R. K. BOYLE.

AUTOMATIC ELECTRIC TELEGRAPH.

No. 186,104. Patented Jan. 9, 1877.

Fig. 1.

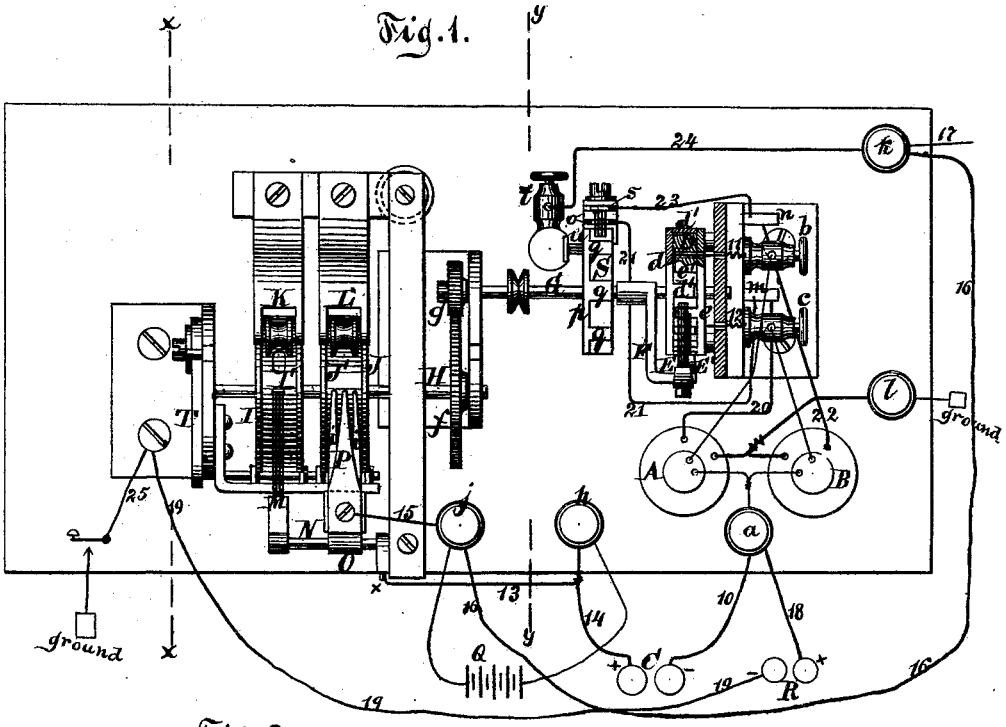


Fig. 2.

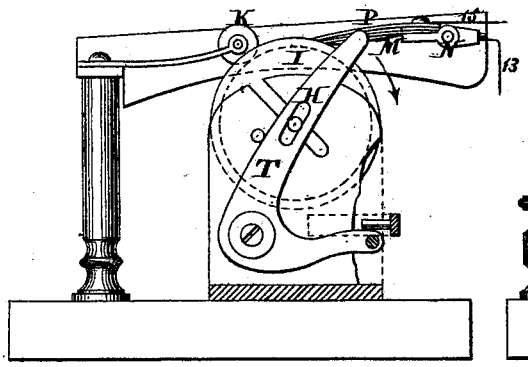


Fig. 3.

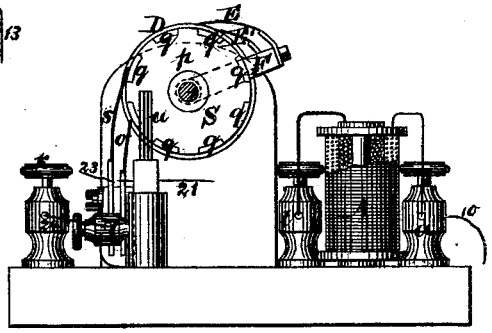
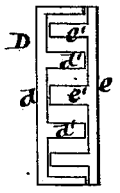


Fig. 4.



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UNITED STATES PATENT OFFICE.

ROBERT K. BOYLE, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOMATIC ELECTRIC TELEGRAPHS.

Specification forming part of Letters Patent No. **186,104**, dated January 9, 1877; application filed June 15, 1876.

To all whom it may concern:

Be it known that I, ROBERT K. BOYLE, of the city, county, and State of New York, have invented a new and useful Improvement in Automatic Electric Telegraphs, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a plan or top view. Fig. 2 is a transverse section in the plane *x x*, Fig. 1. Fig. 3 is a similar section in the plane *y y*, Fig. 1. Fig. 4 is a face view of the stationary circuit-breaker detached.

Similar letters indicate corresponding parts.

This invention consists in the combination, with a local battery, of two induction-coils, and suitable transmitting and recording mechanism with circuit-breakers, and with the wire of a telegraph-line, whereby said induction-coils are alternately charged, and a steady flow of induced electricity of one kind is sent over the line to produce the required signals in the receiving-station. With the transmitting-drum and its brush, and with the circuit-breakers and the induction-coils, is combined a multiplying-gear to increase the number of electric waves sent over the line-wire for each time the brush of the transmitting-instrument passes over a perforation in the strip representing the message. The shaft of the drums which carry the strips of paper for transmitting and recording messages has its bearings in a lever, so that by depressing or moving said lever said drums are relieved from their presser-rollers, and the operation of introducing the strips of paper is materially facilitated.

In the drawing, the letters A B designate two induction-coils, the inner ends of the primary wires of which are connected together in a binding-post, *a*, which connects by a wire, 10, with the negation-pole of a local battery, C. The outer end of the primary wire of the coil A connects with a binding-post, *b*, and the outer end of the primary wire of the coil B with a binding-post, *c*, both said binding-posts being insulated from the metallic portion of the instrument. The post *b* connects by a wire, 11, with a metallic plate, *d*, fastened to one side of a fixed rubber disk, D, and the post *c* connects by a wire, 12, with a metallic plate, *e*, fastened to the opposite side of said rubber disk, each of said plates being provided with toes *d′ e′*, respectively, which alternate with each other and extend across the face of the rubber disk. Over the face of said rubber disk sweep two brushes, E E′, Fig. 3, which are secured in an arm, F, fastened on a shaft, G, that is in metallic contact with the frame of the instrument, and geared together with a shaft, H, by cog-wheels *f g*, of such proportion that one revolution of the shaft H produces five, more or less, revolutions of the shaft G. The two brushes, E E′, are so arranged in relation to the toes *d′ e′* that whenever one of the brushes E bears upon one of the toes *d′* or *e′*, the other brush E′ bears on the rubber face of the disk D, and that the arm F is alternately brought in metallic contact with the metal plate *d*, and then with the metal plate *e*. On the shaft H are mounted two metallic drums, I J, one for transmitting the other for recording dispatches. The dispatches to be transmitted are represented by holes and slots in a strip of paper, I′, which is drawn over the drum I, and retained by a presser-roller, K. Over the recording-drum J extends a strip of paper, J′, which is retained by a presser-roller, L. With the transmitting-drum I is combined a brush, M, which is mounted on a shaft, N, that connects by a wire, 13, with a binding-post, *h*, from which extends a wire, 14, to the positive pole of the local battery C. On the shaft N is fitted a sleeve, O, from which extend two metallic prongs, *i i*, and between these prongs is situated the pen or stilus P, which, however, is insulated from said prongs and from the sleeve O. The stilus P connects by a wire, 15, with a binding-post, *j*, from which extends a wire, 16, to a binding-post, *k*, which connects with the line-wire 17. Between the binding-posts *j h* is placed a resistance-coil or a small battery, Q. The binding-post *a* connects by a wire, 18, with the positive pole of a battery, R, the negative pole of which connects by a wire, 19, with the metallic frame of the instrument.

The inner ends of the secondary wires of the coils A B are connected together and to a binding-post, *l*, which connects with the ground. The outer end of the secondary wire

of the coil A connects by a wire, 20, with a binding-post, *m*, from which extends a wire, 21, to a brush, *o*, which bears on the face of a rubber disk, S, which is firmly mounted on the shaft G, and to one side of which is secured a metallic plate, *p*, which, however, is insulated from the shaft G, and which is provided with toes *q*, which extend at uniform distances apart across the face of the disk S. The outer end of the secondary wire of the coil B connects by a wire, 22, with a binding-post, *r*, from which extends a wire, 23, to a brush, *s*, which bears on the face of the disk S, and which is so situated in relation to the brush *o* that when this brush bears on one of the metallic toes *q* the brush *s* bears on one of the spaces between said toes, and vice versa.

From the binding-post *k* of the line-wire extends a wire, 24, to a binding-post, *t*, which is insulated from the instrument, and which is in metallic contact with a brush, *u*, that bears on the metallic plate *p* fastened to the rubber disk S.

When my instrument is operated in an open circuit, and a message is to be transmitted, the stilus P in the transmitting-station is raised out of contact with the drum J. (For this purpose the sleeve O is mounted on the shaft N in such a manner that it can be turned thereon.) The shaft H is then revolved, and as the brush M sweeps over one of the perforations in the transmitting-strip the circuit of the local battery C is closed as follows: From the positive pole of the battery C through wire 13, shaft N, brush M, drum I, shaft H, cog-wheels *f g*, and shaft G, to the arm F, which carries the brushes E E′, and which receives a rapid revolving motion, causing said brushes to sweep over the toes *d′ e′* in the face of the stationary rubber disk D. At the moment one of the brushes E or E′ is in contact with one of the toes *e′* the current flows through plate *e*, wire 12, post *c*, to the primary wire of coil B, and through this primary wire to the negative pole of the battery C. A current is induced in the secondary wire of coil B, which connects at one end with the ground, and at the opposite end through wires 22 and 23, brush *s*, toes *q*, metal plate *p*, brush *u*, binding-post *t*, wire 24, and binding-post *k*, with the line-wire 17. At the next movement the brush E′ comes in contact with one of the toes *d′* of the metal plate *d*, the battery-circuit is closed through the primary wire of the coil A, and a second wave of electricity of the same kind as before is caused to pass through the line, while the circuit-changer S, with its brushes *o s u*, prevents the formation of induced currents of the opposite kind.

The current of electricity sent over the line-wire from the transmitting-station passes through the wire 16 to the pen in the receiving-station and through the pen, the recording-strip to the metallic drum J, which connects with the ground by a wire, 25, and switch *v*, which switch is open in the transmitting-station and closed in the receiving-station. Furthermore, by combining two brushes, E E′, with the stationary disk D, and by means of the multiplying-gear *f g*, interposed between the shafts H and G, at least ten waves of electricity are caused to pass through the line and through the pen in the receiving-instrument every time the brush M passes over a round hole in the transmitting-strip, and when said brush passes over a slot the number of waves passing over the line is still greater. The resistance-coil or battery Q, interposed between the pen, is intended to clear the pen between the signals. The prongs *i i*, which straddle the pen P, are in the circuit of the local battery, so that a current of electricity is produced across the path of the pen, and thereby "tailing" of the pen in writing is effectually prevented. The battery R serves to clear the instrument from induced currents which form in the metallic parts of the same.

In working my instrument with a closed circuit, I turn down the brush M upon the metallic surface of the drum I in the receiving-station, (the strip of paper having been removed from this drum,) so that, when the instruments in the transmitting and in the receiving stations are set in motion, induced currents of the same kind are thrown into the line-wire in opposite directions, and thereby the effect of these currents is doubled, or, in other words, when I work my instruments in an open circuit the local battery of the receiving-station is entirely cut out, and, while in working with a closed circuit, both the local batteries in the transmitting and in the receiving stations are at work. Furthermore, when I work with a closed circuit, a steady flow of eletricity of the opposite kind passes over the line to clear the spaces between the signals.

With the shaft H of the drums I and J I have combined a lever, T, (see Fig. 2,) which forms the bearing for said shaft. By moving this lever in the direction of the arrow marked near it in Fig. 2, the shaft H is depressed, so that the drums I and J are brought out of contact with their presser-rollers, and the introduction of the strips of paper is facilitated.

If desired, my instrument can be worked by a set of keys, instead of the perforated paper. The brush M is made to bear on the metallic drum I, and the circuit is closed by depressing either of the keys.

It is self-evident that the waves of electricity produced by my apparatus in the line-wire can be used to work any telegraphic instrument, and I do not want to confine myself to chemical writing.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a local battery, of two induction-coils, which are alternately charged, whereby a series of waves of electricity of the same kind are sent over the line-wire, substantially as shown and described.

2. The combination, with the transmitting-drum I and its brush M, of circuit-breakers D S, induction-coils A B—two or more—local

battery C, recording-drum J, and pen or stilus P, substantially as and for the purpose set forth.

3. The combination, with the transmitting-drum and its brush M, the induction-coils A B, and with the circuit-breakers D S, of a multiplying-gear, *f g*, whereby the number of electric waves sent over the line-wire is multiplied each time the brush M passes over a perforation in the transmitting-strip, substantially as set forth.

4. The combination, with the shaft H, which carries the drums I J, and with their presser-rollers K L, of a lever, D, for relieving said drums from the pressure of their presser-rollers, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 14th day of June, 1876.

R. K. BOYLE. [L. S.]

Witnesses:
W. HAUFF,
E. F. KASTENHUBER.