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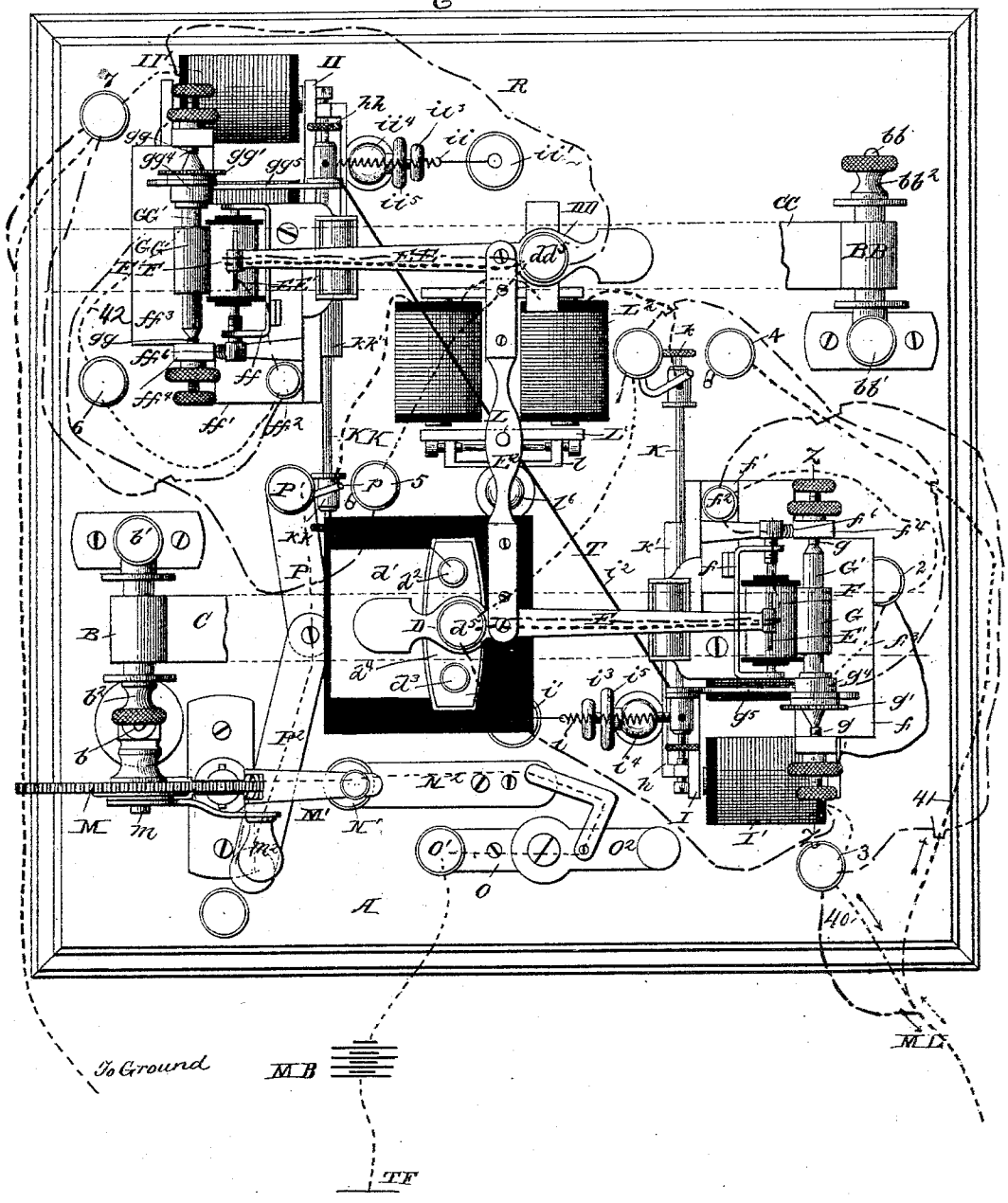
AUTOMATIC TELEGRAPHY.

No. 399,154. Patented Mar. 5, 1889.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

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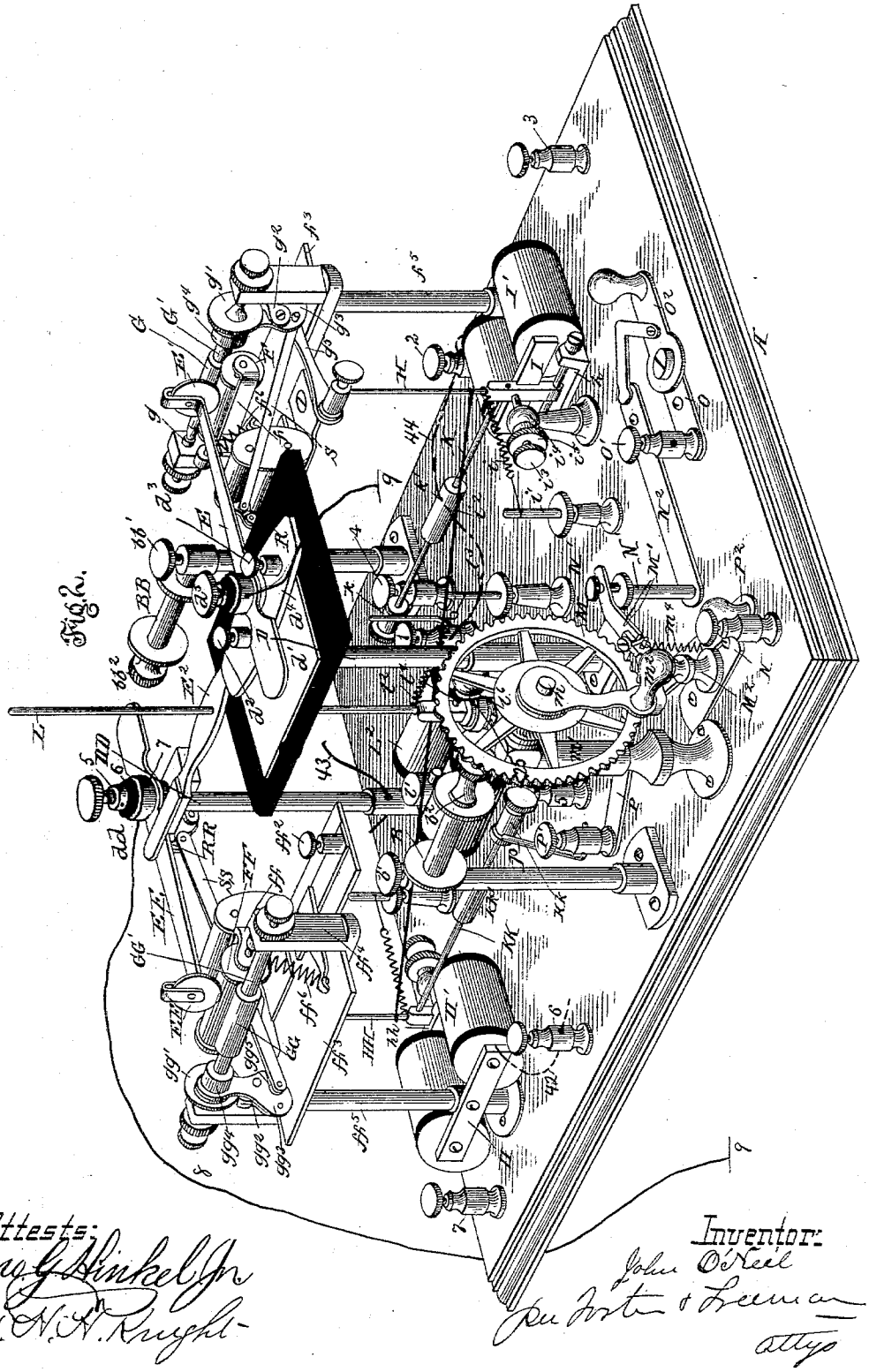
Fig. 2.



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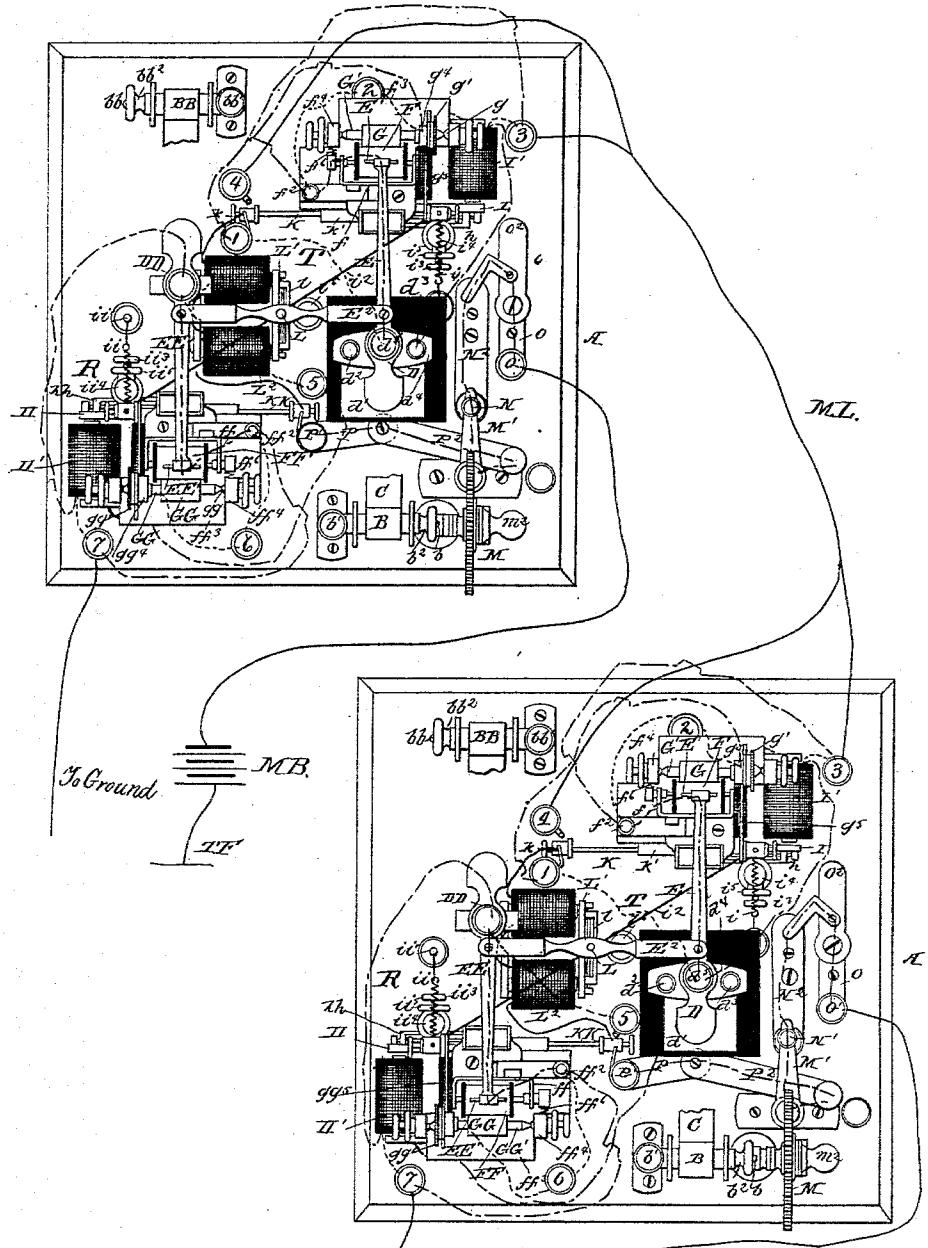
No. 399,154. Patented Mar. 5, 1889.

Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

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No. 399,154. Patented Mar. 5, 1889.

Fig. 4.

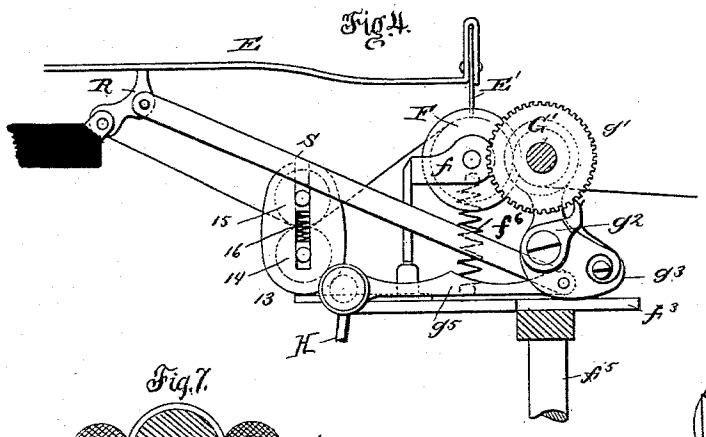


Fig. 7.

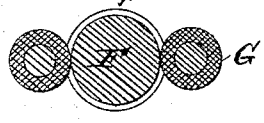


Fig. 8.

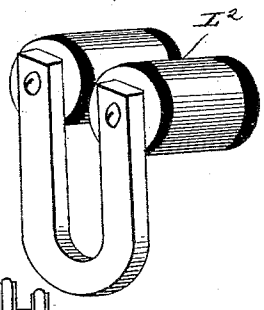


Fig. 5.

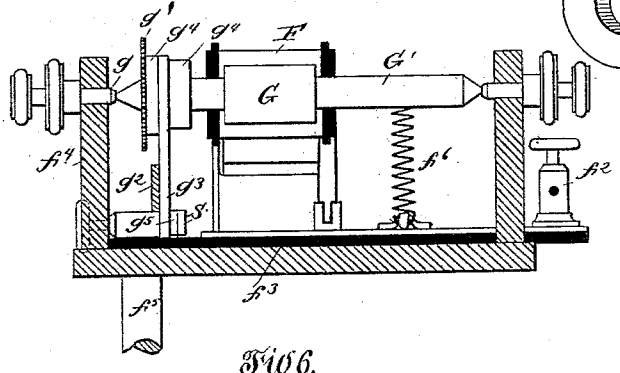
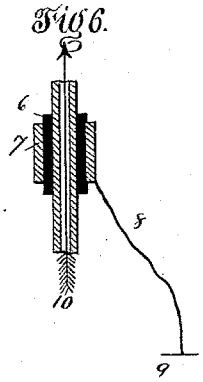


Fig. 6.



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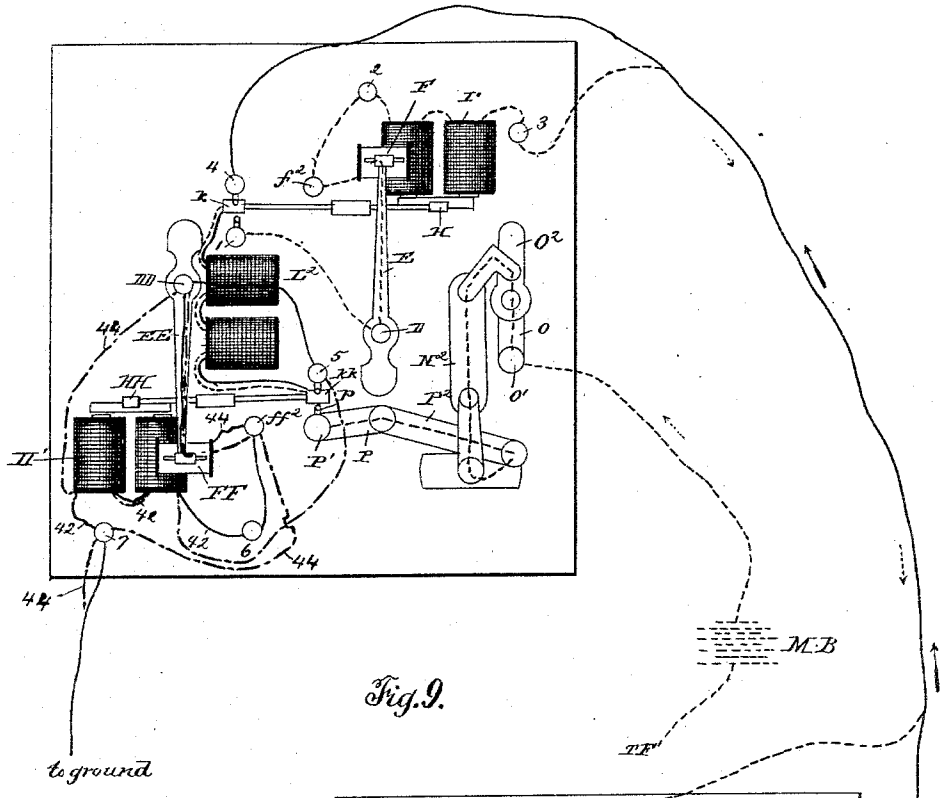
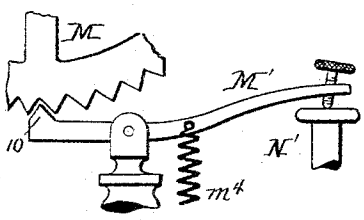
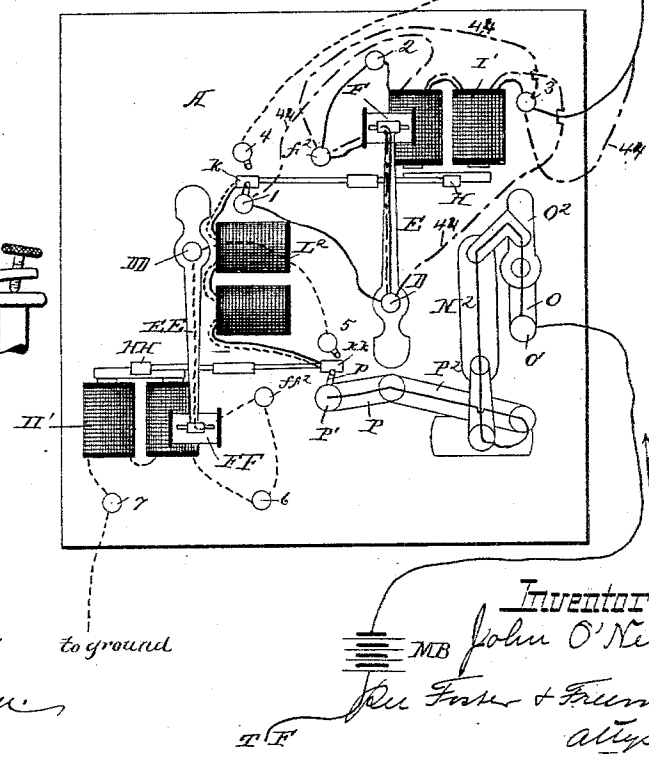


Fig. 9.

Fig. 10.





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UNITED STATES PATENT OFFICE.

JOHN O'NEIL, OF NEW YORK, N. Y.

AUTOMATIC TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 399,154, dated March 5, 1889.

Application filed July 6, 1886. Renewed July 23, 1888. Serial No. 280,826. (No model.)

To all whom it may concern:

Be it known that I, JOHN O'NEIL, of the city, county, and State of New York, have made certain new and useful Improvements in Automatic Multiplex Telegraph-Instruments; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates in general to improvements in telegraphy, and in particular to improvements in that branch of said art commonly known by the term "automatic multiplex telegraphs;" and it consists in the construction, arrangement, and combination of parts, substantially as illustrated in the accompanying drawings, and hereinafter described.

Referring to the accompanying drawings, in which similar letters of reference denote similar parts, Figure 1 represents a plan view of a transmitter and a receiver constructed in accordance with my invention. Fig. 2 is a perspective view thereof. Fig. 3 represents a diagram view of two stations provided with instruments constructed in accordance with my invention and connected by a single-line wire. Fig. 4 represents a detached detail view of the feed mechanism. Fig. 5 is a sectional view taken through said feed mechanism on the line *z z* of Fig. 1. Fig. 6 is a sectional detail view showing another form of counteracting the effect of the "tailings." Fig. 7 represents the contact-roller F, provided upon its opposite sides with feed-rollers. Fig. 8 represents the electro-magnet I^2, connected to a permanent magnet. Fig. 9 is a diagram view of two stations provided with instruments constructed and connected in accordance with my invention, showing the direction followed by oppositely-moving currents in full and dotted lines, respectively. Fig. 10 is a detail view of a portion of its circuit-breaking wheel M, showing its relation to the switch-lever M.

In the accompanying drawings I have shown as one embodiment of my invention transmitting and receiving instruments adapted to receive continuous strips or fillets of conductive or non-conductive paper or its substitute for the transmission and reception of messages, and I have so constructed, arranged, and connected said instruments with each other, the main-line wire, and the devices for throwing them into and out of circuit with said line-wire, that said strips of paper shall be alternately and rapidly acted upon by currents of electricity passing from and to said instruments, whereby a message of one character properly inscribed upon one of said strips of paper—that upon the transmitter—may be automatically sent therefrom while a message of different character is being received and inscribed on the paper upon the receiver. To these ends I secure the transmitter T and receiver R to a common base A, preferably made of wood, but which may be made, if desired, of metal properly insulated from said instruments.

The transmitter and receiver are in construction and operation very similar. I will therefore designate similar parts in said instruments by the same letters, distinguished the one from the other by the use on the receiver side of two letters—as, for instance, *a* for a part of the transmitter, and *a a* for a similar part of the receiver.

B BB designate the paper-receiving spools, which are mounted upon screw-threaded studs *b bb*, that project from posts *b' bb'*, secured to the base, and are provided with tension-regulating nuts b^2 bb^2.

The paper strips C CC pass from said spools through guides formed near the upper ends of posts D DD. One of said posts D is provided upon its top with a table formed of non-conductive material—as, for instance, vulcanite—to which is secured a metallic plate, *d'*, the opposite ends of which are provided with metallic binding-posts d^2 and d^3, that support a strip of non-conductive material, d^4, which extends from one to the other of the posts d^2 and d^3, and is provided with a binding-post, d^5, upon which the stylus-carrying arm or spring E of the transmitter is pivoted. The corresponding post, DD, of the receiver is provided at its top above the paper-guide D $D^\times$ thereon with a binding-post, dd^5, to which its stylus-arm EE is pivoted.

From the posts D DD the paper passes to and about metallic contact-rollers F FF, which are mounted in frames *f ff*, hinged to contact-plates *f' ff'*, having binding-screws f^2 ff^2 and secured upon non-conductive tables f^3 ff^3, held within frames f^4 ff^4, fixed upon the tops of posts f^5 ff^5, that project from the base A.

The rollers F FF and the paper strips thereon are held by springs f^6 ff^6, (see Fig. 4,) pressed firmly against feed-rollers G GG, preferably formed of soft rubber, mounted upon shafts G′ GG′, which have pointed or centered ends that are journaled within the recessed ends of screws g gg, which pass through the sides of the frames f^4 ff^4.

g' gg' designate ratchet-wheels, which are rigidly secured upon said shafts G′ GG′. The teeth of said wheels are engaged by spring-pressed pawls g^2 gg^2, pivoted upon arms g^3 gg^3, loosely hung upon the shafts G′ GG′ and held from lateral movement thereon by collars g^4 gg^4. The arms g^3 gg^3 are connected by rods g^5 gg^5 with upwardly-projecting rods or bars H HH, pivoted at their lower ends in bearings h hh, secured to the base A.

If desired, the contact-rollers may be provided at both sides with feed-rollers having rubber covering similar to that shown. (See Fig. 7.) The rods or bars H HH are vibrated back and forth to rotate the feed-wheels by the following means, viz:

I II designate armatures which are secured to said bars H HH near their lower ends and within the fields of electro-magnets I′ II′, which are secured to the posts f^5 ff^5, whereby when said magnets are energized, as hereinafter described, the rods or bars H HH and their connected pawl-arms g^3 gg^3 will be moved forward to rotate the ratchet-wheels and feed-rolls of the shafts G′ GG′. When said magnets are demagnetized, the rods or bars H and HH and their attached armatures are drawn backward when the machine is not in use by springs i ii, which are connected at their opposite ends to said rods or bars and to tension-studs i' ii', that project from the base A. The back-and-forth movement of the bars H HH is limited by screws i^3 ii^3, that operate in studs i^4 ii^4, projecting from the base. Jam-nuts i^5 ii^5 prevent said screws from turning when adjusted.

I prefer, for reasons hereinafter set forth, that the armatures I II shall be operated in unison the one toward the other from its electro-magnet I′ II′. To this end I connect the rods or bars H HH together in any preferred manner—as, for instance, that shown herein, which consists in a cord or wire, i^2, that extends from one to the other of said bars.

K KK designate rods which project laterally from the bars H HH, and are provided at their ends with binding-posts k kk, to which conducting-wires, hereinafter referred to, are connected. Said bars are each preferably formed in two parts and connected together by an insulating-block, k' and kk'. The stylus-carrying arms or springs E EE extend to points immediately over the contact-rollers F FF, and are provided thereat with rolling electrodes E′ EE′, which bear lightly upon the paper on said rollers, and are vibrated from side to side thereof by the following-described means, viz:

E² designates a bar of non-conductive material, which connects the arms or springs E EE together, and is provided at its center with an aperture to receive a bar or rod, L, that is pivoted at its lower end in proper manner in bearings l, secured to the base A, and provided with an armature, L′, placed within the field of an electro-magnet, L², secured to a post, l', projecting from the base A. A spring, l^2, that extends from the bar L to a tension-post, l^3, operates to move the armature from the magnet when the latter is demagnetized. The back-and-forth movement of the bar L is limited by a screw, l^4, that operates in a post, l^5, secured to the base, and held stationary by an ordinary jam-nut.

As will be hereinafter described, the currents from and to the transmitter and receiver pass successively through the electro-magnet L² in opposite directions, thereby reversing the polarity of said magnet each time the transmitter or receiver is thrown into or out of circuit, whereby the armature L′ is alternately and rapidly attracted and repelled by said magnet, thereby, through the rod L, imparting a rapid vibratory movement to the stylus-carrying arms or springs E EE.

As will be readily understood, the tailings consequent in the magnet L² upon the stoppage of the current in one direction therethrough will operate to aid the current, which, as before stated, is immediately passed through said magnet in direction opposite to the first.

The transmitter T may be thrown into and out of circuit by any desired style of circuit-breaker, one form of which I have shown in the accompanying drawings, and which consists in a toothed wheel, M, rotatably mounted upon a stud, m, projecting from a standard, m', secured to the base A. This wheel is provided with a handle, m^2, and its teeth operate in connection with a tooth formed on a lever, M′, pivoted to a stud, M², that projects upward from a contact-plate, N, secured to the base A. The lever M′ is provided with a distance-screw, the end of which is normally held by a spring, m^4, in close contact with a stud, N′, that projects from a contact-plate, N², secured to the base.

O designates a contact-plate, to one end of which is secured a binding-post, O′, to which the main-line battery-wire is secured in the ordinary manner.

O² designates a switch pivoted to the opposite end of said plate O to establish circuit between said plate and the plate N².

P designates a contact-plate secured to the base A, and provided at one end with a binding-post, P′, to which is secured, in the usual manner, a short section of conductive material, p, to serve a purpose hereinafter described. To the opposite end of the plate P is pivoted a switch, P², which is adapted to be placed in contact with either of the contact-plates N or N², to throw the lever M′ into or out of circuit.

As will be observed, the magnets I′ II′ are interposed in the main-line circuits of the transmitter and receiver, respectively, and that consequently the currents to and from said main line will pass through said magnets either before or after passing through the paper upon said instruments, the different directions of which current necessitates different arrangements of the conducting-wires to and through said instruments to said main line. To clearly show said different arrangements of the wires I have illustrated the first—to wit, that in which the current first passes through the electro-magnet—by alternate dash and dot lines, and the latter—to wit, that in which the current first passes through the paper—by dotted lines, and will hereinafter trace the course of the currents through the instruments to main line from and to the main-line battery and ground.

It will also be understood that the message impulses from the main-line battery are designed to operate electro-magnets I′ and II′ of the feed mechanism, whereby the construction and operation of my improvement are greatly simplified. If desired, however, said electro-magnets may be operated by a local battery, the magnet L^2 being alone interposed in the main-line circuit.

I preferably employ non-conductive transmitting-strips or fillets of paper inscribing the message to be sent thereon in conductive ink or with a soft lead-pencil, the metallic elements of which latter when forced into the paper form a good conductive medium from the stylus to the conducting-roller below; or said transmitting-strips may be composed of suitable conductive material, in which case non-conductive ink is used to write the message thereon. The receiving strip or fillet is impregnated or coated with any desired solution which is adapted to be readily decomposed by electrolysis.

The operation of my device is as follows: Assuming the instruments at one station to be in proper working order, the transmitter having its strip of paper inscribed with a message to be sent, the receiver provided with receiving-strips of proper quality, and both in connection with similarly constructed and equipped instruments at a distant station to and from which messages are to be sent and received, I will first trace the current through the course indicated by dotted lines, in which it will be remembered said current passes through the paper to the feed-magnets. Starting, TF designates the earth, and MB the main-line battery, from which the current passes to the binding-post O′, thence through the plate O and switch O^2 to plate N^2, from which it passes either directly or through the circuit-breaking lever M′ to the switch P^2 and post P′, thence through conductor *p* to the binding-post *kk*, which, it will be remembered, is insulated from its actuating-magnet, and which is drawn by the hand when starting current into contact with the conductor *p*. From the post *kk* the current passes to and through the magnet L^2, energizing said magnet, and thereby vibrating the stylus-carrying arms toward the receiver side of the instrument. From the magnet L^2 the current passes to the insulated post *k*, which, inasmuch as the armature-carrying bars H and HH of the magnets I′ and II′ are positively connected together, as hereinbefore described, is now in contact with the binding-post 1. Thence the current passes to the binding-post d^5 of the arm E, thence through said arm and its stylus to and through the paper strip C to the contact-roller F, thence through the frame *f* to post f^2, thence to a binding-post, 2, secured to the base, A, thence to and through the electro-magnet I′ to binding-post 3, and by line 40 to the main line ML. The magnet I′ is energized by the passage of the current, whereby its armature I and the bar H, to which the armature is attached, are drawn forward, which movement, through the connecting-bar g^5, arm g^3, pawl and ratchet wheel g^2 and g', operates the feed-roll G to move the paper strip forward. Said movement of the bar H, also through the connection i^2, draws the armature II of the receiver away from its magnet II′, and at the same time moves the insulated posts *k* and *kk* away from posts P′ and 1, and into contact with posts 4 and 5, thereby breaking the circuit through the transmitter to main line and closing the circuit therefrom to the receiver. When the circuit is so closed, the current from the distant station passes by line 41 from the main line to post 4, thence to insulated post *k*, and thence to and through the magnet L^2, changing the polarity of said magnet, thereby causing it to first repel and then attract its armature, and thereby, through the bar L, to vibrate the stylus-carrying arms E EE. From the magnet L^2 the current passes to insulated post *kk*, thence to post 5, with which it is now in contact, thence to the binding-post dd^5 of arm EE, thence through said arm, its attached stylus, and the receiving-strip CC to contact-roller FF and its frame ff^2 to post *ff′*, thence to post 6, thence, as shown by line 42 in Figs. 2 and 9, to and through the electro-magnet II′, and thence to post 7 and earth. The magnet II′ is energized by the passage of the current, and through the consequent forward movement of its armature moves the feed-roller of the receiver forward, draws the armature I of the transmitter from its magnet I′, and returns the insulated posts *k* and *kk* into contact with the posts P′ and 1, thereby throwing the receiver out of and the transmitter into circuit with the main line. The circuit through the transmitting-instrument may be either continuously interrupted or wholly broken through the medium of the circuit-breaking wheel M or the switches p^2 or O^2, when necessary, the former of said operations being facilitated by the serrated periphery of the wheel and the relation of said wheel to the pivoted switch or lever M′, the distance

or contact screw in the end of which latter is alternately moved into and out of contact with the stud N′ by the rotation of the wheel, as will be readily apparent. If desired, the circuit may be wholly broken by bringing one of the teeth of the wheel M to rest upon the upper end of the spur 10 of the lever M′, thereby elevating the free end of said lever from the stud N′, as well as by moving the switch P^2 out of contact with the plates N or N^2.

From the foregoing the operation and purpose of the circuit-breaking wheel will be understood without further description.

So far as described, it will be apparent that no provision has been made either in the construction or arrangement of the mechanism or conductor comprised in my invention to counteract the effect upon the strips or fillets C and CC of the tailings consequent upon the demagnetizing of the electro-magnets I′ II′, which, as has been shown, are interposed in the main-line circuits of the transmitter and receiver respectively. To fully protect said strips from damage by said tailings, I provide each of the stylus-carrying arms E and EE with devices that shall operate to positively raise said arms out of contact with said strips C and CC at the moment the magnet in the circuit with said arm is demagnetized, and I also arrange the conductors in such manner that the current shall pass through said magnets before passing through said strips. To these ends R′ RR′ designate props, hinged to the supports upon which the arms E and EE are mounted below the same and connected by arms S SS with the feed-pawl arms g^3 and gg^3 of the transmitter and receiver, respectively. When the bars H HH are moved backward, said props will move in unison therewith and will operate to raise said arms, as will be understood. When this construction of parts is employed, I preferably arrange the conducting-wires so that the course followed by the currents is as follows: Starting at post P′, the current passes to insulated post *kk*, and thence through magnet L^2 to insulated post *k*, as hereinbefore set forth. From said post the current passes to post 1, thence, as shown by line 44, Fig. 2, to and through the magnet I′ (see dash and dot lines) to the binding-post of stylus-holding arm E, thence through said arm, its stylus, and strip C to the contact-roller F, thence through frame *f* to post f^2, thence to post 3 and main line, the return current passing from post 4 through insulated post *k*, magnet L^2, and insulated post *kk*, to post 5, in manner hereinbefore described. The current passes from post 5 to and through electro-magnet II′ to post dd^5 of arm EE′, thence through said arm, its stylus, and the paper CC to contact-roller FF, and thence to post 6 and earth, as shown by dash and dot lines.

By this described construction and arrangement of parts I am enabled to throw each magnet I′ or II′ entirely out of circuit with the main line, and also through the medium of the props R with the arms E EE, thereby effectually guarding against damage to the paper strip from reflex currents from said magnets, as before stated. By reference to Fig. 9, which represents a diagram view of two stations provided with instruments constructed and connected in accordance with my invention, the course followed by the above-described currents will be clearly apparent.

If desired, the transmitter may be made to fulfill the function of a receiver.

If desired, the magnet L^2 may be a permanent magnet; or said magnet L^2 may be connected in any desired manner with a permanent magnet.

It will be observed that the strips C and CC are moved forward in step-by-step motion by the described devices for operating the feed-rollers thereof.

If desired, the feed mechanism of both transmitter and receiver may be located at the same end of the base A, the stylus-carrying arms thereof being arranged to move in the same or in contrary directions. The conducting-wires from the binding-posts 1 and 5 may connect with the bottom of the posts L or D and DD, as shown at 48 in Fig. 2, when the wires are arranged in this manner. I provide that reflex or induced currents from the several magnets comprised in my invention may be counteracted in the event of the mechanism for that purpose, hereinbefore described, becoming inoperative by the following means, viz: 6, Fig. 6, designates a rubber ring, which is placed upon the binding-posts d^5 and dd^5 of the arms E and EE, as shown, or with the posts D and DD, and holds in position a metallic (preferably copper) ring, 7, which is connected by a wire, 8, with a ground-plate, 9, by which induced currents passing through the posts in the direction or contrariwise of the arrow 10 will be counteracted, as will be readily understood.

If desired, the mechanism above described may be used in connection with the prop R′ and its actuating-rod, hereinbefore described.

To insure that the strip or fillet may have the proper degree of moisture, I provide a fluid-receptacle, 13, (see Fig. 4,) securing the same to the plates f^3 ff^3 in advance of the metallic rollers F FF, and placed within said receptacles rollers 14 and 15, the lower, 14, of which is preferably made of vulcanite and operates as a brush to dampen the paper fillet. The other, 15, is preferably made of metal, and operates as a press-roll to remove superfluous fluid from said strip in its forward passage between said rollers, for which reason I employ springs 16 to connect the bearings of said rollers, as shown.

Any desired form of battery may be employed in connection with the devices shown and described.

Without limiting myself to the precise con-

struction and arrangement of parts shown, I claim—

1. In an automatic multiplex-telegraph instrument, a continuously-energized electro-magnet interposed in the main-line circuit and independent intermittently-energized electro-magnets in alternate circuit with said main line, in combination with styluses vibrated by said continuously-energized magnet and independent electrodes in intermittent circuit with said main-line circuit, substantially as described.

2. In an automatic multiplex-telelegraph system, a combined transmitting and receiving instrument, each having supports to receive material on which the message is written or is to be recorded, a single electro-magnet interposed in the main-line circuit, continuously-vibrating separate styluses or electrodes connected to a vibrating armature pivoted in the field of said electro-magnet, and mechanism, substantially as described, to intermittently throw said electrodes into and out of said main-line circuit, as and for the purpose set forth.

3. A continuously-energized electro-magnet interposed in the main-line circuit, a vibrating armature therefor, and independent electro-magnets in intermittent circuit with said main line and provided with armatures positively connected together, in combination with styluses, connections between said styluses and the armature of the continuously-energized magnet, electrodes carried by said styluses, message-fillets in normal contact with said electrodes, feed mechanism for said fillets, and connections between the armatures of said independent magnets and said feed mechanism, substantially as described.

4. In an automatic multiplex-telegraph instrument, a message-fillet, a support therefor, and feed mechanism to move said fillet in forward direction, a stylus having an electrode in normal contact with said fillet, an armature to vibrate said stylus, a continuously-energized electro-magnet included in the main-line circuit to actuate said armature, and independent intermittently-energized electro-magnets, substantially as described, armatures therefor, and connections between said armatures and said electrode to automatically throw said electrode into and out of the main-line circuit and into and out of contact with the message-fillet as and for the purpose specified.

5. In an automatic multiplex-telegraph system, a combined transmitting and receiving instrument having supports to receive material on which the message is written or is to be recorded, means, substantially as described, to move said material in forward direction, separate styluses or electrodes connected together and to an armature pivoted in the field of an electro-magnet, which is continuously closed to the main-line circuit, and mechanism, substantially as described, to intermittently throw said electrodes into and out of circuit with the main line, as and for the purpose specified.

6. In an automatic multiplex-telegraph system, a transmitter and a receiver placed in juxtaposition and provided with supports to receive strips on which messages are written and are to be recorded, means to move said strips consecutively in forward direction, separate styluses connected together and to a vibrating armature pivoted in the field of a single electro-magnet, which is interposed in the main-line circuit, whereby the said styluses are vibrated over the surface of said material, and means, substantially as described, for throwing said styluses alternately out of contact with said material and out of circuit with the main line, as and for the purpose set forth.

7. A transmitting-instrument and a receiving-instrument in juxtaposition, each having a message-fillet, a support and feed mechanism for the same, and a stylus or electrode in normal contact with said fillet, a connection between said styluses or electrodes, an armature to vibrate said electrodes simultaneously, a continuously-energized electro-magnet to actuate said armature, and intermittently-actuated electro-magnets independent of said continuously-energized magnet, to actuate said feed mechanism and to intermittently throw said electrodes into and out of circuit with the main line, subtantially as described.

8. A multiplex-telegraph instrument provided with a transmitting-instrument and a receiving-instrument in juxtaposition, each having a message-fillet, a support and feed mechanism for said fillet, and a stylus or electrode in normal contact with said fillet, connections between said styluses or electrodes, a continuously-energized magnet interposed in the main-line circuit to simultaneously vibrate said electrodes, in combination with devices to positively move said electrodes out of contact with said fillets, intermittently-energized electro-magnets interposed in the circuits of said transmitting and receiving instruments, and connections between said magnets, feed mechanism, and contact-breaking devices, substantially as described.

9. An automatic multiplex-telegraph instrument having a transmitting and a receiving device provided with styluses intermittently in circuit with the main line, connected together and to the vibrating armature of an electro-magnet interposed in the main-line circuit, electro-magnets interposed in the circuits of said transmitter and said receiver and alternately energized by message-impulses over said main line, and means, substantially as described, connected to said magnets to feed the message sending and receiving material in forward direction, and to automatically and intermittently throw the transmitting and receiving instruments into and out of the main-line circuit, as and for the purpose set forth.

10. In a combined transmitting and re-

ceiving instrument, styluses, which are intermittently thrown into and out of the main-line circuit, are connected together and to a vibrating armature pivoted in the field of and operated by the intermittently-reversed polarity of a single electro-magnet interposed in the main-line circuit, supports to receive material on which the message is written or is to be recorded, feed mechanism to move said material in forward direction, mechanism to move said styluses out of contact with said material, and intermittently-operating electro-magnets interposed in the circuit of each of said instruments and connected to said feed mechanism and to the mechanism by which the styluses are thrown out of contact with said message sending and receiving material, as and for the purpose specified.

11. A transmitting-instrument and a receiving-instrument placed in juxtaposition and provided with message-fillets, feed mechanism therefor, and with connected styluses having electrodes in normal contact with said fillets, a continuously-energized electro-magnet to vibrate said styluses, an intermittently-energized electro-magnet included in the circuit of each of said magnets and provided with armatures, positive connections between said armatures, and stops to limit the movement thereof, connections between said armatures and feed mechanism, devices to move said electrodes out of contact with said fillets, and connections between said devices and the armatures of said intermittently-energized magnets, substantially as described.

12. In an automatic multiplex-telegraph system, a transmitting and a receiving instrument having metallic rollers F FF to receive strips of material on which messages are written or are to be recorded, styluses or electrodes E′ EE′ in contact with said material and attached to vibrating arms E EE, which are connected together and operated by a vibrating armature pivoted in the field of an electro-magnet which is interposed in the main-line circuit and adapted to be intermittently energized by oppositely-moving message-impulses over said main-line circuit, intermittently-operating electro-magnets interposed in the circuits of said instruments and connected to feed mechanism to move said material in forward direction, and mechanism to throw said arms E EE and electrodes E′ EE′ out of contact with said material, as and for the purpose set forth.

13. A transmitting and a receiving instrument placed in juxtaposition and provided with electro-magnets I′ and II′, interposed in the circuits of said instruments, respectively, and having armatures I and II, positively connected together and provided with binding-posts *k* and *kk*, which are insulated from said armatures, rods or bars H HH, and connecting-rods from said bars to operate feed mechanism arranged to move message sending and receiving material in forward direction and to move electrodes which are normally in contact with said material out of contact therewith, substantially as described.

14. In an automatic multiplex-telegraph system, the combination of a transmitting and a receiving instrument provided with vibrating stylus-carrying arms E EE, metallic rollers F FF, to receive strips or fillets of proper material on which messages are written or are to be recorded, and means, substantially as described, to operate said arms and rollers, with pivoted props R RR and arms S SS, connecting said props with feed mechanism, as and for the purpose specified.

15. The combination of the vibrating stylus-carrying arms E EE, metallic rollers F FF, feed-rollers G GG, having feed ratchet-wheels and pendent arms provided with spring-pressed pawls, and means, substantially as described, to operate said feed-rollers, with material on which messages are written or to be recorded, and pivoted props R RR and connecting-rods S SS, substantially as described.

16. The combination, in a multiplex-telegraph instrument and with the message receiving and transmitting fillet thereof, of a fluid-receptacle, 13, having rollers 14 and 15 arranged therein and upon opposite sides of said fillet, contact-rollers F and FF, and feed-rollers having intermittent rotary motion, substantially as described.

17. The combination, with the message receiving and transmitting fillet of a receiving or transmitting instrument, of intermittently-rotating feed-rollers and a fillet-dampening device comprising a fluid-receptacle, a vulcanite roller, 14, and a metallic roller, 15, operating therein, and a spring, 16, connected to hold said rollers in contact with the opposite sides, respectively, of said fillet, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN O'NEIL.

Witnesses:
CHARLES E. FOSTER,
WM. T. FARNHAM.