(No Model.) 3 Sheets—Sheet 1.

J. H. ROGERS.

AUTOMATIC TELEGRAPH.

No. 277,349. Patented May 8, 1883.

Fig. 1

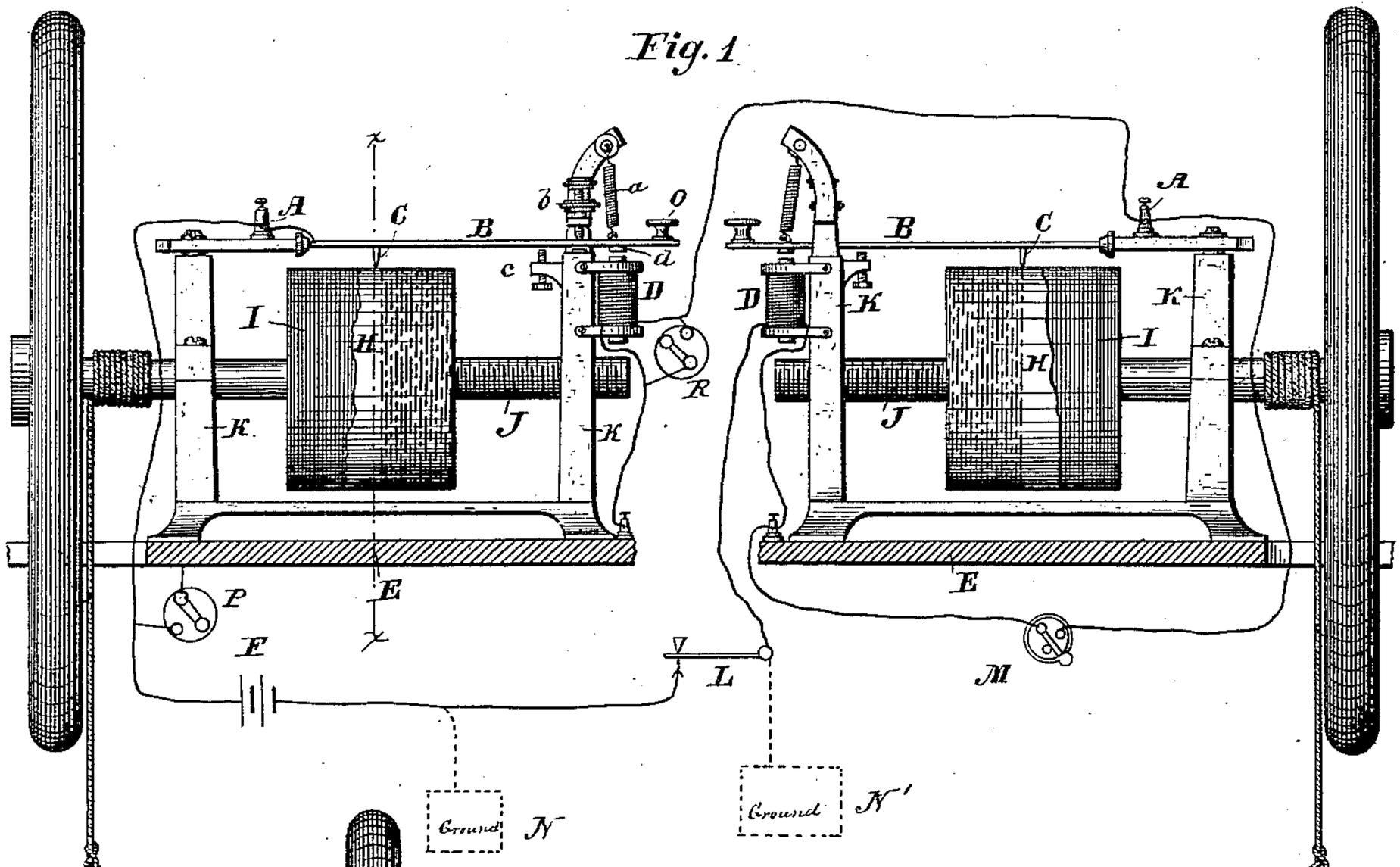


Fig. 2.

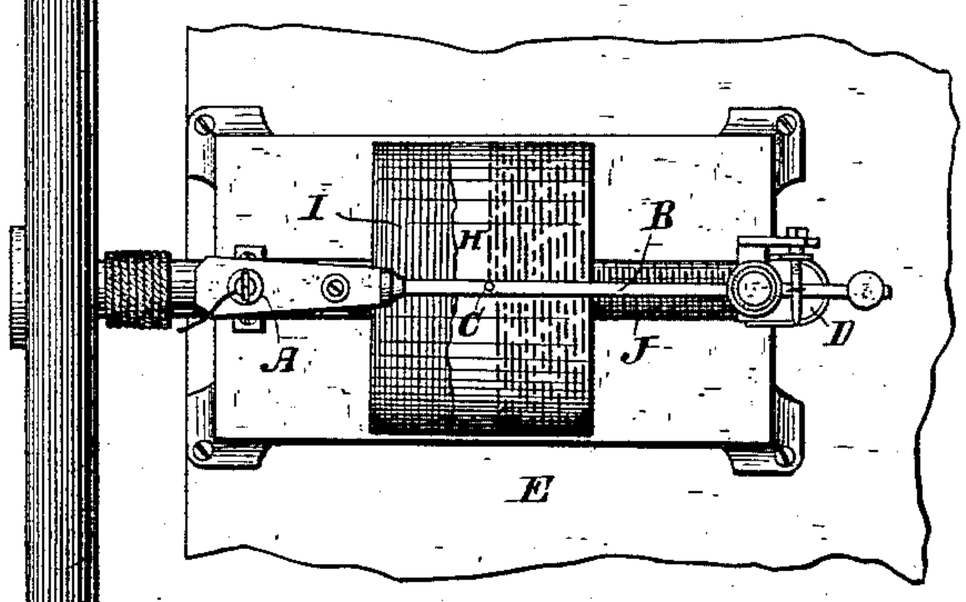
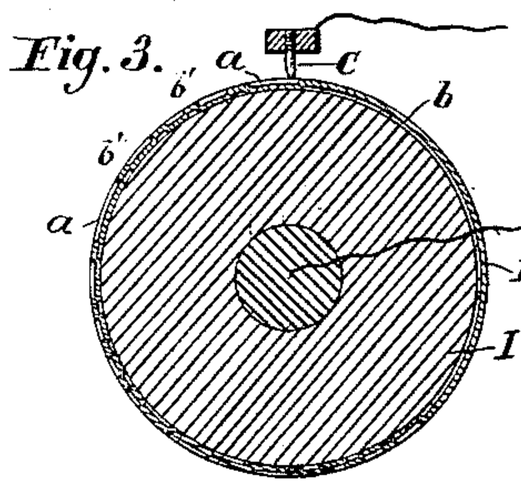


Fig. 3.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4.

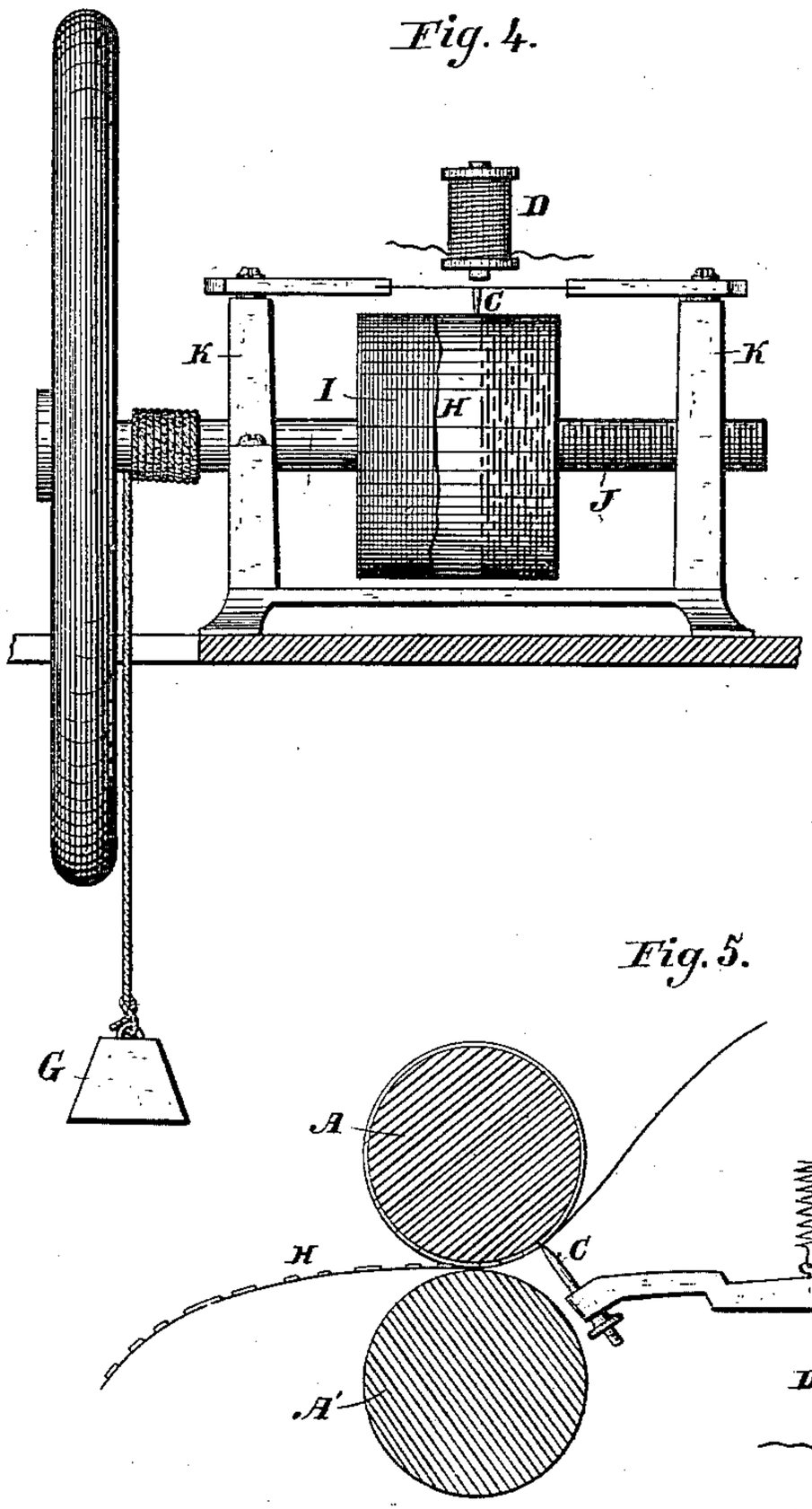
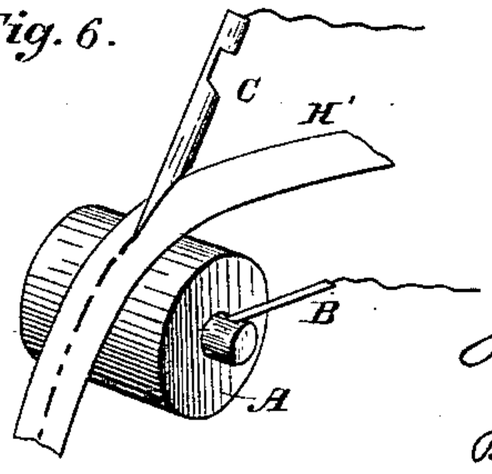


Fig. 5.

Fig. 6.



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AUTOMATIC TELEGRAPH.

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Fig. 7.

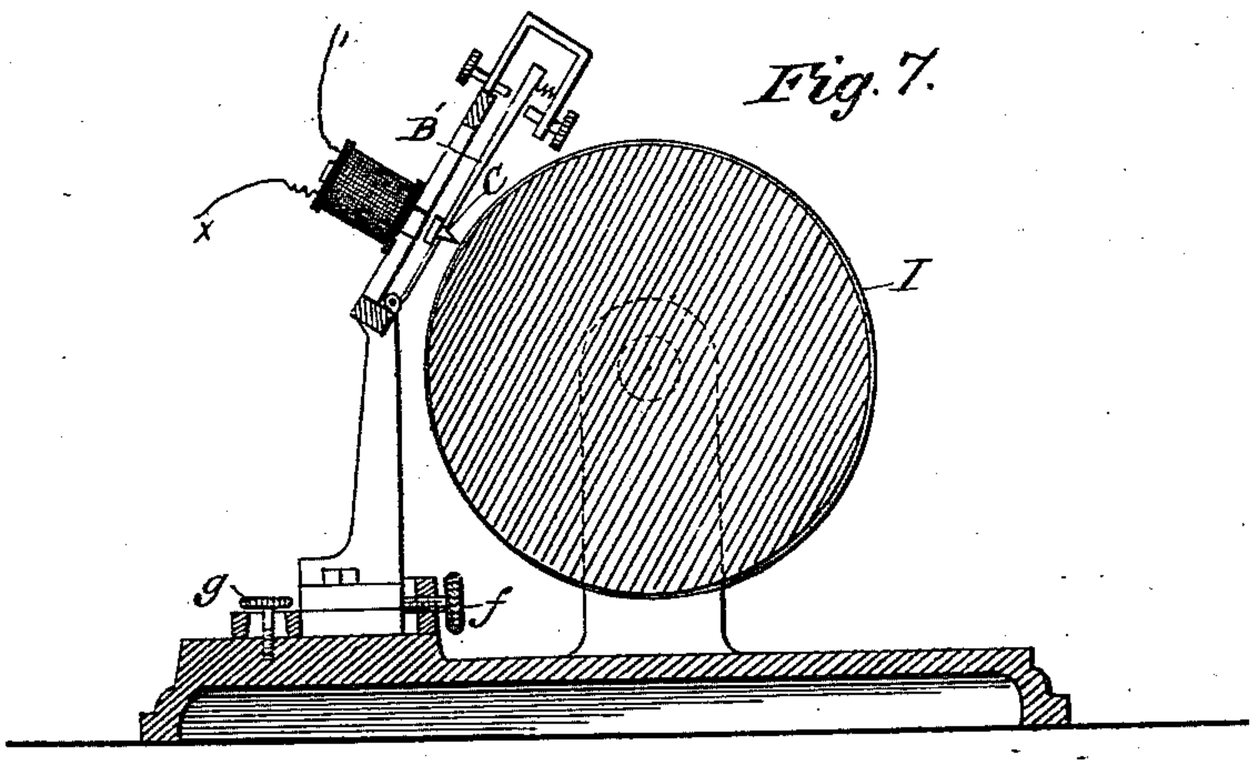
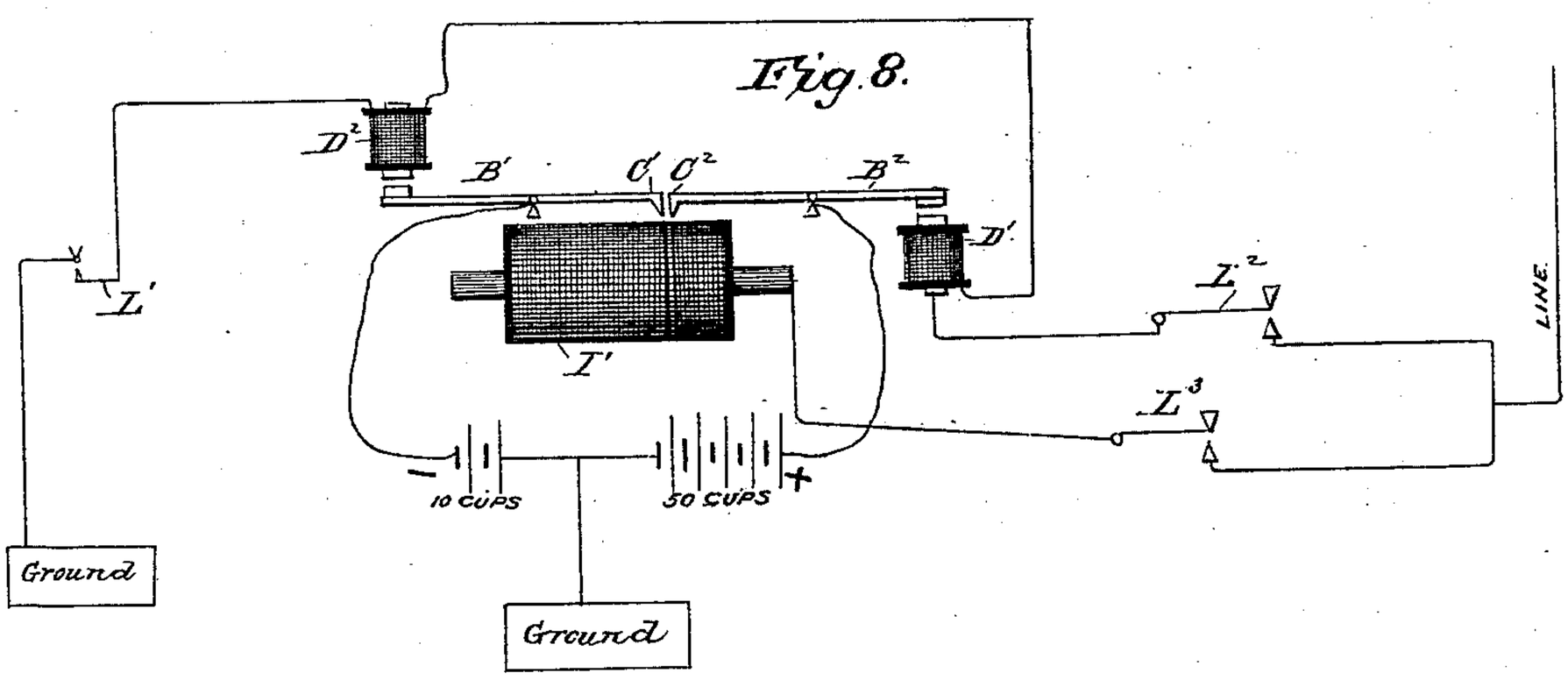


Fig. 8.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 277,349, dated May 8, 1883.

Application filed March 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARRIS ROGERS, of Washington city, District of Columbia, have invented a new and useful Improvement in Automatic Telegraphs; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

In the system of telegraphy known as the "automatic" or "rapid" system various means have been resorted to for sending and receiving electric impulses of greater or less duration to form dots and dashes to conform to the Morse code.

Among those systems which are most analogous to the improvement which I am about to describe as my invention, I may refer to a fillet of paper having a metallic face, or a thin strip of metal upon which is previously placed, in an insulating-ink, dots and dashes, which fillet, when passed through the terminal contacts of an electric circuit, make and break the same in accordance with the record, and transmit corresponding impulses to the other end of the line.

Another means of sending messages is to take a fillet of paper or other material and simply emboss, by means of a stylus, the dots and dashes, and then pass this embossed strip into a device in which the embossments act mechanically to raise and lower one end of a spring or lever, whose other end is arranged to make or break contact between the terminals of a circuit. Still another plan is that patented by me August 20, 1882, with J. W. Rogers as co-inventor, in which a thin metal strip was embossed with dots and dashes and the strip passed beneath a contact-point, which closed the circuit whenever said point touched an embossment or elevation, and broke the circuit at the intervening points. In this case it will be perceived that the metal embossment successively form the terminals of one end of the circuit.

My present invention is based upon this latter principle; and it consists in a novel arrangement of stylus and indented metal foil or sheet in an automatic telegraph for the purpose of transmitting electrical impulses by breaking connection over the indentations in the strip or sheet and making contact with the intervening spaces lying in the normal plane of the strip or sheet, in contradistinction to making contact with raised embossments.

My invention also consists in the method of preparing and transmitting a message without removal of the strip or sheet from its carrier; and also, further, in the means for avoiding tailings or static charges on the line, as will be fully set forth hereinafter.

Figure 1 is a side view, partly in section, of two of my instruments arranged for illustrating the working of the same. Fig. 2 is a plan view of one of the instruments. Fig. 3 is a cross-section through the line *x x* of Fig. 1. Fig. 4 is a side elevation, showing a modification of my invention. Fig. 5 shows the arrangement of a Morse register for receiving the messages transmitted by my instrument. Fig. 6 shows a chemically-prepared fillet, upon which the message may be received. Fig. 7 shows a vertical section of a further modification of the invention, and Fig. 8 shows a diagram illustrating the circuits and arrangement of parts for preventing tailings or static charges on the line.

Referring to Fig. 1 of the drawings, E is the base-plate of the instrument, provided with uprights or standards K K. In these standards are supported the ends of the shaft J of the cylinder I. The periphery of this cylinder is threaded or formed with a spiral groove, and so, also, is one end of the shaft, which latter is received into the interiorly-threaded bearing of one of the standards K. The pitch or rectilinear progression of the threads on the cylinder and its shaft is exactly the same. For giving rotary movement to the shaft and cylinder, so as to secure its progressive revolution, a weight, G, is suspended by a cord wound around its shaft, and a hand-wheel is fixed upon the shaft for winding it up or controlling its motion. These actuating devices, however, may be replaced with any other motor, or any suitable means for rotating the cylinder may be provided.

Upon one of the standards K is fixed a horizontal lever or spring-bar, B, bearing a stylus or point, C, which is adapted to press upon and indent the tin-foil into the spiral groove of the cylinder when the lever B is depressed,

and which rises out of contact when the lever B is drawn up. This lever is insulated from both of the posts K K, and is drawn up by a spring, *a*, its upward movement being limited by a stop-screw, *b*, while said lever is drawn down by the influence of the electro-magnet D upon the armature *d* borne by said lever.

Now, in describing the working of the instrument, I will first describe the simplest method of forming a record of signals for subsequent transmission. For this purpose a slow, uniform rotary motion is given to the cylinder I, and the lever B is worked by the knob O as a telegraphic key, which causes the point or stylus C to indent the tin-foil H with dots and dashes from the direct action of the key by the operator, as indicated in Fig. 3. Now, for transmitting this message the lever B is raised and the cylinder I is run back to the starting-point, so that the point C is at the beginning of the message. Electrical connections of the wires are then so arranged that the point C is one terminal of the line and the tin-foil or cylinder I the other terminal. The lever B is then slightly adjusted up by set-screw *c*, so that the stylus-point C will not touch the bottom of the grooves or indentations on the tin-foil, which are shown at *a'*, Fig. 3, but will touch the intervening spaces, *b'*. It will therefore be seen that as the cylinder revolves electrical contact is made just the reverse of the characters on the tin-foil, or by the spaces between the indentations. These electrical impulses, however, when taken off on a Morse register geared reversely to the usual manner, as in Fig. 5, will exactly reproduce the characters on the original tin-foil jacket. The distinctive feature of this part of my invention, then, it will be seen, is in making contact between the indentations, in contradistinction to closing contact with raised embossments, as in my former patent, hereinbefore referred to, and the merit of my present method is to be found in the fact that the same point which makes the indentations or manufactures the record also transmits the record by making and breaking contact, as described, without removal or transfer of the tin-foil from the place where the record is first made upon it.

I will now describe how the two instruments shown in Fig. 1 can be used—one for making and transmitting the message, and the other for receiving it. For this purpose the key L must be ignored and the ground-connections N N' considered. We will suppose the instrument on the left is the transmitting-station and the one on the right is the receiving-station. Now, switch P is open and R and M closed, and the two cylinders I I being in motion the current from battery F flows as follows: to insulated lever B and point C, touching the spaces *b'*, between the depressions on the tin-foil, and closing circuit through frame K, switch R, to line, thence to magnet D of the distant instrument, thence to ground, and thence to battery F again, so that whenever a space *b'* touches the point C in the transmitter the distant magnet attracts lever B and causes its point C to make a corresponding character on the tin-foil of that cylinder. These characters will be, however, the reverse of those on the transmitter-cylinder, and to make them identical the magnet of the receiving-instrument should be arranged to lift the point C, (instead of pulling it down on the tin-foil,) as shown in Fig. 4, for instance, in which a metal diaphragm forms the armature and carries the point C; or, instead of changing the position of the magnet, the modified form of Morse register, Fig. 5, may be used. In this connection I find it appropriate to describe what I conceive to be one of the most valuable and distinctive features of my invention, and that is its convenience and efficacy for repeating messages.

In the description of the operation of the devices in Fig. 1, where the instrument on the left has been considered the transmitter and the one on the right the receiver, it will be perceived that the message received on such instrument is in such shape that it in turn can become the transmitter to a third station without removal of the tin-foil or any other adjustment than the making of the necessary connections and the retraversing of the record by the stylus adjusted to a higher position, and so the message may be repeated indefinitely through any number of stations without an expert. This practical advantage cannot be made available where the message of automatic transmission is received on a chemically-prepared paper, because the latter cannot become a transmitting-slip, nor can it be made available with an embossed tape from a Morse register without special additional appliances.

One other use of my invention is for multiplying messages for different lines from the manipulation of a single key. To explain how this may be accomplished, the two instruments shown in Fig. 1 may be made to separately make their messages and transmit them to different points. For this purpose the key L is to be considered, and the ground-connections N N' are out. Switches P and M are closed and R is opened. By the manipulation of the key L, then, the current from the battery flows only through the two magnets D D, and the two armatures B and points C are simultaneously actuated to form the message on the tin-foil of the two instruments, and after this is done these two instruments may be separately connected to their independent lines and their separate currents then made and broken through the indented tin-foil jackets and points C, as hereinbefore described. As a matter of course any number of instruments may thus be acted upon by the same key L, and any number of multiplications of a message made to different points.

Figs. 1 and 4 show two forms of my invention, and in Fig. 7 appears still another modification. In this case a standard carrying the

electro-magnet and stylus is made adjustable to or from the cylinder by set-screws *f g*, *f* serving to limit the approach of the stylus to the cylinder, while *g* affords means for quickly moving the standard with electro-magnet and stylus back when the cylinder is to be run back to start the transmission of the message. The stylus or point C is in this case fixed to a very light hinged lever, B′, bearing an armature and working between the magnet and the cylinder, permitting the use of an ordinary Morse register for receiving in a manner as has been described with reference to Fig. 4.

I will now describe the means for clearing the line of static charge or preventing "tailings," which is a serious drawback in rapid transmission. For this purpose I employ a well-known method—namely, a current of reversed polarity, which is alternately thrown on the line. I arrange it, however, in connection with the other parts of my invention, in a manner which secures some important and useful features.

In constructing the cylinder I do not make a single continuous spiral groove in the periphery of the same, but use two parallel grooves, side by side, and employ two styluses, one of which styluses, working in one groove, sends the main impulses over the line, and the other of which alternately throws a current of reversed polarity over the line to clear the static charge.

Referring to Fig. 8, I′ is the cylinder with its jacket of tin-foil, and C′ C² are the two styluses on the ends of levers B′ B², and resting side by side in the two separate parallel grooves of the cylinder, which two grooves it will be understood traverse the periphery of the cylinder spirally side by side. One of the styluses, C², is arranged to be lifted by magnet D′, and the other is arranged to be depressed by the magnet D² by the same current passing through each, the said magnets being arranged on opposite sides of the levers carrying said styluses. To one of the styluses, C², is connected the positive pole of a battery of, say, fifty cups, and the other is connected to the negative pole of a battery of, say, ten cups, and the other poles of said batteries connect with the ground. Now, in preparing a message on the tin-foil of the cylinder I′, the key L′, it will be seen, causes the two styluses to produce exactly reversed characters on the tin-foil of the cylinder, and when this message is to be sent the key L² is opened. Then as the cylinder I′ revolves, the stylus on the right throws impulses to the line through key L³ from the main battery of fifty cups, and the instant a break is made by that stylus contact is made with the other, and a current of reversed polarity from the battery of ten cups is thrown upon the line and secures the clearing of the same of tailings or the static charge.

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

1. In an automatic telegraph, the combination, with an indentable metal foil having characters indented therein, of a stylus disposed upon the side of the foil upon which said indentations were made, and arranged, as described, to break contact over the indentations and make contact on the intervening spaces lying in the normal plane of the foil, substantially as described.

2. As an improvement in the art of automatic telegraphy, the method of recording and transmitting messages, which consists in producing intermittent linear indentations representing characters in a metal foil or strip of conducting material, and then causing said indentations to successively interrupt, and the intermissions or intervening spaces in the foil to successively close an electric circuit, substantially as described.

3. A cylinder having a rotary movement with two grooves on its periphery traversing the same in parallel position, in combination with a tin-foil covering two styluses arranged to act in said grooves alternately, and two batteries connected with the two styluses for reversed currents for the purpose of following each character-impulse with an electric impulse of reversed polarity to clear the line of tailings or static charges, as set forth.

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