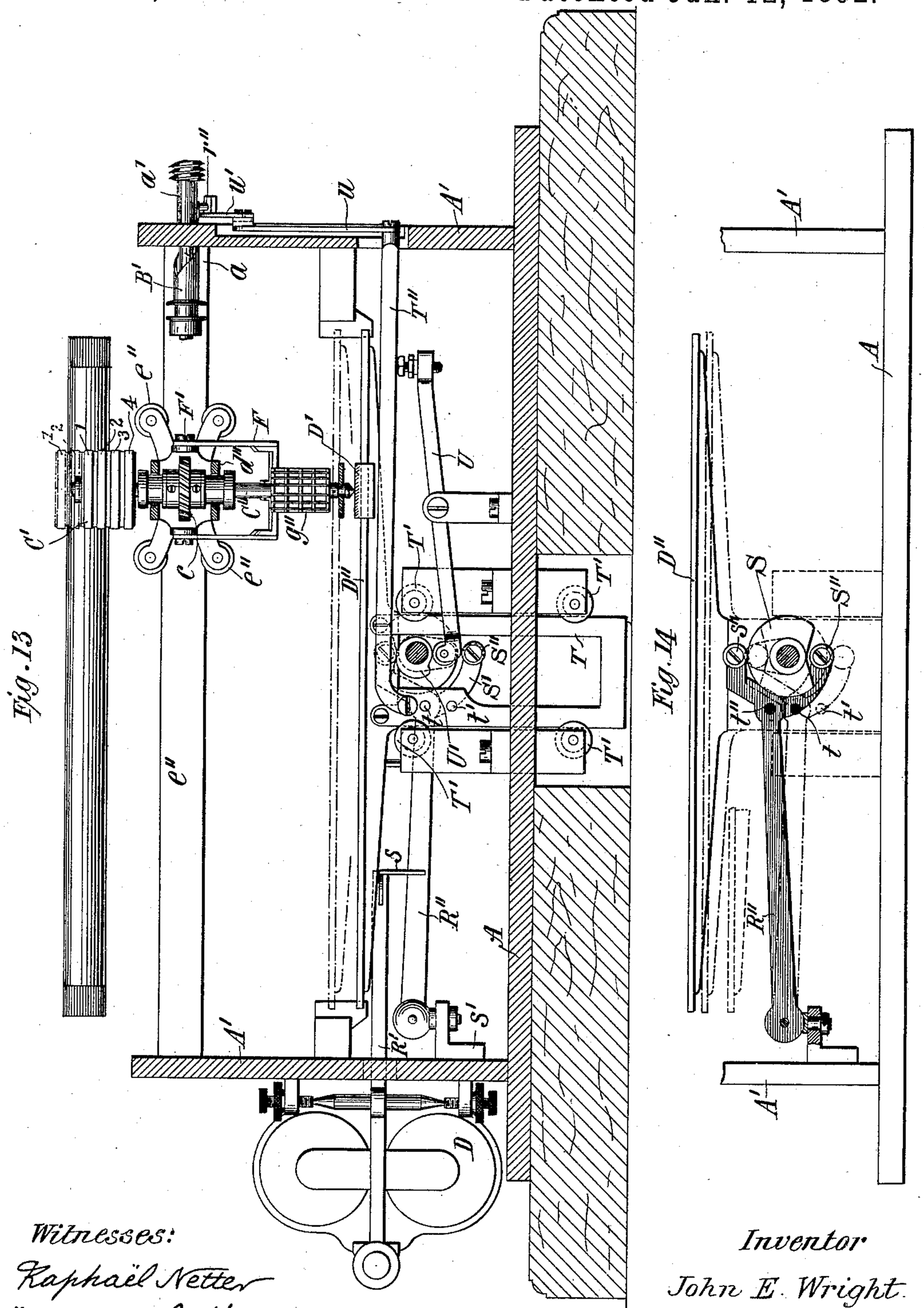

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UNITED STATES PATENT OFFICE.

JOHN E. WRIGHT, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN TYPE TELEGRAPH, OF NEW JERSEY.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 466,858, dated January 12, 1892.

Application filed September 5, 1891. Serial No. 404,820. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. WRIGHT, a citizen of the United States, residing at 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, reference being had to the drawings accompanying and forming a part of the same.

This invention relates to printing-telegraph receiving-instruments, and comprises certain new and useful improvements therein, which, while applicable generally to instruments of this kind, are more especially designed for use in that particular class of receivers which print the letters and characters in columns or successive rows.

The main object of the invention is to relieve the electro-magnets which are operated by or connected with the main line of as much load or work as possible, which object is accomplished by the use of a suitable motive power independent of the magnets for effecting the mechanical operation of the several parts of the printing and feed mechanism and by utilizing the electro-magnets merely for releasing, arresting, and generally for controlling the action or operation of the said motive power.

The mechanism as a whole involves the several instrumentalities heretofore employed in devices of this character—that is to say, the proper electro-magnets—together with devices for rotating the type-wheel to bring the proper characters thereon to the printing position for impressing or printing the characters and for effecting the proper feed movements for letter and line spacing; but the distinguishing features of the present invention are in the novel character of these instrumentalities. The type-wheel employed has four rows or series of characters, and is combined with means for raising or lowering the same for the proper alignment of any one of such rows or series. The said type-wheel is, moreover, constructed to oscillate and thereby print or impress the character on or in the paper. In combination with the type-wheel and the feed devices is a power-driven shaft adapted to operate the same in proper order or succession through the instrumentality of cams or similar devices, and various other novel details of construction are present, which will be described more fully herein by the aid of the drawings, and more particularly indicated in the claims.

In the drawings, which illustrate the construction of the complete machine, Figure 1 is a general top plan view of the principal operative parts of the machine. Fig. 2 is a similar plan view, in which, for greater clearness, all of the magnets but one and certain of the upper parts of the apparatus are omitted. Fig. 3 is an end view of the instrument in elevation. Fig. 4 is a detail of the type-wheel escapement. Fig. 5 is a vertical cross-section of the instrument. Fig. 6 is an enlarged sectional detail of the type-wheel shaft and its bearings. Fig. 7 is an enlarged detail of a device forming part of the letter-feed mechanism. Fig. 8 is a side elevation projection of the releasing device shown in broken section in Fig. 5 and from the direction of view indicated by the arrow in the latter figure. Fig. 9 is a front elevation and part section of the instrument. Figs. 10, 11, and 12 are details of mechanism detached from the instrument, the nature of which will be hereinafter pointed out. Fig. 13 is an elevation of part of the machine illustrating the action of the mechanism for raising and lowering the type-wheel. Fig. 14 is a part of the same detached.

The various parts of the instrument are supported by a base A, side plates A′ A′, and suitable cross bars or braces; but the specific construction and arrangement of the said parts with reference to this or any other proper means of support is largely immaterial.

The main or signaling line includes three electro-magnets—one a sensitive magnet B, that responds to the shortest impulses of current, whether weak or strong, and which is used in connection with the type-wheel escapement; another a magnet C, somewhat sluggish in its action and not, therefore, affected by a very short impulse of current, but sensitive to any prolonged impulse and which is used as a relay-magnet in connection with the controlling-magnet M for the motive power, and the third a magnet D, the function of which is to control certain devices for vary-

ing the elevation of the type-wheel and which requires for its operation a stronger current than is necessary for either of the others.

Mechanism for rotating the type-wheel to present any desired character of a given row to the paper in the printing position.—A″ is a three-cornered horizontal shaft, Figs. 1, 5, and 9, with bearings at opposite sides of the instrument. An extension *a* of this shaft is round, and its pointed end has a bearing in the end of the escapement-shaft *a′*. This shaft is connected by friction with a pulley *a″*, which is constantly rotated by an independent motor. The tendency to rotation which is thus imparted to the escapement-shaft *a′* is controlled by the armature *b* of the magnet B, acting as a pawl and oscillating between the two ratchet-wheels *b′*. Thus the shaft *a′* may be brought to any desired position corresponding to a given letter by sending through the magnet B the proper number of alternations or impulses of current. In the shaft *a′* is set a stud or beveled projection *b″*, and when the said shaft has been brought to the desired position a sleeve B′ on the extension *a′*, that is formed as a double cam at its end and which moves longitudinally on the shaft *a* but turns with it, is shifted by a lever B″, engaging with it, into engagement with the stud *b″*. The cam-sleeve and with it the shaft A″ is thereby turned in one or the other direction through an arc of greater or less extent, according to the relative positions of the cam-sleeve and stud *b″* before engagement. This rotary movement of the shaft A″ is imparted to the type-wheel by bevel gear-wheels *c c*, one of which slides along the shaft A″, while the other is connected with the vertical type-wheel spindle, as hereinafter set forth. In this way by giving to the end of the cam-sleeve B′ a proper form the type-wheel may be turned in one direction or the other from any given point to present a selected character for printing and is never turned more than a half-revolution.

The type-wheel and its carriage.—The type-wheel proper C′ is a light cylinder, preferably of such material as aluminium, and is provided with four rows of characters, generally made of rubber or rubber-faced type and indicated by the numerals 1 2 3 4. This cylinder is fixed to a vertical spindle C″, the lower end of which passes through a slotted plate over a step D′, fitted to and adapted to be moved freely along a guide rail or bar D″ by the transverse movement of the spindle C″. The spindle C″ passes through a vertical sleeve or cylinder *d*, which is capable of rotation about its longitudinal axis. The bearings for the sleeve *d* are at the ends in plates *d′*, which are secured to the type-wheel carriage, the frame of which is designated by *d″ d″*. Said carriage is provided with rollers *e*, that travel on guide-bars *e′ e″*. The spindle C″ passes freely through a ball E, (see Fig. 6,) which works in a socket E′ inside the sleeve *d* and which turns with the sleeve horizontally. A vertical groove *f* is formed in the side of spindle C″, into which extends a pin *f′*, fixed in the ball E and extending into a vertical slot *f″* in the socket E′. It will thus be seen that the spindle C″, while it revolves with the sleeve *d*, that carries the bevel-wheel *c* and receives rotary motion from the shaft A″, is capable of a free movement of limited extent vertically through said sleeve, and, being of smaller diameter than the bore of the sleeve, is also capable of oscillation within said sleeve in a given vertical plane, the center of oscillation being the ball-joint. The elevation of the spindle or its vertical position with reference to the sleeve obviously depends upon the position of the step D′ and bar D″, by which its lower end is supported. A bifurcated lever F is pivoted to the type-wheel carriage, as shown at F′ in Fig. 13, and the end of this lever extends downward into the path of a swinging frame, which depresses it when an impression is to be made. The lever F carries a light spring *g*, that bears upon the type-wheel carriage and retracts the lever after each impression. The said lever is also provided with a tooth *g′*, which, when the lever is depressed, enters a recess or slot in a cylinder *g″* on the lower part of the spindle C″ and locks the spindle against any rotary or lost movement. This perforated cylinder or cage *g″* is made to correspond with the type-wheel and has four rows of holes, so that when the lever F is depressed the tooth *g′* will enter that hole which corresponds to the character to be impressed or printed. The depression of the lever F has also the effect of throwing the type-wheel over against the paper which is carried on a roller G and printing the letter that is presented at the printing-point. On the retraction of the lever F, the spindle C″ and the type-wheel thereon adjust themselves at once to their normal position. A small flat spring *h* is placed on the step D′, and being bent by the displacement of the end of the spindle from the center of the step, exerts sufficient force to return the same when released from engagement with the lever F.

The feed mechanism for the type-wheel carriage.—G′ G″ are two rack-bars that extend across the instrument parallel to the path of the type-wheel carriage. One of said bars, as G″, is stationary, while the other, being supported by the pins *h′ h′*, passing through slots *h″*, Fig. 9, is capable of limited longitudinal movement equal to the space between two teeth. This rack-bar is arranged, as will be hereinafter described, to be reciprocated through such space every time that the magnet C is energized. Between arms H, depending from the type-carriage *d″*, Figs. 1, 5, and 7, are pivoted two pawls *i i′*, which are in engagement with the two racks G′ G″, respectively. The reciprocation of the bar G′ causes, through the instrumentality of these pawls, the type-wheel carriage to advance through the space of one tooth for each to-and-fro

movement of the said bar G′, and in this way the letter-spacing or feed is accomplished. Between the two pawls *i* and *i′* and with bearings in the arms H is a pivoted lever I′. The upper end *j′* of this lever carries a light pivoted bar *k*, that extends at right angles and over both pawls *i i′*, as shown in Figs. 1 and 9. The bar *k* has sufficient range of oscillation to permit either one of the pawls *i* or *i′* to be raised so as to pass over a tooth, but not both at the same time, so that the carriage can never move backward unless the bar *k* be removed from the path of the pawls. A pawl *i″* is pivoted between the other two, and to it is fixed a pin or bar *j″*, that extends under both pawls *i* and *i′*. An arm *j* of the lever I′ extends under the pawl *i″*, and when the lever I′ is turned about its pivot the oscillating bar *k* is carried away from the pawls *i i′*, as shown in Fig. 7, and the latter are lifted out of engagement with the racks. The carriage is then free and is returned by a cord *k′*, attached to it and running over a pulley to a spring-barrel *k″*. The lever I′ is turned by a bar H′, carried by swinging arms H″ and extending under the lower end of the lever I′, parallel to its line of travel. When the bar H′ is raised by mechanism hereinafter described, it is engaged and retained in an elevated position by a spring-hook I, attached to the side plate of the instrument. It is disengaged by the carriage itself, which on reaching the end of its course strikes the spring or a pin J, connected therewith, and allows the bar H′ to drop. This action immediately drops the pawls *i i′* into engagement with the racks G′ G″.

The paper-feed.—Whenever the type-wheel carriage is thrown back to begin a line, the paper is fed through a sufficient space for the new line. The paper is taken off from a reel J′ and carried around the printing-roll G. On the shaft of the roll G is a ratchet-wheel *l*, with which pawls *l′* engage. These pawls are operated by a lever K, to which they are connected by a link *l″*. When the lever K is raised, a stud K′ thereon raises the bar H′ that releases the pawls on the type-wheel carriage, while at the same time the paper-roll is turned through the space for a line.

The actuating mechanism.—In printing-telegraph instruments heretofore it has been usual to impose upon the electro-magnets, either in the main or local circuits, a considerable part of the work of printing, feeding, and the like; but the efficiency and capabilities of the apparatus are by such means necessarily impaired. In the present invention, while it is evident that some or all of the several mechanisms hereinbefore described might be operated by electro-magnets, the object sought is to operate them all mechanically and to employ the magnet or magnets simply for purposes of control. The mechanism devised and employed for this purpose will now be described. A main shaft L is mounted in the frame and is provided with a friction-pulley L′, which in the operation of the machine is designed to be constantly rotated by a suitable source of power—as, for example, a small electro-magnetic motor. The shaft L is normally locked against rotation by the engagement of a stop L″ on the shaft L with the end of the armature-lever *m* of a local electro-magnet M, controlled by the relay-magnet C. The said lever *m* carries, also, a spring-actuated pawl *m′*, limited in its movement by a stop *m″*. When the armature is attracted to the magnet M, the end of its lever *m* is withdrawn from the path of the stop L″, and the shaft L is turned by its frictional connection with the motor. In order to arrest the shaft after making one revolution, the pawl *m′* is used. This pawl is brought into the path of the stop L″ by the movement of the armature-lever, which releases the latter, and, receiving the impact of the stop L″, it is moved against the force of its spring until the stop *m″* is encountered. Then upon the return of the armature-lever *m* the stop L″ slides from the pawl *m′* onto the end of the lever *m*. When the escapement-wheel *b′* is brought by rapid alternations of current to the proper position for bringing a given character into the printing position, the final impulse of current operates the magnets C and M and releases the shaft L, permitting the latter to make one revolution.

The type-wheel-setting mechanism.—The shaft L carries an eccentric Q, upon the periphery of which bears a stud or collar Q′ on a rocking arm Q″, connected by a link R with the pivoted lever B″, that connects with the cam-sleeve B′. The first effect following the rotation of the shaft L is to force the levers Q″ and B″ back, and by sliding the cam-sleeve B′ along on its shaft into engagement with the stud *b″*, to turn and set the type-wheel until it presents at the printing-point the character determined by the position of the said stud *b″*.

The impression mechanism.—An eccentric M′ is also carried by the shaft L, and a roller on the end of an arm M″ bears on the periphery of the same. This arm extends from a rock-shaft N, from which is supported by arms *n* a bar N′, arranged to encounter the end of the printing-lever F and depress the same. One of the functions of the shaft L, therefore, is to impart partial rotation to the rock-shaft N by means of the eccentric M′, and thus print or impress one of the characters on the type-wheel at each revolution.

The letter-feed and spacing mechanism.—Depending from the movable rack-bar G′ is a yoke N″, between the arms of which is an eccentric O, fixed to the shaft L. By this means the reciprocating movement necessary for the feed of the type-wheel carriage is imparted to the rock-bar G′ by each revolution of the shaft L.

Mechanism for returning type-wheel carriage and feeding the paper.—The following devices are employed to operate the lever K

for feeding the paper and sending the type-carriage home to begin a new line: O′ in Figs. 9 and 12 is a bar extending across the machine. The bar is formed with a saddle O″, that fits over the shaft L and carries an anti-friction roller *o*, resting on the periphery of an eccentric *o′* on the said shaft. Every revolution of the shaft L will therefore raise and lower the center of the bar O′. One end of the bar O′ passes through a guide-plate *o″* and enters an opening or slot in the lever K. (Shown at *p* in Fig. 5.) The other end passes through a slot in the side plate A′, and spiral springs *p′ p″*, of which the former is the stronger and more difficult to distend, are connected to the bar near its opposite ends and to the bed-plate of the instrument. If both ends of the bar are free to move, it is obvious that the raising and lowering of the center will produce an oscillation of the bar about that end as a center which is held down by the stronger spring *p′*, and the lever K will not, therefore, be moved. On the outside of the side plate A′ there is pivoted at *q* a lever P, the lower end of which is connected by a link *q′* with a lever P′, (see Fig. 2,) which is oscillated by engagement with a cam P″ on the shaft L. The movement of lever P′ is transmitted by this means to lever P, which oscillates back and forth during each revolution of the shaft L. The lever P carries a small lever *q″*, pivoted at *r* and acted upon by a spring *r′*, that keeps the lower end of the same normally out of the path of movement of the projecting end of the bar O′. When the paper is to be fed, the escapement-shaft is turned by the proper number of impulses, so that the last or prolonged impulse brings a pin *r″* directly in the path of the upper end of lever *q″*. Hence when the lever P is oscillated the lever *q″*, coming into engagement with the pin *r″*, is turned so that its lower end intercepts the end of bar O′, preventing the same from rising. The fulcrum of the bar is thus shifted from the opposite end, so that the lever K will be raised, which, as above described, returns the type-wheel carriage and feeds the paper.

An instrument constructed in the manner above described combines all the elements essential to the operation of a type-wheel with a single row of characters or which has but one vertical position. In the present case, however, it is proposed that the type-wheel shall have four different positions, which, for convenience, are designated as the "first," or that which has been described, the "second," "third," and "fourth" positions.

The second position: The electro-magnet D has been described as one requiring a stronger current for its operation than the magnet C and as being connected with the main line. When a character is to be printed that requires the type-wheel to be in the second position, the final current-impulse that is required to turn the type-wheel horizontally for the proper alignment of the selected character thereon is sent from additional battery or through less resistance, so that all three of the magnets B, C, and D are energized. The pivoted armature-lever R′ of the magnet D extends through a slot in the side plate A′ and carries at its end a forked extension *s*, that embraces a lever R″, Figs. 13 and 14. The lever R″ is pivoted to a bracket *s′* by a universal joint, so as to be capable of swinging both vertically and horizontally, and its end is provided with a stud or roller *s″*, that rides on the periphery of an eccentric S on shaft L. An arm S′ is attached to this lever and carries a steadying-roller S″, that runs on the under side of the eccentric S. Each revolution of the shaft L, therefore, causes the lever R″ to rise and fall; but the lever being normally disconnected from the other parts of the apparatus no effect is produced thereon. The bar D″, upon which the step D′ of the type-wheel spindle travels, is supported by a rectangular frame T, supported by guide-rollers T′ and capable of moving freely in a vertical plane. Two pins *t* and *t′* are set in one side of this frame. One of the two pins *t* stands opposite to a hole *t″* in the lever R″ when the said lever and the frame T are in their normal or lowest position. The stronger current impulse that is sent to print a character on the second row of type operates the magnet D and shifts the armature-lever R′, which carries the lever R″ with it, causing the pin *t* on frame T to enter the hole in said lever. In consequence of thus connecting the lever R″ and frame T the latter is raised by the eccentric S and the type-wheel brought to its second position. After the impression is made the frame T is lowered, and as soon as the magnet D is demagnetized and its armature retracted the lever R″ is disconnected from the frame T.

The third position: When a character is to be printed that is on the third row on the type-wheel, the latter must first be brought to the third position by one operation and the character printed by another. A light bar T″ is pivoted to the frame T and extends out through a slot in the side plate A′. The end of this bar is connected by a link *u*, Fig. 13, with a bell-crank lever *u′*, pivoted to the side plate A′ and provided with a stop *u″*. Under the bar T″ is mounted a lever U, one end of which bears against the under side of the bar, while the other carries an anti-friction roller that rides on the periphery of an eccentric U′ on the shaft L. The lever U is oscillated by the rotation of the shaft L and raises and lowers the bar T″; but the end of this bar, to which is connected the link *u* and bell-crank lever *u′*, being free to move, the bar merely oscillates about its pivotal point on the frame T without producing any effect on the other parts of the apparatus. The escapement-shaft *a′*, as has been above described, carries the pin *r″*, which is in line with the stud *b″*, and hence never encountered by the cam-sleeve B′. To raise the type-wheel to the

third position, the escapement-shaft is turned until this pin r'' is brought into the path of the stop u'' on the oscillating bell-crank lever u'. The shaft L being then released by the magnet M, the eccentrics impart the movements above described to the several levers; but since the bell-crank lever u' is prevented from rising, the lever T'', instead of swinging on the frame T in its upward movement, lifts said frame bodily, and with it the bar D'' and the type-wheel, until the bar is engaged by a catch v'', Figs. 1 and 2, which retains it in an elevated position after the other parts have dropped back into their normal position. The type-wheel is now in its third position and remains so until by a special operation it is shifted to another.

Mechanism for restoring type-wheel from third to first position.—The catch v'' is a small lever, pivoted to a stationary support and held normally in the path of the bar D''. The engaging end, however, is beveled on the under side, so that as the bar D'' rises it forces aside the catch, but when the latter slips under the bar it prevents its descent. A plate w (shown in Figs. 1, 2, and 3) is connected to one end of the catch-lever v'', and a spiral spring w', attached to the said plate and the frame of the instrument, respectively, serves to maintain the catch in its normal position. A pin w'', set in the plate w, projects through a slot in the side plate A'. The lever P, Fig. 3, has pivoted to it a small lever x, the upper end of which is in the plane of the revolution of the pin r'' on the escapement-shaft. A light spring x' bears on the lever x and maintains its lower end out of engagement with the pin w'', which extends through the plane of its oscillation. If it be desired to shift the type-wheel from the third to the first position, the escapement is set so that the pin r'' will encounter the end of lever x as the latter oscillates with the lever P. When this is done, the lever x will be turned on its fulcrum and its lower end will force the pin w'' and plate w forward, thus withdrawing catch v'' from engagement with the bar D'' and permitting the latter to fall back to the normal position. It may be observed that while both the raising of the type-wheel to the third position and restoring it to its normal position involve a revolution of the shaft L and the consequent operation of the feeding and printing mechanism, no impression is made if blanks be left on the type-wheel in positions corresponding to the said positions of the escapement-shaft, but the type-wheel will be moved or fed one letter-space. By a proper distribution of small letters, capitals, and figures among the several rows on the type-wheel, no appreciable delay in the operation of the instrument will result from this plan of shifting the type-wheel. The type-wheel remains normally in the first position and drops after each impression from the second to the first. When once brought to the third position it remains there, as has been explained, unless by a special operation it is returned to the first. It may be raised from the third to the fourth position, but after each impression it drops back to the third in the same way that it returns from the second to the first position.

The fourth position: The lifting of the type-wheel from the third to the fourth position is effected by the magnet D and lever R''. When the type-wheel is in the third position, the elevation of the frame T brings the pin t' into the position normally occupied by pin t with relation to the lever R''. Hence, if the magnet D be energized, the lever R'' will be brought into connection with the frame T by the pin t' entering the hole t'', and the frame and type-wheel will be raised to the fourth position.

With the instrument, of which the essential characteristics are above described, a suitable transmitter is employed that automatically controls the selection and printing of characters, according to the particular manipulation of the same by an operator, so that a high rate of transmission is secured.

The invention is not limited to the special construction of the various elements described, for it is evident that these may all be varied to a very great degree.

What I claim is—

1. In a printing-telegraph receiver, the combination of a power-driven pulley or shaft, an escapement in frictional connection therewith, a magnet for determining the extent of movement of the escapement, a rotary type-wheel, a cam intermediate to the type-wheel and escapement, a power-driven shaft and connections for moving the cam and adjusting the type-wheel to positions corresponding to those of the escapement, and an electro-magnet for locking or releasing the said shaft, as herein set forth.

2. In a printing-telegraph instrument, the combination, with a type-wheel and means for setting the same to bring a selected character thereon into printing position, printing mechanism for taking impressions of the selected characters, and feed mechanism for effecting the necessary spacing for the printed impressions, of a power-driven pulley continuously rotated, a shaft in frictional engagement therewith, and mechanical connections between said shaft, the impression, and the feed mechanism, and an electro-magnet for locking or releasing the shaft, as herein set forth.

3. In a printing-telegraph instrument, the combination, with the type-wheel and means for setting the same to present different characters at the printing-point, impression mechanism, and feed mechanism, of a shaft provided with eccentrics adapted when in rotation to move and operate the impression and feed mechanisms, respectively, a continuously-acting motor with frictional connection with said shaft, and an electro-magnet for releasing and locking the shaft, as herein set forth.

4. In a column-printing-telegraph instru-

ment, the combination, with the paper or printing roll, feed mechanism, and impression mechanism, of a type-wheel carriage adapted to be moved by the feed mechanism in a direction parallel to the axis of the printing-roller, and a type-wheel carried thereby on a vertical spindle capable of rotary movement in a horizontal plane and of oscillation in a plane at right angles to the printing-roller, as set forth.

5. In a column-printing-telegraph instrument, the combination of a paper-carrying roll or printing-surface, a type-wheel carriage movable in a direction parallel to the same, a spindle on said carriage capable of rotary and vertical movement and of oscillation in a plane at right angles to the printing-surface, a type-wheel having a plurality of rows or lines of characters mounted on the spindle, and mechanism for imparting and controlling the said movements of the spindle and type-wheel, as and for the purpose set forth.

6. In a column-printing-telegraph instrument, the combination, with a paper-carrying roll or printing-surface, of a type-wheel hav- a plurality of rows or lines of characters and capable of rotary movement about its axis, of movement bodily in a direction parallel with the printing-surface, of vertical movement in the direction of its axis, and of an oscillating movement in a plane at right angles to the printing-surface, and mechanism for imparting and controlling such movements, as and for the purpose set forth.

7. In a printing-telegraph instrument, the combination, with a type-wheel having four rows or lines of characters on its periphery and capable of a movement in the direction of its axis for presenting any one of said rows in alignment with the printing-point, an electromagnetically-controlled device capable only of moving the said wheel from a given position through the space of one row, and an independent mechanism capable only of moving the wheel through the space of two rows, as and for the purpose described.

8. In a column-printing telegraph, the combination of a transversely-movable type-wheel carriage, two rack-bars, one fixed and the other capable of limited longitudinal movement and supported parallel to the path of the carriage, pawls on said carriage engaging with the rack-bars, respectively, a continuously-operating motor, and a shaft in frictional connection therewith and engaging with the movable rack-bar by an eccentric, whereby on the rotation of the shaft the said rack-bar will be reciprocated and an intermittent movement imparted to the carriage, as set forth.

9. The combination, with the fixed and movable rack-bars, the type-wheel carriage, the pawl pivoted to the same and engaging with the rack-bars, of a lever pivoted to the carriage and carrying an oscillating bar or plate normally over the pawls, whereby but one can be disengaged at a time and adapted when turned to withdraw said plate and raise both pawls, as set forth.

10. The combination, with the lever for releasing the type-wheel and permitting its return and the lever for feeding the paper and adapted in its movement to encounter the said releasing-lever, of a bar engaging at one end with the paper-feed lever, a power-driven shaft and eccentric acting on said bar at or near its center to raise and lower the same, and an electro-magnet and escapement adapted to interpose a detent in the path of the free end of the bar, whereby the bar is caused by the eccentric to raise the paper-feed, as set forth.

11. The combination of the escapement mechanism, the electro-magnet for operating or controlling the same, the printing mechanism, the feed mechanism, a rotary shaft for imparting movement to and operating the said printing and feed mechanisms, a constantly-rotating motor in frictional connection with the said shaft, and an electro-magnet in the main line for releasing and locking the shaft, as herein set forth.

12. The combination, in a type-wheel carriage, of a rotating sleeve in gear with the type-wheel-setting mechanism, a type-wheel spindle, a ball-and-socket connection between the sleeve and spindle, and a pin extending through the ball and entering a longitudinal groove in the spindle, and a recess in the socket whereby the spindle is rotated with the sleeve, but is capable of limited vertical and lateral movement with respect to the same.

13. The combination, in a printing-telegraph, with a type-wheel having a plurality of lines of characters, of the lifting-bar D″, the power-driven eccentric-shaft L, the lever R″, oscillated thereby, and an electro-magnet in the main circuit for throwing said lever into engagement with the bar D″ and raising the same through the space of one row of characters, as and for the purpose set forth.

14. The combination, with the type-wheel having a plurality of rows of characters, of the lifting bar or frame D″, the power-driven eccentric-shaft L, the lever T″, pivoted to the frame D″, the lever U, oscillated by an eccentric on shaft L and engaging with the lever T″, and an escapement-shaft carrying a pin or stop adapted to be set in a position to obstruct the upward movement of the free end of lever T″ when raised by the lever U and thereby cause said lever to raise the frame D″ and the type-wheel through the space of two rows of characters.

15. The combination, with the vertically-movable type-wheel having a plurality of rows of characters, of two systems of levers for setting the type-wheel in an elevated position and for releasing the same, respectively, and a power-driven shaft for oscillating the same, an escapement-shaft carrying a pin or stud, and an electro-magnet for bringing the pin into

engagement with either of said systems of levers, for the purpose set forth.

16. The combination, with the type-wheel having a plurality of rows of characters and a lifting bar or frame D″, of a lever T″, connected to the frame D″ and adapted in its operation to raise the same through the space of two rows of characters, a lever R″, oscillated by a power-driven shaft, and an electro-magnet and armature adapted to throw the lever R″ into engagement with the frame D″ and raise the same through the space of one row of characters, as set forth.

17. In a printing-telegraph instrument, the combination, with a type-wheel having a plurality of rows of characters and capable of assuming different positions corresponding thereto, of independent mechanisms for raising said type-wheel through the space of one and two rows, respectively, a power-driven shaft for operating the said mechanisms, and two electro-magnets of different electrical character connected with the main line adapted to establish and control connection between the shaft and the said mechanisms for raising the type-wheel, respectively, as herein set forth.

18. The combination, with a rotary type-wheel and spindle capable of movement vertically or in line with its axis and of oscillation in a plane at right angles to the printing-surface, means for rotating said type-wheel to bring the selected character into alignment with the printing-point, and means for elevating or depressing the type-wheel and spindle to present a given row of characters at such point, of a stationary printing-bed or paper-supporting surface, and a printing-lever adapted to strike or encounter the type-wheel spindle and swing the type-wheel into contact with the paper, as set forth.

19. The combination, with a rotary type-wheel and spindle capable of oscillation in a plane at right angles to the printing-surface, of a wheel carried by the spindle and provided with holes in its periphery corresponding to the characters on the type-wheel, a printing-lever adapted in its movement to enter one of said holes, thereby locking the spindle against rotary movement and to turn the spindle about its center of oscillation and bring the type-wheel into contact with the paper, as set forth.

JOHN E. WRIGHT.

Witnesses:
ERNEST HOPKINSON,
PARKER W. PAGE.