2 Sheets—Sheet 1.

T. A. EDISON.

Automatic-Telegraph.

No. 213,554. **Patented Mar. 25, 1879.**

Fig. 2.

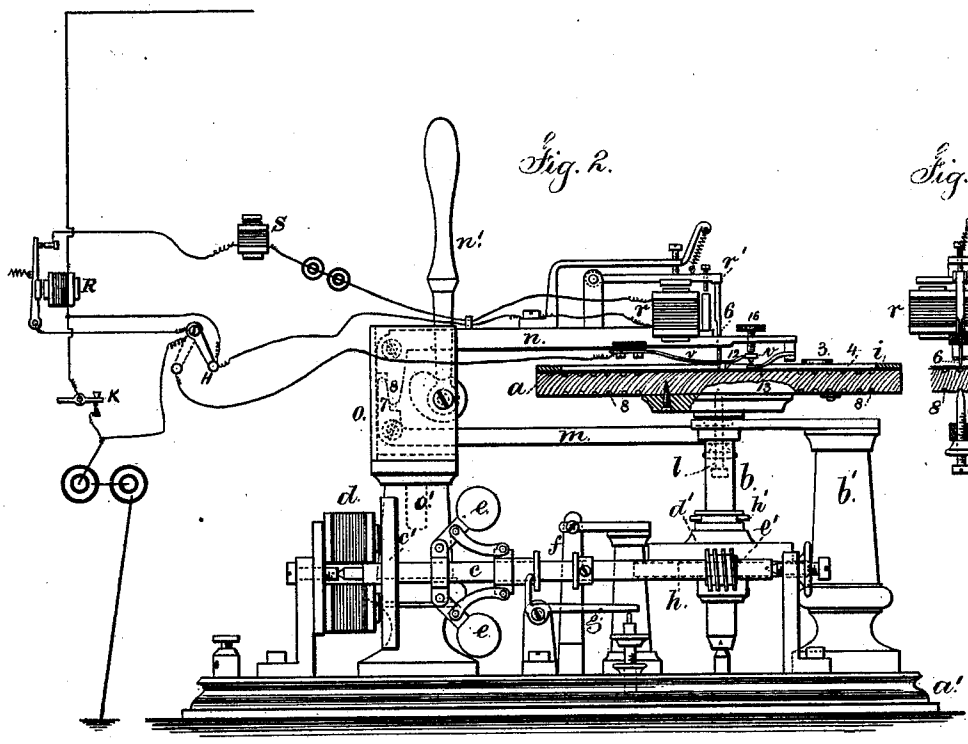
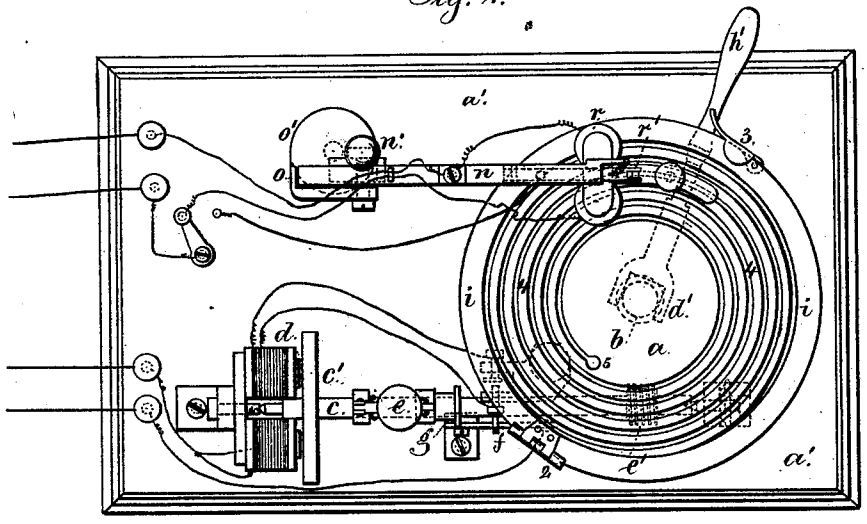


Fig. 3.

Fig. 1.



Witnesses

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2 Sheets—Sheet 2.

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Fig. 5.

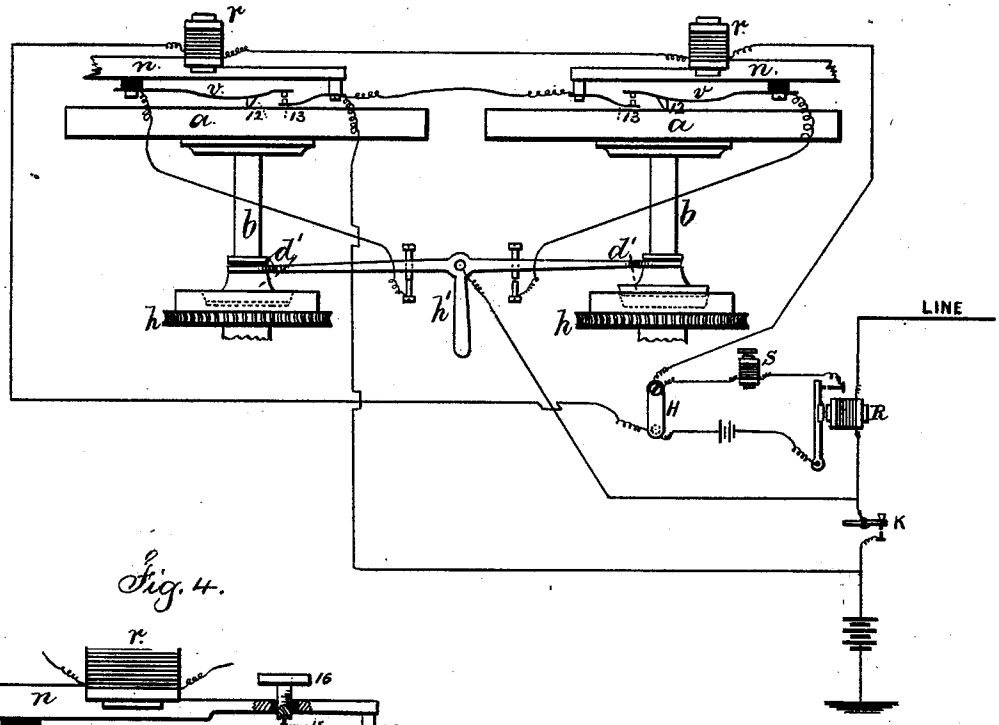
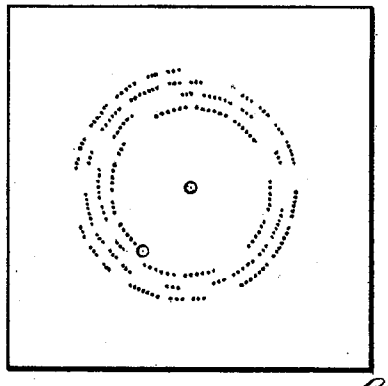


Fig. 4.

Fig. 6.



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

IMPROVEMENT IN AUTOMATIC TELEGRAPHS.

Specification forming part of Letters Patent No. **213,554**, dated March 25, 1879; application filed March 26, 1877.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented an Improvement in Telegraphs, of which the following is a specification:

The object of this invention is to indent upon a sheet of paper the characters received from a distant station, or the characters transmitted from the same station, and to use such sheet of paper to transmit the same message, thus providing an automatic device for transmitting the same message more than once from one station to different stations, and for retransmitting the message automatically where it has to pass through several offices to reach its destination.

In the drawings, Figure 1 is a plan of the instrument. Fig. 2 is a side view with the indenting-plate in section; and Fig. 3 is a section of part of the indenting-plate and pin.

In chemical telegraphs a sheet of paper has been clamped to a disk, and the stylus resting upon such paper has been moved gradually toward or from the center of the disk by a volute groove in the surface of the disk itself or in a separate plate.

I make use of a volute groove in a disk or plate; but the first part of my invention relates to the disk or plate with volute groove or channel in the under surface and the guiding-point below such plate, while the point that operates upon the paper is above that plate.

The disk or plate *a* is mounted upon the vertical shaft *b*, sustained by the standard *b'* and bed *a'*. Any suitable motor is applied to revolve the shaft *b* and plate *a*.

I have shown an electric engine consisting of the shaft *c*, armature *c'*, stationary magnets *d*, governor-balls *e*, circuit breaker or commutator *f*, and lever-arm *g*, operated upon by the governor to open or close the local circuit to the magnets *d*, according to the speed of the engine, and thereby obtain uniformity. This electric engine is similar to that shown in my Patent No. 131,343.

The worm *e'* upon the shaft *c* serves to rotate the wheel *h* upon the shaft *b*, and there is a friction-clutch, *d'*, and lever *h'*, by means of which the wheel *h* is connected with or disconnected from the shaft *b*.

Upon the plate *a* is a clamping-frame, *i*, preferably hinged at one side, 2, and provided with a swinging catch, 3, at the other side. The paper to receive the message is laid upon this plate *a*, and held by the frame *i'* around its edges.

There are to be guide-marks upon the paper and also upon the disk *a*, so that the paper can be correctly positioned upon the disk in the first instance, and replaced absolutely correct when required. For this purpose it is preferable to perforate the paper at the center and at a point corresponding to the hole 5.

The volute groove 8 is upon the bottom of the plate *a*, and in it is the point of the pin *l*, that is at the end of the arm *m*, and above the disk *a* and paper is the marking-point 6 at the end of the arm *n*.

These arms *m* and *n* are hinged to a stock, *o*, upon a vertical standard, *o'*, and there is a vertical pivot upon which the stock *o* and the lever-arms *m n* swing horizontally. The arms *m n* have right-angled toes, as seen by dotted lines at 7 and 8, and the weight of the arm *n* is greater than that of *m*, and hence the point *l* is raised up into the volute groove, and the point 6 rests upon the paper. The lever *n'* acts to raise the point 6 off the paper by pressing the lever-arm *m* downwardly when it is desired to move both points away from the paper.

The marking-point 6 is made to indent the paper by the action of the electro-magnet *r* and its armature-lever *r'*, and thereby produce Morse or other characters by pressing the paper down into the groove 4 of the disk *a*, and this electro-magnet *r* is either in the main line or (by preference) in a local circuit.

In Fig. 2 these circuit connections are illustrated. The relay-magnet R operates by its armature the local circuit to the electro-magnet *r*, and in this is placed the sounder *s*.

The operator at the receiving-station closes the switch H of his key K, and the sending operator opens his switch.

When the instrument is employed to trans-

late or repeat the message into another circuit the delicate insulated spring circuit-closer *v*; tracing-point 12, and contact-point 13 are made use of, and these are placed in the circuit into which the message is to be sent in order that the tracer 12 may lift the spring *v* and break the circuit when resting on the portion of paper that is not indented, and when the indented portion is beneath said point the spring closes the contact at 13, and the message is sent to the distant station.

The arrangement of circuits shown in Fig. 2 is convenient. In this the movement of the switch H to the dotted positions causes the main-line circuit to pass through the insulated spring circuit-closer *v*, point 13, arm *n*, so that the indented paper will give motion to the circuit-closer and transmit the message previously recorded.

The spring 13 rests upon the paper, and the circuit-closing spring *v*, carrying the point 12, has also the screw 15 to close the circuit upon the spring 13 when the indentation passes below the point 12. This screw 16 requires to be adjusted to suit the condition of the paper or of the indentations. I therefore provide a T-head to the screw, and a turner, 16, above it, which passes through the arm *n*, so that the adjustment can be made while the instrument is at work, the said turner being insulated and having a notch for the T-head of the screw, as shown in Fig. 4.

There may be two disks arranged to receive their motion from the prime mover, each having a friction-clutch that is operated by a double lever, *h'*, whereby one disk is disconnected and stopped simultaneously, or just after the other disk is put into motion, so that when one paper is full its disk may be stopped just after the other is started, so as not to drop any signals, and the paper that is full is removed and another paper substituted. The same devices are available either in receiving or in sending messages.

In the diagram, Fig. 5, the connections for this purpose are shown, and the lever *h'* closes the circuit through the spring circuit-closer *r* and contact-point 13 in the act of shifting the power from one of the disks to the other.

It will generally be preferable to make the volute grooves in square or oblong plates, so as to receive ordinary square or oblong sheets of paper. These can be more easily filed away for future reference, and contain the dates and facts desired upon the face of the paper, in the angles thereof. Fig. 6 shows one of these square blanks. The message can be read upon these blanks, or it can be repeated at any time.

In place of having only one contact spring and point, it may be preferable to have three, placed side by side and close together, so as to allow for any inaccuracy in the position of the paper, or that may result from expansion or contraction of the paper. Either one of these points passing into the indentation in the paper will close the circuit and transmit the signal. The screw 16 allows the contact-points to be adjusted to suit the paper that is in use.

A puncturing or perforating point might take the place of the indenting or embossing point.

It is obvious that many modifications may be made to produce the same result. For instance, the electric engine may be replaced by a clock-work or other motor.

The arm *n* might be made to rotate instead of the plate *a*. The underneath spiral might be dispensed with, and the spiral on top of the plate might be continued out a greater distance from the center, and the additional spiral used for giving an outward movement to the arm. The plate itself might be dispensed with, and a drum used, with grooves cut lengthwise, and the indenting-magnet moved back and forward by suitable mechanism, the paper being fed from a continuous roll.

I am aware that it is not new to record telegraph-signals by indenting or embossing paper, as that method is adopted by Morse. Neither is it new to retransmit from such characters by causing them to give motion to contact mechanism, as that is shown in the English patent granted to William Thomson and Fleming Jenkin August 25, 1860, No. 2,047, Such embossing, however, was done on narrow strips of paper.

I claim as my invention—

1. In a telegraph in which the indented or embossed message is employed for transmitting electric pulsations, the means, substantially as specified, for recording the message in a volute line upon a sheet of paper, and for following that line with the circuit-breaking device in transmitting from such record, as set forth.

2. A plate provided with a volute groove upon its surface, and means for clamping a sheet of paper thereto, in combination with an indenting or perforating point, and means for maintaining the proper position of the point over the spiral groove, substantially as set forth.

3. A telegraphic blank of paper or similar material provided with one or more perforations, in combination with the plate receiving the same, and having corresponding marks to insure accurate adjustment in the various machines, substantially as specified.

4. The combination, with a spirally-grooved or volute plate, of an arm and indenting and transmitting mechanism supported by such arm, and a second similar groove for moving such arm, substantially as set forth.

5. In combination with a rest upon the paper, a point operated by the undulations of the surface of the paper and a circuit-closer and electric circuit to a distant receiving-instrument, substantially as set forth.

6. The arms *n* and *m*, pivoted to the stock *o*,

and turning upon a vertical pivot, in combination with the plate *a*, containing a volute groove, substantially as specified.

7. In combination with two revolving plates and the indenting or transmitting mechanism connected thereto, a clutch for connecting one plate before disconnecting the other, substantially as and for the purposes set forth.

8. The combination, with an indenting-instrument, electro-magnet, and spirally-grooved plate, of a sounder in the same circuit as the indenting-magnet, substantially as set forth.

Signed by me this 3d day of February, A. D. 1877.

THOS. A. EDISON.

Witnesses:
GEO. T. PINCKNEY,
CHAS. H. SMITH.