(No Model.) 2 Sheets—Sheet 1.

J. W. ROGERS.

AUTOMATIC TELEGRAPH.

No. 283,665. Patented Aug. 21, 1883.

Fig. 1.

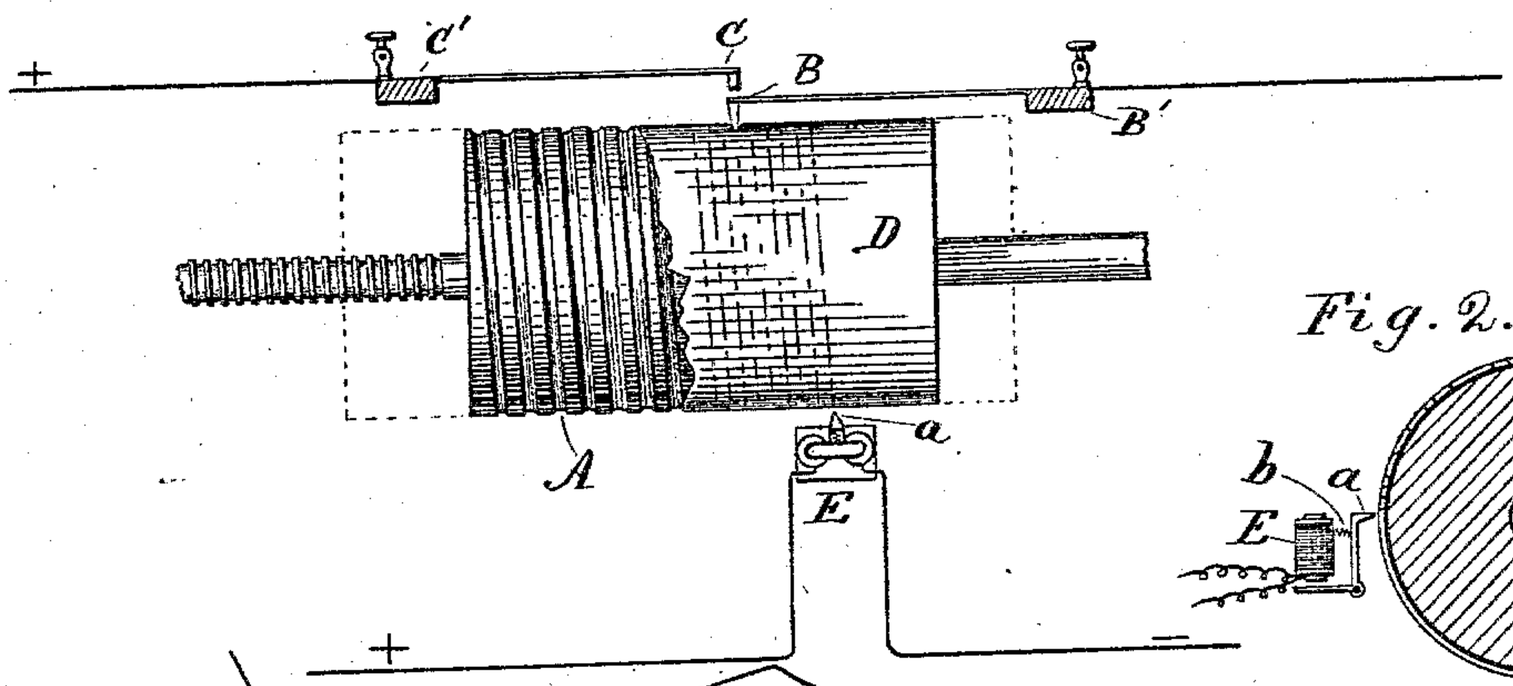

Fig. 2.

Fig. 3.

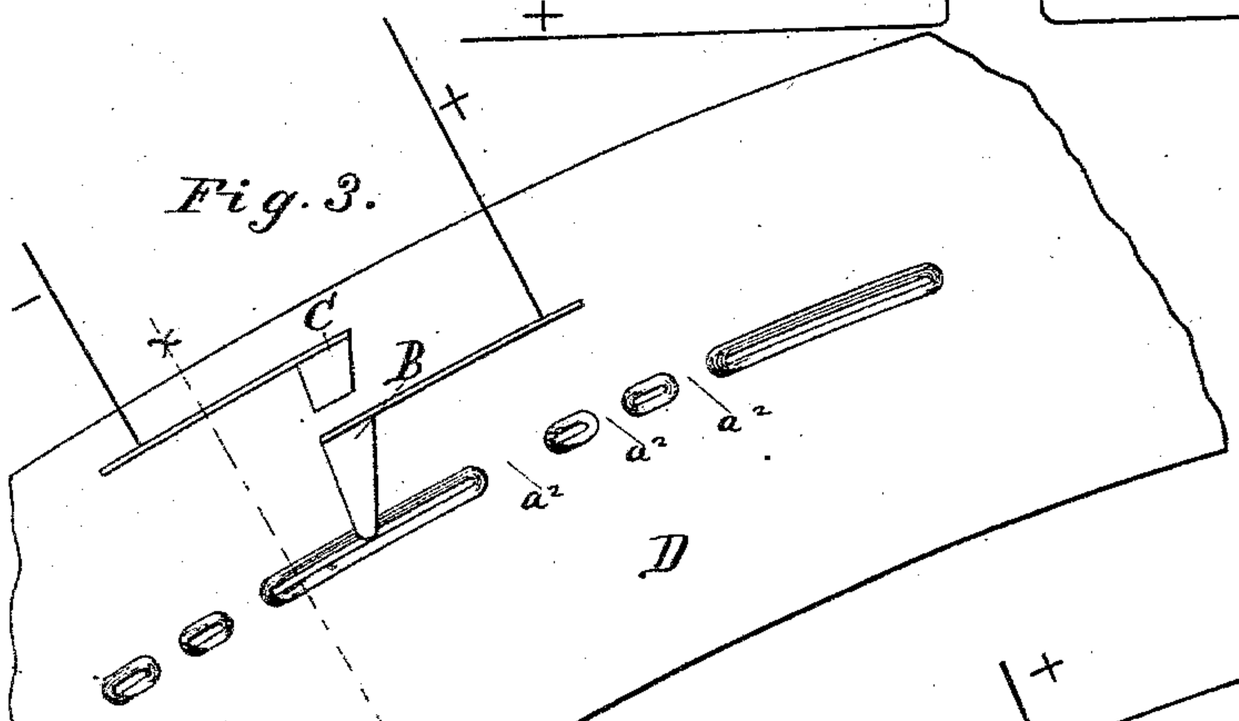

Fig. 4.

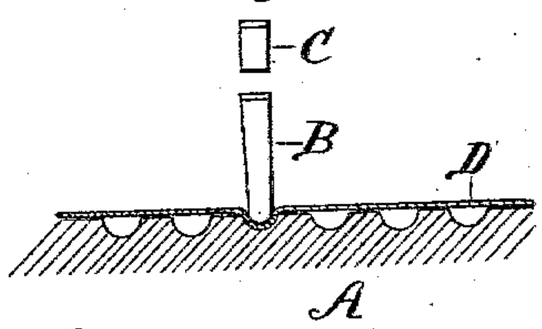

Fig. 5.

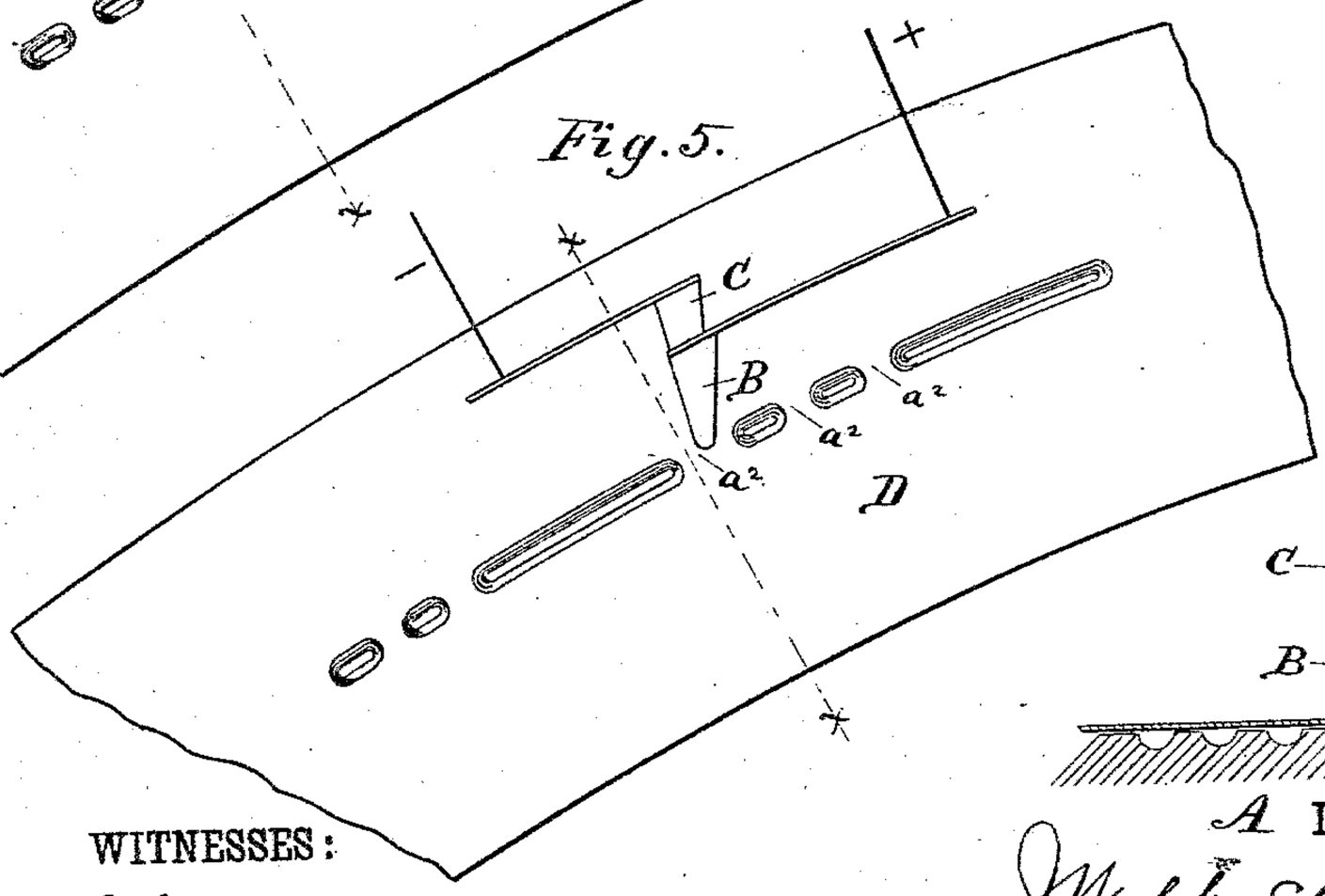

Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

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AUTOMATIC TELEGRAPH.

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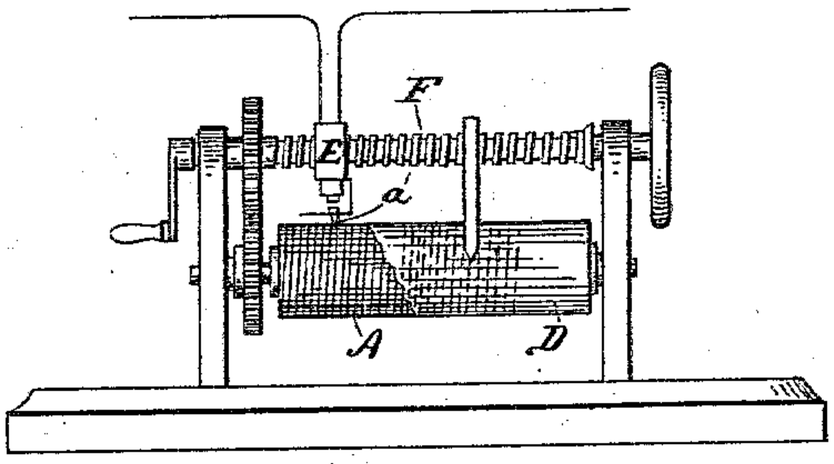
Fig. 7.



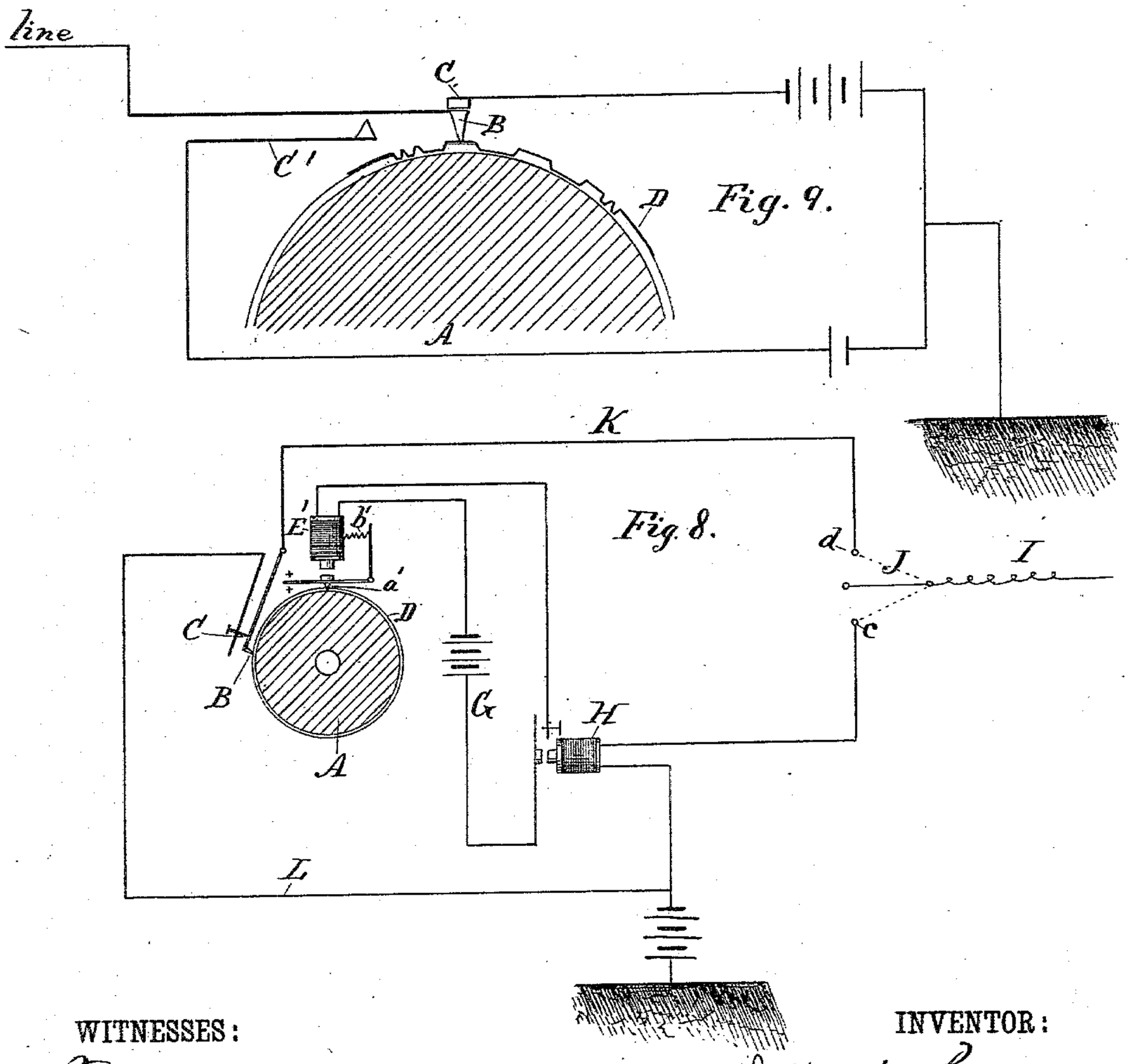


Fig. 9.

Fig. 8.

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AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 283,665, dated August 21, 1883.

Application filed May 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, JAMES WEBB ROGERS, of New York, in the county of New York and State of New York, 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 which—

Figure 1 is a side view of the cylinder with a portion of the indented jacket broken away, and showing the position of the indenting-relay and the traversing stylus. Fig. 2 is a cross-section of the cylinder, showing the relation of the indenting-relay thereto. Figs. 3 and 5 are exaggerated views in perspective, showing how the circuit is made and broken by the indentations and alternating spaces. Figs. 4 and 6 are cross-sections, Fig. 4 being taken through line *x x* of Fig. 3, and Fig. 6 being through line *x x* of Fig. 5. Fig. 7 is a side view of a modification of my invention. Fig. 8 shows a diagram of circuits for the same, and Fig. 9 shows means for avoiding tailings or static change on the line.

My invention relates to an automatic telegraph designed for rapid transmission and easy repetition of messages. It is founded upon the following general principles of construction, which are already known and made use of, viz: an indented fillet or sheet of paper or other non-conducting material, which, when passed under a movable terminal of an electric circuit, is made to actuate mechanically the said terminal to alternate contact and separation from the other terminal as the indentations successively pass under the movable terminal for the purpose of alternately opening and closing an electric circuit.

My invention consists in the combination of a spirally-grooved cylinder having a rotary motion, a jacket or strip of paper or other indentable material having indented characters therein and wrapped around said cylinder, and two terminals of an electric circuit, one of which is movable and is actuated to intermittent contact with the other terminal by traveling on the normal or plane surface of the paper, and separates from the other terminal by falling into the indentation in said strip of paper, the traverse of the groove by the movable terminal being effected either by the endwise movement of the cylinder or the movement of the terminals parallel to the axis of the cylinder, as hereinafter fully described.

In Fig. 1 of the drawings, A represents a cylinder having on its periphery a spiral groove, and having upon one of its journals a spiral thread of a pitch exactly equal to that of the spiral groove on the periphery of the cylinder, so that when the journal of the cylinder is fitted in an interiorly-threaded bearing and the cylinder is turned the cylinder has an endwise progressive movement in a right line, so that a relatively-stationary stylus on the periphery of the cylinder is made to traverse the groove therein.

B is a stylus, which is sustained by a spring mounted on the fixed support B′, and C is a stationary anvil attached to a spring immediately above the stylus, and mounted upon a fixed support, C′. This stylus and anvil constitute the two terminals of an electric circuit, as shown.

D is a jacket, sheet, or strip of paper, or other indentable non-conducting material, which is simply fastened about the periphery of the cylinder. This jacket is indented into the groove of the cylinder with Morse characters, by means of an indenting-point, *a*, worked by a relay, E, the said point being mounted upon one arm of an elbow-lever, as in Fig. 2, while the other arm carries the armature of the relay, and the relay serving to throw the point against the periphery of the cylinder, while a spring, *b*, withdraws it therefrom. This relay is worked by a Morse key in an independent circuit.

Now, for recording a message on the paper jacket and transmitting it the following is the method of working: The circuit of the relay is made and broken by the key in the usual way, either close at hand or at a remote point, and the relay is made to project the point against the paper jacket of the cylinder in accordance therewith, and as the cylinder rotates its groove in passing under the point of the relay permits the latter to indent a spiral row of Morse characters in the said paper

around the cylinder. Then, after the record has been thus made on the cylinder, the latter is run back, so that the beginning of the row of characters is under the stylus B, and the cylinder being now rotated and progressively moved under the stylus, the alternate indentation and intervening flat spaces cause the stylus to be alternately projected into contact with the anvil C of the other terminal, thus making and breaking the circuit in accordance with the record made. Thus, when the stylus drops down into an indentation, as in Figs. 3 and 4, the stylus B leaves the anvil C and breaks the circuit, and when the stylus rides up on the space intervening between the indentations and lying in the normal plane of the paper strip or jacket, as in Figs. 5 and 6, the stylus B is projected into contact with the anvil and completes the circuit.

This apparatus permits a message to be made and then transmitted without removing the paper from the place where its message is recorded, and makes a very desirable form of repeater, as the message recorded on the cylinder A may be received by the relay E from a distant station, and then, when transmitted through the stylus and anvil B and C, is sent to another distant station in an easy and practical manner, without mistake and without the aid of an expert.

In Figs. 7 and 8 is shown another form of my invention, in which the cylinder does not have an endwise motion, but simply revolves, while the relay with indenting-point and the transmitting-stylus and its anvil have a right-line movement parallel to the axis of the cylinder in traversing the groove of the same. For this purpose the indenting-relay and the transmitting-stylus are hung upon a screw-threaded counter-shaft, F, arranged parallel to the axis of the cylinder, and the screw-threads of which counter-shaft have such pitch that when the cylinder and counter-shaft are geared together by wheels, as shown, the rate of rectilinear progression of the relay and the stylus on the counter-shaft is exactly the same as that of the groove of the cylinder, so that when the cylinder revolves the stylus will traverse the groove from end to end. In this modification the indenting-point a' of the relay is forced inwardly to the cylinder by the spring b', and is drawn away from it by the relay, which is here shown in a local circuit, G, closed by the relay H. The main line I is also provided with a switch, J, which, when thrown on the point c, causes the main-line impulses to pass through relay H to ground, and by closing the local circuit operate the indenting-relay E. When the switch J is resting on the point d, relay H is cut out and the instrument is ready for transmitting, and as the cylinder revolves the stylus B, rising and falling in response to the indentation, alternately makes and breaks the circuit between I K B and C L.

Now, I am aware that it is not new to cause indentations in a piece of paper to actuate a movable terminal to intermittent contact with another terminal when said paper was disposed as a flat plane and the indentations were arranged as a volute spiral. On the other hand, I am aware that a spirally-grooved cylinder has been provided with an indented tin-foil jacket, in which the tin-foil formed one of the terminals of the electric circuit. The objection to the first arrangement is that a volute spiral lying in the same plane makes a constantly-varying rate of travel, which is overcome in a spirally-grooved cylinder, and the distinction with respect to the second arrangement disclaimed is that when indented tin-foil constitutes one of the terminals the transmitting-stylus has to be carried with very great accuracy to prevent it from touching either the bottom or sides of the indentations, whereas with my invention, where a non-conducting sheet is used, the stylus may continually bear upon the paper and touch the sides and bottom of the indentations without risk of making a closure of the circuit.

Another advantage of my invention is (see Figs. 5 and 6) that when the stylus B is projected up to contact with the anvil C considerable lifting effect is required, and it will be seen that this lift is effected by the straight or plane surface of the paper at a^2 a^2, which paper is distended over a groove, as in Fig. 6, like a miniature suspension-bridge, and this lifting action is much more positive than would be obtained from an embossment, which, being narrow, would be crushed down by the weight of the stylus and the tension of its spring, and fail to make electrical contact above.

It is obvious that instead of using a non-conducting jacket for the cylinder a jacket of conducting material might be used, since its only function is a mechanical one, and not that of conduction.

For preventing induction on the lines or avoiding tailings or static change, currents of reversed polarity may be thrown upon the line alternately with the main impulses, as has been heretofore done. Thus, in Fig. 9, the stylus B, when elevated by the spaces between the indentations, makes contact with the terminal C of main battery, and when an indentation comes under the stylus the latter drops away from contact with C and makes contact with C′, which is the terminal of a smaller battery of reversed polarity.

In defining my invention more clearly with respect to Edison's Patent No. 213,554, I would state that in the latter the modification referring to the use of a cylinder is substantially different from my construction, in that the cylinder is grooved longitudinally and not spirally, as in mine, and the cylinder is not the permanent carrier of the paper jacket, but the paper simply passes over the same tangentially from a separate roll. I therefore confine this part of my invention to the spirally-grooved cylinder and the permanent periph-

eral indentable jacket, in which the paper or indentable covering is not required to be removed from the cylinder between the time of making the record and transmitting it and the registration of the indented record with the subjacent grooves is preserved with accuracy and with the expenditure of no skill or labor.

With respect to the method of transmitting the electric impulses, Edison's tracer or stylus lifts the spring and breaks circuit when the tracer is passing over the surface of the paper not indented. In my method just the reverse takes place—*i. e.*, the tracer or stylus makes or completes the circuit when the tracer or stylus is on the portion of the paper not indented. When the tracer, stylus, or movable terminal makes contact by descending into the grooves and striking against the other subjacent terminal, the said movable terminal must have an invariable or uniform and definite range of movement in descending in order to strike the subjacent terminal, and sometimes the movable terminal or stylus will (by wedging against the sides of the grooves or indentations in the paper when they are not wide enough, or striking against the bottom when they are not deep enough) fail to have that range of downward movement necessary to bring it into certain contact with the lower terminal, and the result is that the circuit is not closed when it should be. It is not possible to guard against this contingency by adjusting the lower terminal to a closer position to the movable terminal, because of the variable character of the grooves or indentations as to width and depth caused by the contraction of the paper after the grooves or indentations are made. Where, however, the circuit is closed by the elevation of the movable terminal against a superposed stationary terminal by the pressure of the non-indented surface or normal plane of the paper, a certain and positive closure of the circuit is obtained, because the normal plane of the paper always projects the movable terminal a fixed, uniform, and determinate distance, and the stationary terminal above may be adjusted to a position that insures contact and the closure of the circuit each time the movable terminal is lifted by the normal plane of the paper. Furthermore, in my case, as the opening of the circuit is made by the initial movement of the movable terminal in falling into the indentation, it matters not, for this action, whether the movable terminal moves a uniform distance or not.

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

The combination of a cylinder having a spirally-grooved periphery, a jacket having characters indented therein below the normal plane of the jacket, and two terminals of an electric circuit arranged upon the indented side of the jacket, and one of which is made movable and traverses the route of the indentation, the said movable terminal being thrown into contact with the other terminal by the non-indented portion or normal plane of the paper, and the said terminals and cylinder having a motion one over the other, as described.

The above specification of my invention signed by me in the presence of two subscribing witnesses.

JAMES WEBB ROGERS.

Witnesses:
EDW. W. BYRN,
SOLON C. KEMON.