(No Model.) 3 Sheets—Sheet 1.

S. V. ESSICK.

PRINTING TELEGRAPH.

No. 279,550. Patented June 19, 1883.

Fig. 1.

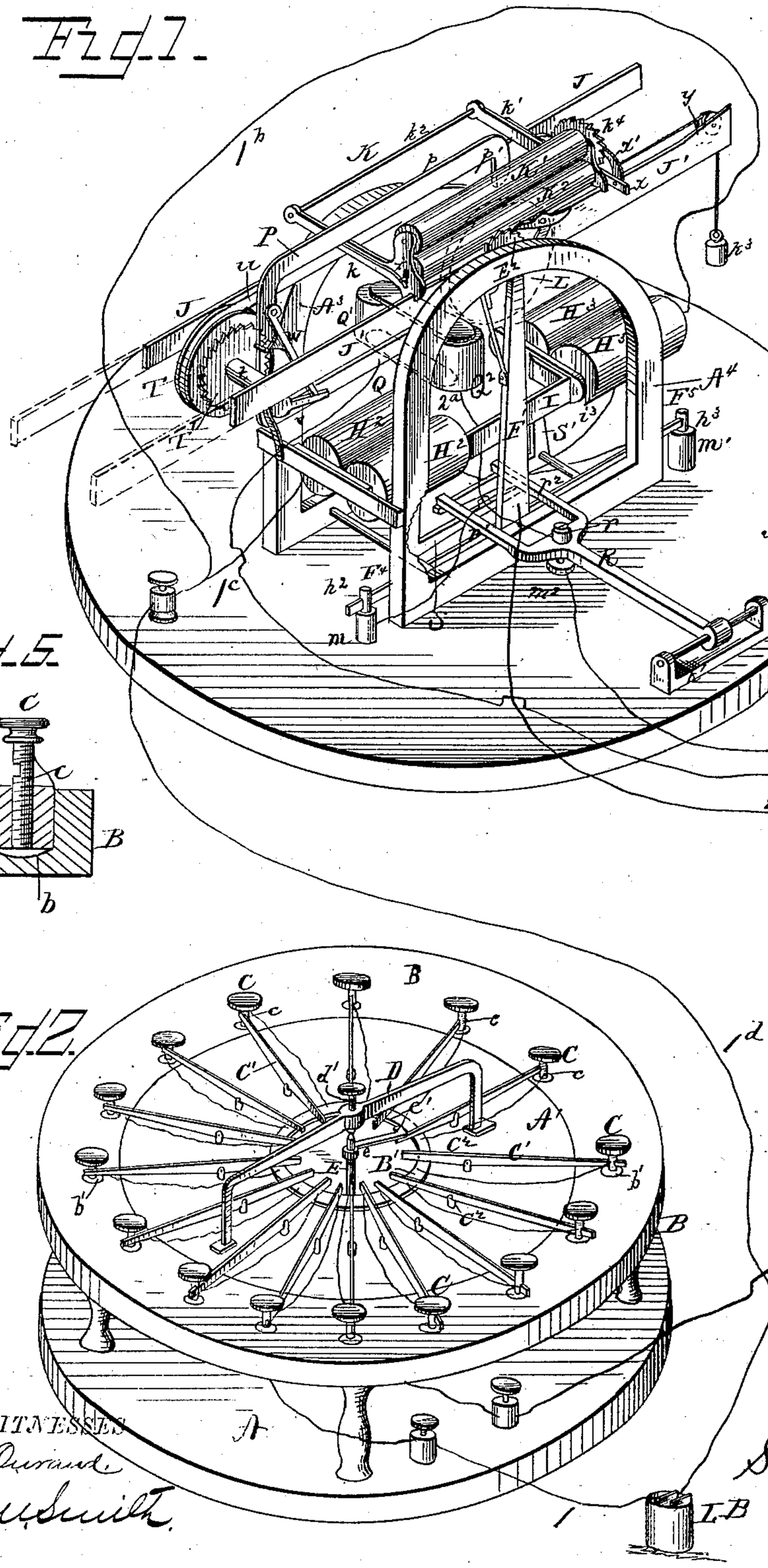

Fig. 8.

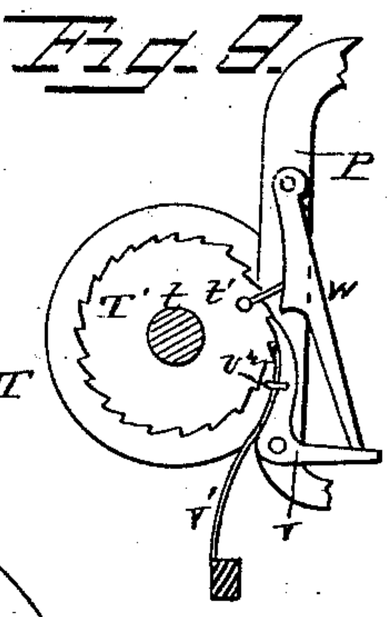

Fig. 5.

Fig. 2.

WITNESSES
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R. Wm. Smith.

INVENTOR
Samˡ. V. Essick.
by A. M. Smith.
Attorney

(No Model.) 3 Sheets—Sheet 2.

S. V. ESSICK.

PRINTING TELEGRAPH.

No. 279,550. Patented June 19, 1883.

Fig. 3.

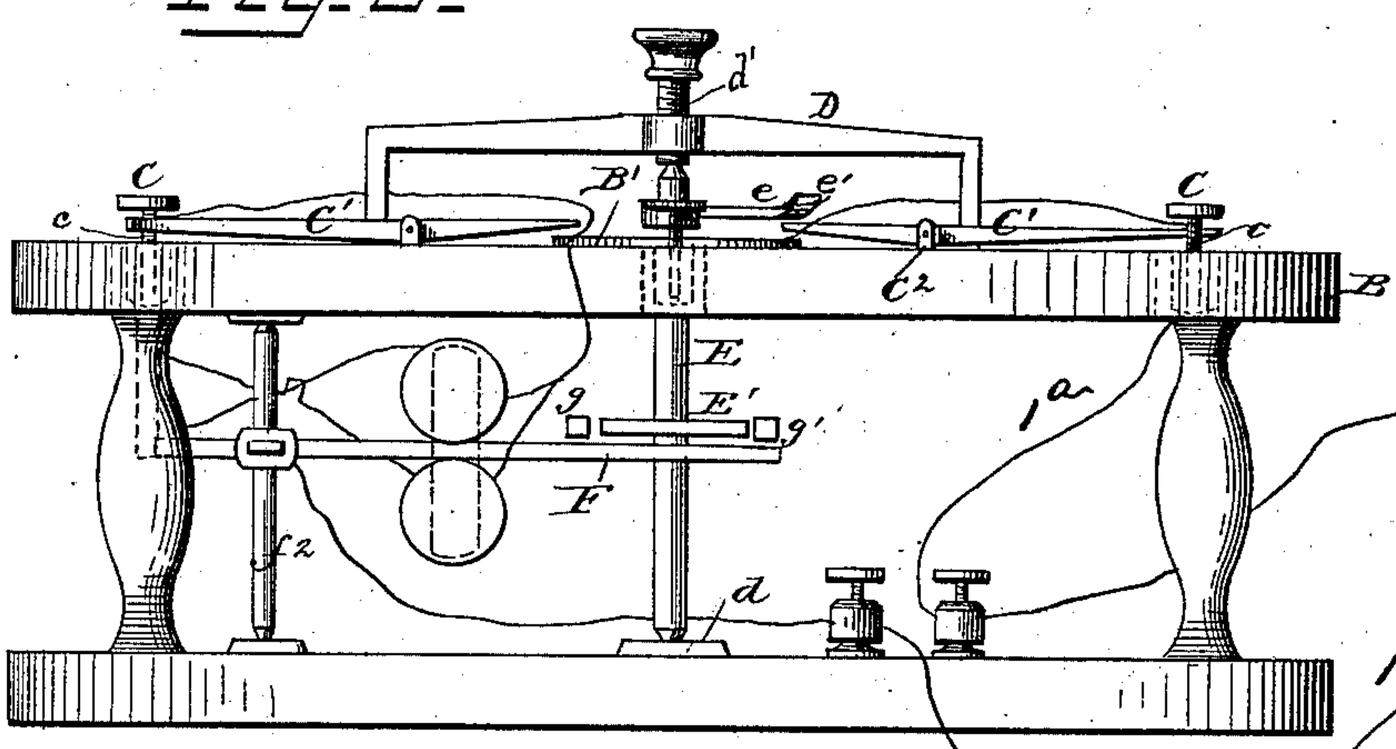


Fig. 4.

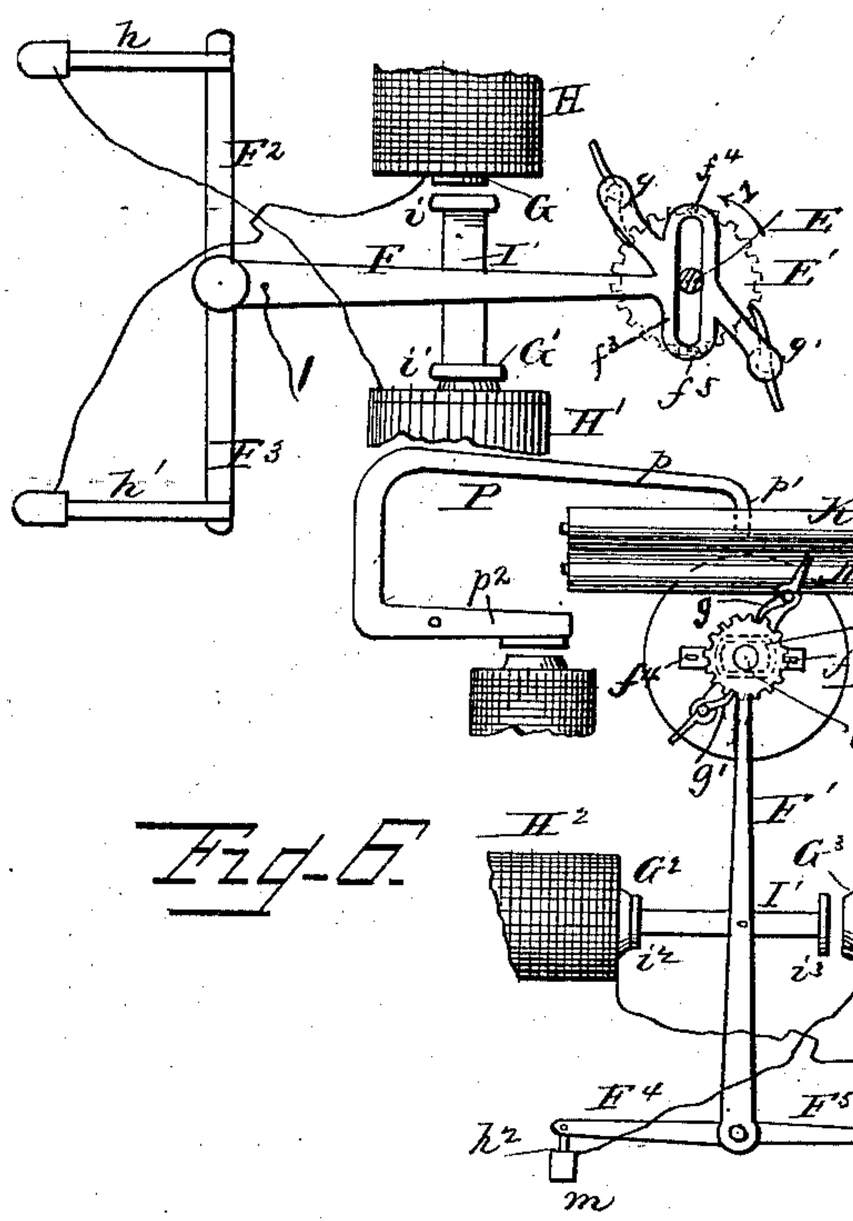


Fig. 6.

Fig. 7.

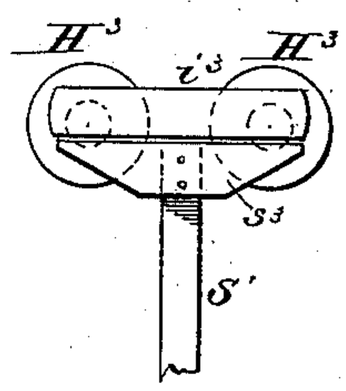


Fig. 8.

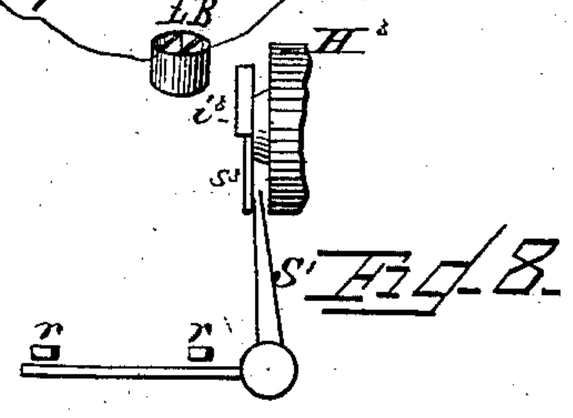
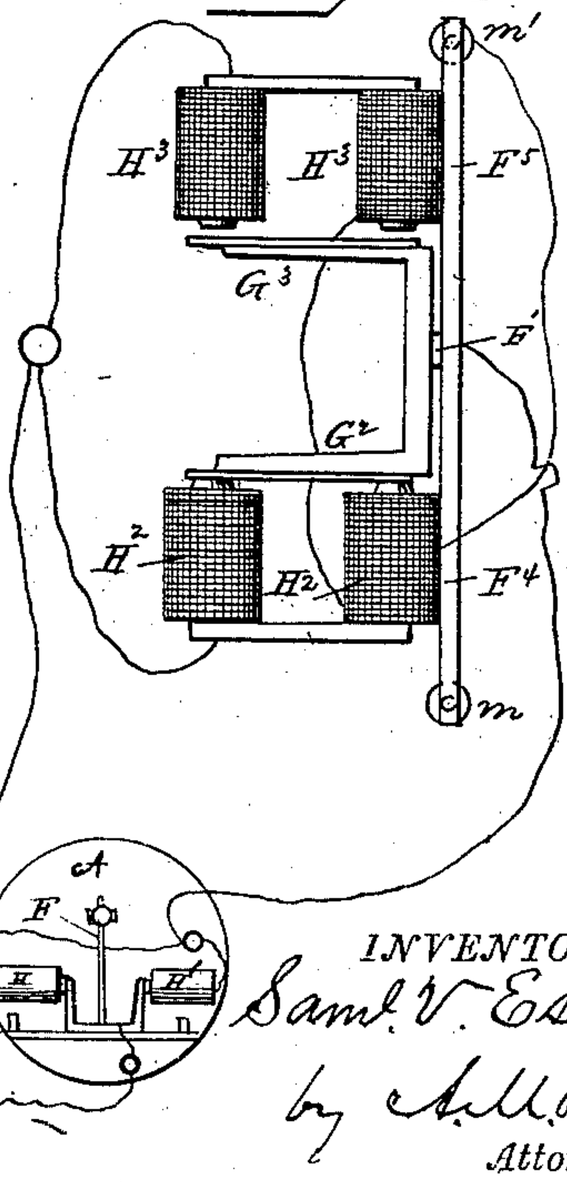


Fig. 13.



WITNESSES

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No Model.) 3 Sheets—Sheet 3.

S. V. ESSICK.

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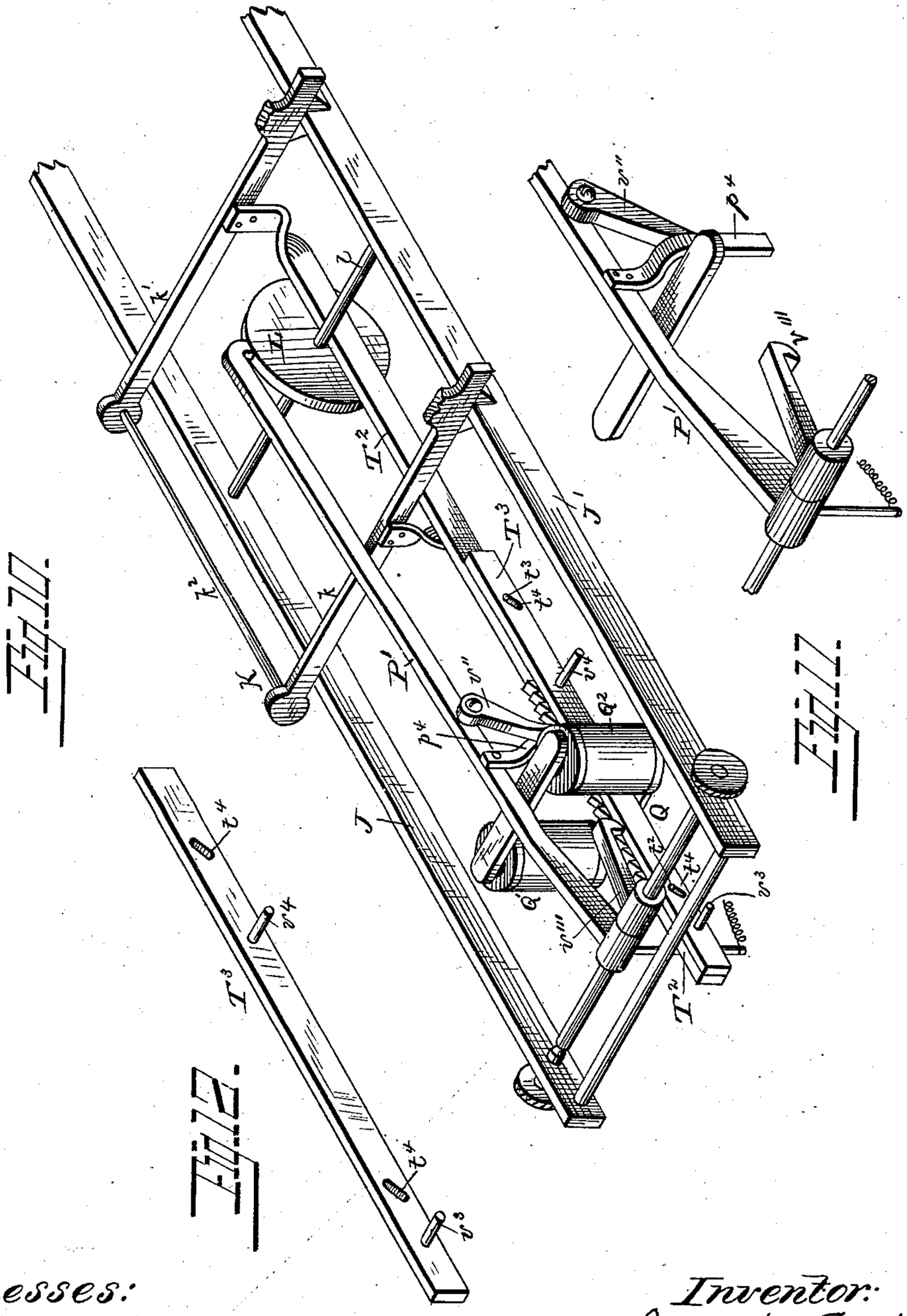

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses:
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R. F. Gaither.

Inventor:
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by A. H. Smith.
Atty.

UNITED STATES PATENT OFFICE.

SAMUEL V. ESSICK, OF ALLIANCE, OHIO.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 279,550, dated June 19, 1883.

Application filed September 5, 1882. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL V. ESSICK, of Alliance, county of Stark, and State of Ohio, have invented new and useful Improvements in Printing-Telegraphs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to certain improvements in printing-telegraphs, adapting the circuit-breaking arm of the transmitter and the type-wheel of the receiver to be driven each by a lever having two pawls which act upon opposite sides of ratchet-wheels, the two levers carrying the pawls, one of the transmitter and the other of the receiver, being actuated simultaneously, each by two pairs of magnets acting in unison, in such manner that when the key of a certain letter of the transmitter is touched or depressed a circuit-breaking arm of the transmitter is caused to revolve until it reaches the lever of the key which was depressed to close the circuit, and acts thereon to break the circuit, stopping the rotation of the circuit-breaking arm, and simultaneously therewith that of the type-wheel, which has moved in unison with said arm until the letter on the type-wheel corresponding with that of the key depressed has been brought into position to be acted upon by the printing device.

It further relates to certain improvements in the means for receiving the message in page form, as hereinafter explained.

In the accompanying drawings, Figure 1 is a perspective view of the receiver of my improved printing-telegraph, with its local battery; and Fig. 2 is a similar view of the transmitter, wires being shown connecting it with the receiver and line-battery. Fig. 3 is a side elevation of the transmitter. Figs. 4, 5, 6, 7, 8, and 9 represent certain details of construction; and Figs. 10, 11, and 12 represent modifications, hereinafter explained. Fig. 13 is a diagram showing the relation of the transmitter and receiver and the wires connecting them with each other and with the line-battery, a metallic circuit being shown.

A represents the base-plate or support of the transmitter, made of any suitable non-conducting material and in any preferred form, that shown being in circular or disk form, upon which, by means of suitable uprights, is secured a plate, A′, of similar material, provided with a central opening, and made by preference in annular form. To the outer and inner edges of this non-conducting ring are secured two rings, B and B′, both of conducting material, the former or outer ring, B, being provided on its upper face with an annular groove or with a series of pockets (indicated at *b* in the sectional view of said ring, Fig. 5) containing mercury. These pockets are provided above the mercury with non-conducting sleeves or thimbles *b′*, which serve to guide the movements of the pins *c*, of conducting material, provided at their upper ends with keys C, representing and corresponding with the letters and other characters formed on the printing or type wheel of the receiver, hereinafter described. These pins or their keys are secured to levers C′, pivoted in short posts C^2 on the plate or table A′, and extend at their inner ends within reach of a rotating circuit-breaking arm, *e*, secured to a central vertical shaft, E. The shaft E is stepped in a block, *d*, secured to the base-plate A, and has a bearing at its upper end in an adjusting-screw, *d′*, supported in a yoke or angular bracket, D, attached to the upper face of the plate A′. The shaft E is by preference provided with conical bearings, as shown, the screw *d′* serving to regulate the adjustment of the shaft in and to compensate for wear of said bearings. The pins *c* are each connected by a wire or other suitable conductor with the inner ring, B′, in such manner that when any key is depressed, moving its pin into the mercury in the outer ring, B, said ring will be connected with the inner ring, B′.

The shaft E is provided with a cog or ratchet wheel, E′, similar in form to that shown at E^2, Fig. 6, and with which pawls *g g′* on a vibrating lever, F, engage for imparting a rotary movement to the shaft E and its arm *e*. This lever F is made of metal, in T shape, (shown in Fig. 4, and similar to that shown at F′ in Figs. 1 and 6,) and at its junction with the cross-head or arms is connected with an upright pivot or shaft, f^2, which, like shaft E, has by preference conical bearings in plates secured to the frame-plates A and A′. The lever F, near its swing-

ing end, is expanded in width at f^3, and provided with a transverse slot, through which the shaft E passes, the slot permitting the vibration of the lever relatively to the shaft, the arms of the transverse portion in which said slot is formed affording supports for two small upright pins, f^4 f^5, which, as said lever is vibrated, engage alternately with the teeth of the wheel E′, for arresting the rotation of the shaft E. The pawls g and g' are mounted upon short arms secured to or formed upon the lever F, and so arranged relatively to the wheel that they act alternately thereon, one in the movement of the lever in one direction and the other in the movement of said lever in the opposite direction. The pawls are held engaged with the teeth of the ratchet-wheel by any suitable arrangement of spring which allows one pawl to back when the wheel is being acted upon by the opposite pawl. By this arrangement of the pawls, the wheel is rotated always in the same direction, (indicated by the arrow 1, Fig. 4,) whichever the direction of movement of the lever F. In the transmitter, under the arrangement shown, the shaft f^2 is vertical, and the lever F and its arms F^2 F^3 vibrate in a horizontal plane, the arms F^2 F^3 moving alternately into and out of contact with two platinum spring-points, h h', secured in metallic posts, either pendent from the ring A′ or standing up from the base-plate A, as preferred, and the springs, of platinum or other conducting material, are so arranged that as one arm, F^2, moves out of contact with one of the springs h the arm F^3 moves into contact with the spring h', and vice versa.

The lever F, near the center of its length, is provided with a transverse bar or arm, I, of conducting material, provided at its ends with armatures i i', to two magnets or pairs of magnets, G and G′, arranged on opposite sides of the lever in suitable supports attached to the base-plate A. The magnets are made double, or in horseshoe form, the arms of one being surrounded with coils H and of the other by coils H′, the coils H being connected with the spring-arm h' and the coils H′ with the spring h, and both coils with the ring B′, and the lever F is connected by a conducting-wire, through a suitable binding-post, with the line-battery, (indicated at L B.)

The circuit-breaking arm e is provided at its outer end with an arm, e', cam-shaped on its lower face, which, when it reaches the inner end of the lever of any key which has been depressed, rides up on and serves to depress said inner end, lifting the outer end of the lever and raising the pin of said lever and key out of the mercury-cup, thereby breaking the connection between the pin and the ring B. The ring B is connected by a suitable conductor with a binding-post on the base-plate A, and thence by line-wire with the receiver.

A^2 represents the base-plate or support of the receiver, made, like that of the transmitter, of insulating or non-conducting material, upon which is secured the frame-work of the receiver, made by preference in the form of two upright parallel arches, A^3 A^4, connected by suitable cross bars or rods, as shown. In the upper part of this frame two horizontal parallel bars, J J′, are secured, forming a track or way, on which is mounted a reciprocating frame, K, carrying the paper upon which the message is to be printed. This frame is composed by two parallel side bars, k k', crossing and resting upon the bars J J′, and connected by a suitable rod or bar, k^2, and the shafts of two rollers, K′ K^2, between which the paper is fed in giving the message page form, the lateral movement of the frame K on the ways J J′ serving to form the lines.

In suitable bearings, either in the frame-pieces A^3 and A^4 or in the bars J J′ supported thereby, is mounted a horizontal shaft, l, arranged at right angles to said bars, and provided with a type-wheel, L, located in close proximity with the feeding-rollers of the paper-carrier on the side adjacent to the rod k^2. The shaft l on the opposite side of the feed-rollers from the type-wheel is provided with a spur or ratchet wheel, E^2, similar in construction to E′, above referred to, and operated by pawls pivoted on opposite sides of the wheel to an armature-lever, F′, also similar in all respects, except in position, to the lever F of the transmitter above described, and provided with detents which, in connection with the pawls, act upon the spur-wheel E^2 in the same manner as the corresponding pawls and detents of lever F, above described, act upon the wheel E. The lever F′ of the receiver has a horizontal shaft or pivot, and, being upright and vibrating with its arms in a vertical instead of in a horizontal plane, I prefer to provide the ends of the arms F^4 and F^5, corresponding to arms F^2 F^3 of lever F, with pendent pins or spurs h^2 h^3, which dip alternately, as the lever F′ vibrates on its pivot, into metallic cups m m', containing mercury, and provided with guiding insulating-thimbles similar to those of the ring B of the transmitter. The lever F′ is provided with a transverse bar, I′, having two armatures, i^2 i^3, acted upon alternately by magnets G^2 and G^3, similar to those of the transmitter, and provided with coils in pairs H^2 H^3, the former, H^2, being connected with the cup m', and the latter, H^3, with the cup m, and thence alternately through the pins h^2 h^3 and the vibrating arms of the lever F′ with the latter, to which the line-wire is connected, as shown. The coils are connected, also, with a common binding-post, either directly or through a "split" connection, as shown, and thence by ground or by metallic connection, as shown, with the line-battery.

Between the bars J J′ is located an U-shaped printing-lever, P, arranged upon its side, with its upper horizontal arm, p, elongated and overhanging the type-wheel L, and provided with an angular foot or projection, p', forming the hammer for forcing the paper down upon the type-wheel and taking the impression. The short lower arm, p^2, of this printing-lever

is pivoted near the center of its length in the frame A^3 A^4, and is provided at its end with an armature overhanging and acted upon by a magnet, Q, secured to the base-plate A^2, and provided with coils Q' Q^2, the wire of which is connected, one end with a local battery (indicated at L B') and the other with a vibrating conducting-lever, R, provided with a pin, *r*, dipping into a metallic cup, m^2, containing mercury, and provided with an insulating guiding-thimble, similar to those in cups *m* and *m'* and in the ring B, above described. This cup m^2 is connected with the other pole of the local battery, as shown, and when the pin *r* is depressed into the mercury in the cup m^2 it serves to close the local circuit. The lever R is pivoted at one end in a bracket, R', secured to the base-plate A^2, and at its opposite vibrating end is forked, as shown, the arms r' r^2 passing upon opposite sides of, but out of contact with, the lever F', and overhanging the horizontal arms of two bell-crank levers, S S', pivoted at their elbows in the frame-pieces. These levers S S' are placed in reverse positions, with their horizontal arms parallel and side by side, underlying and in close proximity with the arms r' r^2 of the lever R, and their upright arms are provided with thin armatures s^2 s^3, one arranged in inductive proximity with the magnet surrounded by coils H^2, and the other in similar relation to the magnet of coils H^3, adapting them to be alternately acted upon by said magnets, (see Figs. 1, 7, and 8,) and when thus acted upon to lift the lever R, withdrawing the pin *r* from the mercury in the cup m^2, thereby breaking the local circuit and releasing the armature of the printing-lever P, which is provided with a spring, or so arranged or weighted relatively to its pivot as to cause its foot or hammer *p'*, when said armature is released, to swing upward away from the type-wheel L.

The bars J J' are provided near one end with bearings for a horizontal shaft, *t*, carrying a pulley or band wheel, T, upon which is wrapped a band, *u*, secured at one end to the paper-carrier frame K. Upon this same shaft, *t*, is secured a ratchet-wheel, T', the teeth of which are acted upon by an L-shaped pawl, *v*, pivoted at its elbow to the printing-lever P at or near the lower elbow of the latter, (see Fig. 9,) the arrangement of the pawl relative to said wheel and lever being such that as the printing-lever is vibrated to act on the type-wheel the pawl acts upon the ratchet-wheel, giving it a rotary movement the distance of one tooth, carrying the pulley or band-wheel with it, the latter acting through the band *u* upon the frame K, and the paper carried thereby to move the latter onward the distance of one letter. A spring-pawl, *v'*, secured to one of the bars connecting the frame-pieces A^3 and A^4, engages with the ratchet-wheel T', locking it against backward movement. The spring-pawl *v'*, near its free or pawl end, passes through a loop or eye, v^2, or over a pin on the upright arm of the L-shaped pawl *v*, in such manner that when said pawl is vibrated to release the wheel T', for allowing the paper-carrier to be retracted for beginning a new line, said spring-pawl will also be moved outward for releasing said wheel T'. The printing-lever P, near the junction of its upper printing-arm with its upright portion, is provided with a pendent pivoted arm or lever, *w*, (see Fig. 9,) the lower end of which rests upon the horizontal arm of the L-shaped pawl *v*, said lever *w* being held in an inclined position, as shown, thereby. As the frame K is moved forward to receive the final letter of the line, said frame, or an arm or projection thereon, is brought into contact with the lever *w* and crowds its swinging end inward upon the horizontal arm of the pawl *v*, depressing it and throwing said pawl, and with it the spring-pawl *v'*, out of engagement with the wheel T', releasing the latter, and with it the paper-carriage, when the latter is retracted by means of a weight, k^3, connected with said carriage by a cord running over a suitable sheave or pulley, as shown, or in any suitable manner. The wheel T' is provided with a cam or wiper, *t'*, which in the backward rotation of said wheel, just as the carriage K completes its backward throw, is brought into contact with an incline or cam projection on the adjacent side of lever *w*, for moving the latter outward, releasing the pawl *v* therefrom, and adapting said pawl and the spring *v'* to again engage and act upon the wheel T', as before.

Figs. 10, 11, and 12 show modifications in the form of the printing-lever and in the means for moving the paper-carrier. In these the printing-lever, (indicated at P',) instead of being in the U form above described, consists only of the upper long arm thereof, pivoted at its heel end through a shaft having cone-bearings in adjusting-screws in the bars J and J', the armature being directly connected with said lever, with the magnet Q arranged, as shown, to act thereon. The paper-carrier frame has a horizontal bar, T^2, suspended underneath it by pendent lugs, said bar projecting laterally underneath the printing-lever P', and being provided on its upper face, at its outer end, with a ratchet-toothed rack. A pendent pawl, *v''*, pivoted to the printing-lever P' near the center of its length, and inclining outward toward the pivotal end of said lever, engages with said rack, and as the printing-lever is vibrated downward the pawl, acting on the rack and paper-carrier, moves them outward the distance of the length of one tooth of said rack equal to the space occupied by one letter. A hook-shaped pawl, *v'''*, pivoted to the shaft of the printing-lever, drops into engagement with the rack and holds it when the printing-lever rises, backing the pawl *v''* to take hold of another tooth of said rack-bar. The rack-bar has pins t^2 t^3 on its side, which support a bar, T^3, arranged upon one side of the bar T^2, and provided with inclined slots t^4, through which the pins t^2 t^3 pass, serving to uphold the bar T^3, and providing for a slight sliding movement of the same relatively to the bar T^2. The

bar T^3 is provided on its outer vertical side with laterally-projecting pins v^3 and v^4, and the printing arm or lever P′ has a pendent arm, p^4, attached to it, said parts being so arranged that as the rack-bar T^2 is moved for causing the paper to receive the last letter of a line the pin v^4 is brought into contact with the arm p^4, and the outward movement of the bar T^3, with the bar T^2, is stopped, and said bar T^3 is caused, by means of its inclined slots, to ride upward on the pins t^2 t^3, and to lift the pawls v'' v''' out of engagement with the rack-bar, permitting the latter and the paper-carriage to be retracted for beginning a new line. Just as the paper-carriage is completing its backward movement the pin v^3 comes in contact with the pendent arm p^4, and the movement of the bar T^3 relatively to the bar T^2 is reversed, depressing the bar T^3 and permitting the pawls v'' v''' to again engage the rack-bar T^2.

The shaft of one of the feed-rollers K′ is provided with a ratchet-wheel, k^4, and a pawl, x', pivoted to one end of a bar, x, which at its opposite end is pivoted to the outer face of and lies parallel with the bar k', and its free end rests and rides on the track-bar J′, which, near its forward end, is provided on its upper edge with a short incline, y, upon which said free end of the bar or lever x moves just as the carrier-frame K is completing its backward movement preparatory to beginning a new line. This upward movement of the free end of the bar x lifts the pawl x', and thus imparts a rotary movement the distance of one tooth of wheel k^4 to the roller K′, and, the paper being grasped and held by frictional contact between said roller and the roller K^2, the latter is correspondingly moved, and the paper is thus fed forward the distance of one line. The lower roller, K^2, is held up in frictional contact with the roller K′ by means of springs, as indicated at x^3, Fig. 1.

The operation will be readily understood from the foregoing description, and may be described as follows: When one of the keys of the transmitter is depressed into the mercury of its cup in ring B, the line-circuit is completed and the current acts through the levers F and F′, and the opposing magnets acting alternately thereon, the latter are alternately magnetized and demagnetized, producing a rapid vibration of said levers, which, acting through their respective pawls and detents upon the wheels E′ and E^2, cause the latter to act in unison, one for rotating the circuit-breaking arm e of the transmitter and the other for rotating the type-wheel of the transmitter, in such manner that simultaneously with the action of the circuit-breaking arm on the lever of the key which was depressed in closing the circuit for breaking said circuit the letter on the type-wheel corresponding with that of said key is brought into position to be acted upon by the printing-lever, carrying with it the paper to receive the impression of said letter. Simultaneously with the closing of the line-circuit the magnets of the coils H^2 and H^3, as they are alternately magnetized and demagnetized, act on the armatures of the L-shaped levers S and S′, causing the horizontal arms of said levers to be alternately vibrated upward in rapid succession in such manner as to hold the lever R up with its pin out of the mercury in the cup m^2, thereby breaking the circuit of the local battery and holding it open until the line-circuit is broken, as above explained, when the horizontal arms of levers S and S′ drop, allowing the lever R also to drop, depressing its pin r into the mercury of cup m^2 and closing the local circuit simultaneously with the breaking of the line-circuit. The magnet Q of the local circuit now acts on the armature of the printing-lever, causing the hammer of said lever to be drawn down on the type-wheel, the pawl v, pivoted to the upwardly-vibrating loop portion of said lever, at the same instant acting on the ratchet-wheel, and thence, through the connections described, on the paper-carrier, for moving the paper forward into position to receive the impression of the letter presented by the type-wheel. The line-circuit is from the battery L B, by wire 1, to lever F of the transmitter; thence through the commutator and the coils H and H′, alternately, to ring B′, through any key of the key-board that may be depressed and its wire to ring B; thence by line-wire 1^a to the lever F′ of the receiver, through its commutator and the coils H^2 and H^3, alternately, and the wires 1^b and 1^c, as the case may be, to any suitable binding-post, and thence by ground or line wire 1^d to the battery L B; and the local circuit of the receiver is from the local battery L B′, by wire 2, to the coils Q′ Q^2; thence, by wire 2^a, to pin r of the lever R, and thence through the cup m^2 and wire 2^b to the battery, as shown.

I do not wish to be restricted to the particular form of commutator or cut-off described; but,

Having now described my invention, what I claim as new is—

1. In a printing-telegraph, the combination, in the line-circuit, of the lever F, its actuating-magnets, and the circuit-breaking arm e of the transmitter, with the lever F′ and type-wheel L of the receiver, operated in unison with the circuit-breaking arm, whereby, when the desired letter of the type-wheel is presented to the printing-lever, said circuit-breaking arm is made to automatically break the circuit and stop the type-wheel in proper position to print the desired letter.

2. The combination, in a printing-telegraph, of a transmitting-instrument provided with keys for closing the line-circuit, and an arm for automatically breaking said circuit, magnets in the receiving-instrument, arranged in the line-circuit, for operating the type-wheel in unison with the circuit-breaking arm, and a local circuit for operating the printing-lever of the receiving-instrument automatically thrown into action by the breaking of the line-circuit.

3. In a printing-telegraph, the combination, in the line-circuit, of the levers F and F′, one

of the transmitter and the other of the receiver, the actuating-magnets G and G′ of the transmitter and G^2 and G^3 of the receiver, and the commutators of said transmitter and receiver, substantially as described.

4. In a telegraph receiving-instrument, the combination of the lever F′, the ratchet-wheel actuated thereby, the pawls pivoted to said lever on opposite sides of said wheel, for rotating the latter, the magnets G^2 and G^3, for drawing said lever in opposite directions alternately, and a commutator, substantially as and for the purpose described.

5. In a telegraph receiving-instrument, the combination of the lever F′, with its pawls g and g', pivoted thereto on opposite sides of the ratchet-wheel E′, the magnets G^2 and G^3, for drawing said lever in opposite directions alternately, the commutator for changing the current, the type-wheel L, and the printing-lever P, substantially as and for the purpose described.

6. In a telegraphic receiving-instrument, the combination, with the lever R and the local-circuit-connecting devices r and m^2, of the levers S and S′, provided with armatures acted upon by magnets arranged in the line-circuit, for breaking the local circuit, substantially as described.

7. The combination, in a telegraphic receiving-instrument, of the levers S and S′, lever R, local-circuit-connecting devices r and m^2, magnet Q, printing-lever P, and type-wheel L, substantially as described.

8. The combination, with the paper-carrier frame K, of the rack-bar or its equivalent, and the pawl connected with and operated by the printing-lever, for moving said frame, substantially as described.

9. The combination, with the paper-carrier K and the feed-rollers K′ K^2, carried thereby, of the ratchet-wheel k^3, pawl x', pivoted bar or lever x, and cam or incline y, for actuating said rollers, substantially as described.

10. The combination, with the paper-carrier K and its feed-rollers, of the ratchet-wheel k^4, pivoted bar or lever x, pawl x', incline y, and weight k^3, substantially as and for the purpose set forth.

11. In a telegraphic receiving-instrument, the combination of the lever F′ and its circuit-connecting devices, magnets G^2 G^3, armatures i^2 i^3, ratchet-wheel E^2 and pawls g g', levers S, S′, and R, and its local-circuit-connecting devices, magnet Q, printing-lever P, carrying an armature to said magnet Q, and the type-wheel L, substantially as described.

12. The combination, in a telegraphic transmitting-instrument, of the keys C, corresponding to the characters to be transmitted, and provided with circuit-closing devices, the levers C′, and the circuit-breaking arm e, substantially as described.

13. In a printing-telegraph transmitter, the combination of the lever F with its pawls for actuating and detent for stopping the ratchet-wheel E′, magnets G and G′, circuit-connecting devices h h', keys C, with their circuit-forming devices and levers C′, and the circuit-breaking arm e, substantially as described.

14. In a printing-telegraph, the combination of the circuit-breaking arm e of the transmitter, the type-wheel L of the receiver, the lever F of the transmitter, and its actuating-magnets for operating said circuit-breaking arm, and the lever F′ of the receiver and its actuating-magnets for operating said type-wheel, the two levers F and F′ being operated in unison and simultaneously by the line-current, substantially as and for the purpose set forth.

15. In a telegraph transmitting-instrument, the combination of the lever F, the ratchet-wheel actuated thereby, the pawls pivoted to said lever on opposite sides of said wheel, for rotating the latter, the detents for arresting the rotation thereof, the magnets G and G′, a commutator, and the circuit-breaking arm e, arranged and operating substantially as described.

In testimony whereof I have hereunto set my hand this 28th day of August, A. D. 1882.

SAMUEL V. ESSICK.

Witnesses:
SAMPLE F. NEWLON,
J. ALLSPAUGH.