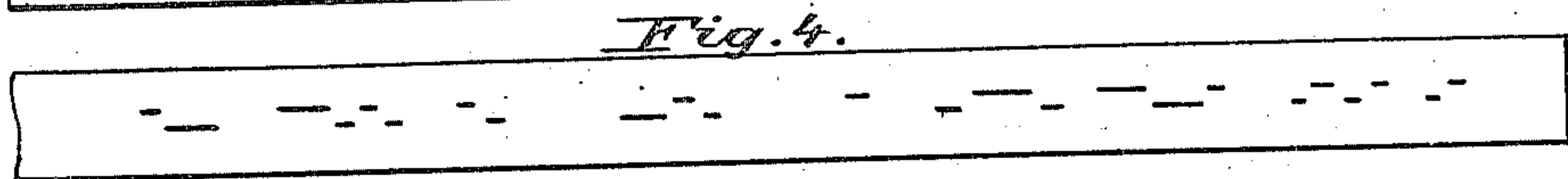
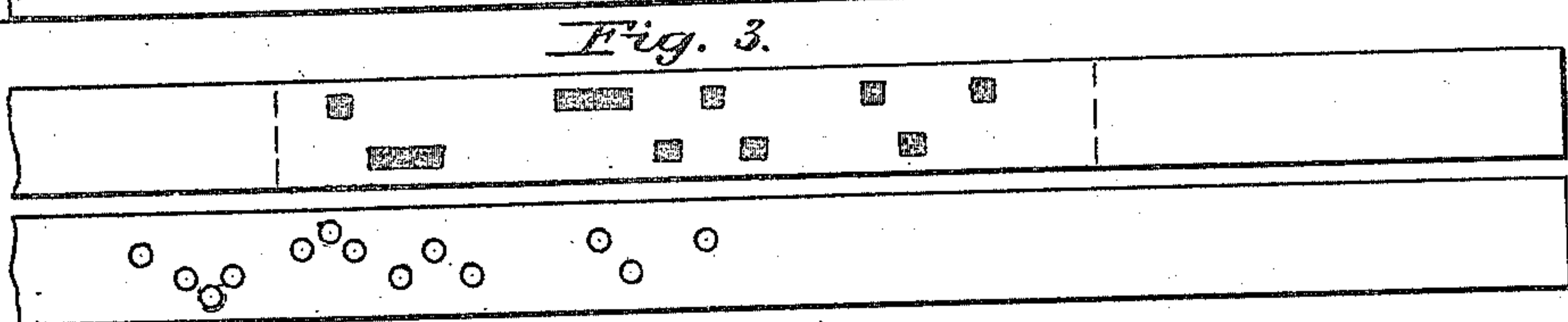
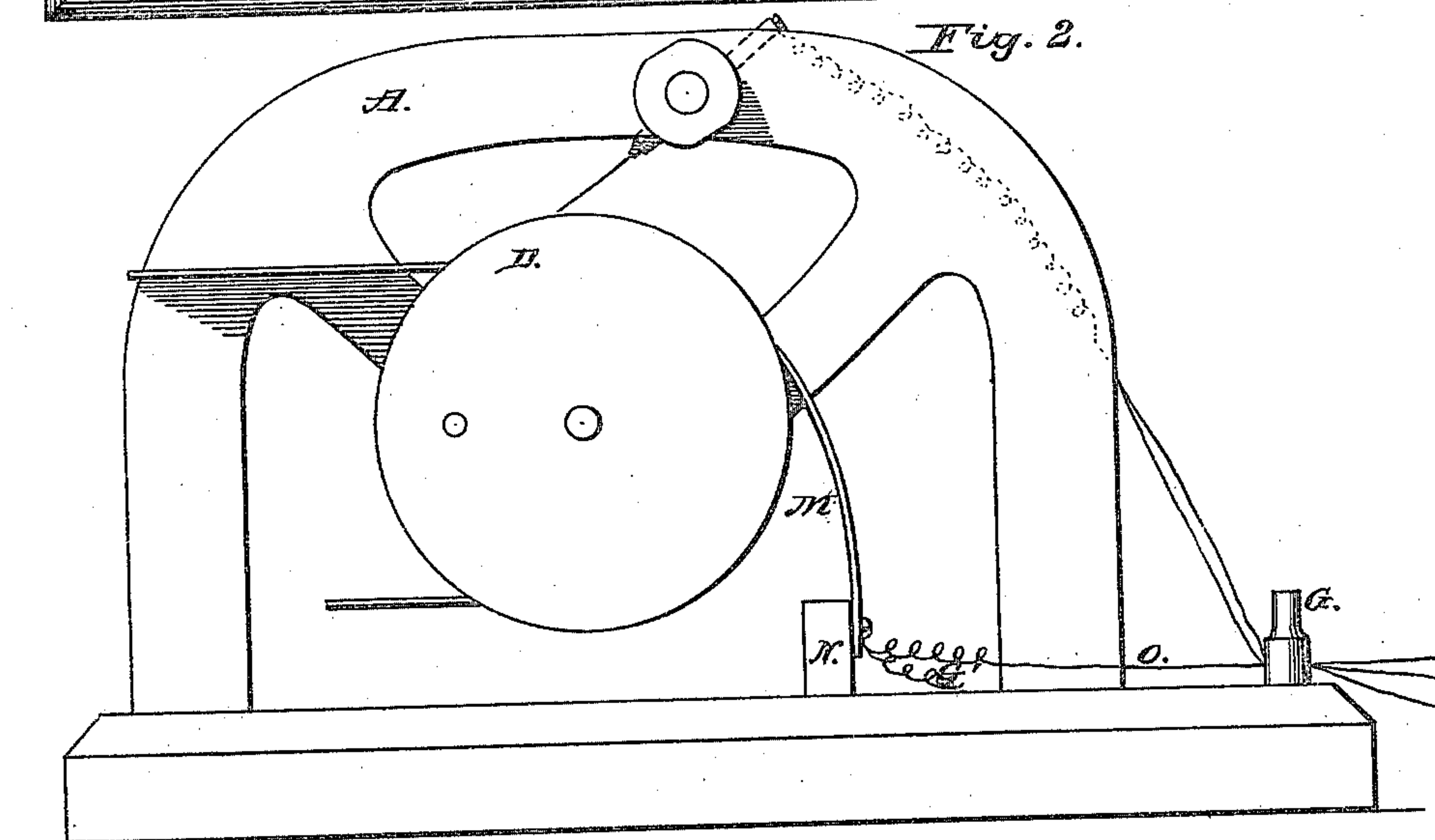
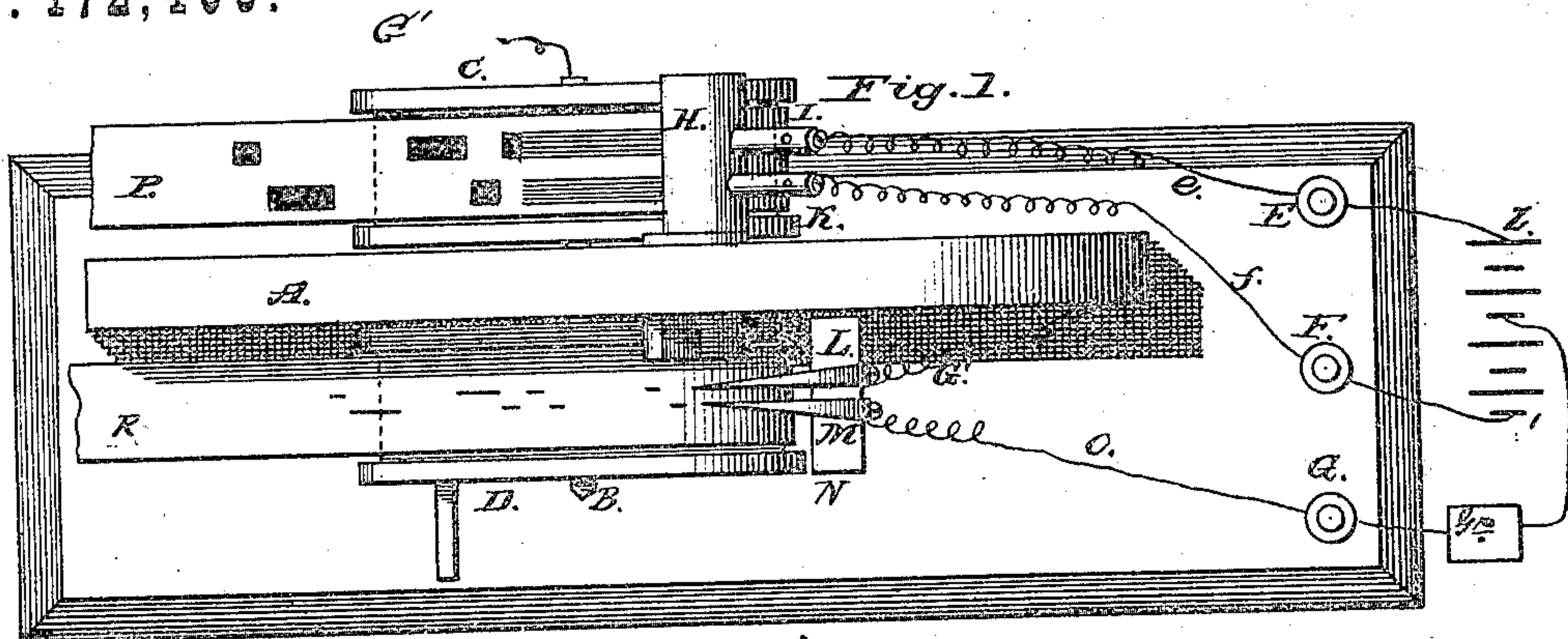


T. M. FOOTE & C. A. RANDALL.

AUTOMATIC-TELEGRAPHY.

No. 172,409.

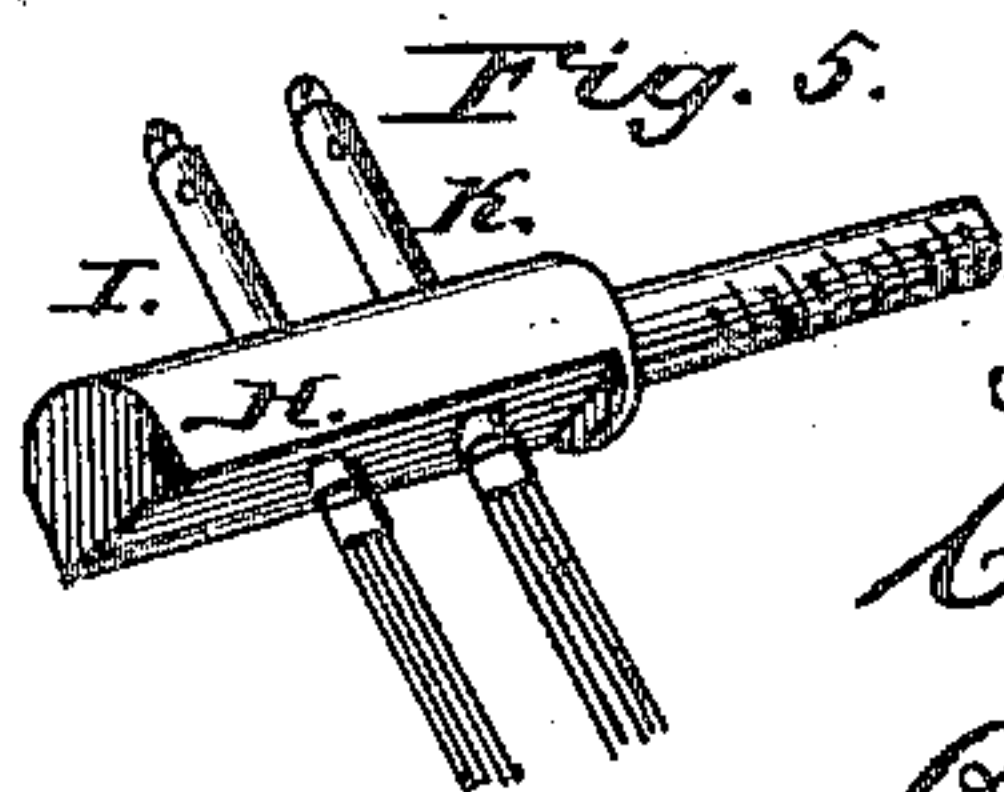
Patented Jan. 18, 1876.



Attest:

W. H. Norris

Geo. H. Graham.



Inventors:

T. M. Foote
C. A. Randall

By their attorney
James L. Norris.

UNITED STATES PATENT OFFICE

THEODORE M. FOOTE AND CHARLES A. RANDALL, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOMATIC TELEGRAPHY.

Specification forming part of Letters Patent No. **172,409**, dated January 18, 1876; application filed May 31, 1875.

To all whom it may concern:

Be it known that we, THEODORE M. FOOTE and CHARLES A. RANDALL, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic-Telegraph Apparatus, of which the following is a specification:

This invention relates to certain improvements in that class of automatic chemical-telegraph systems and apparatus in which the proper connections and breaks in the circuit are made at the transmitting-instrument through the medium of a strip or fillet of perforated paper, recording signals at the receiving-instrument corresponding in character to said perforations.

It will be evident, however, to those skilled in the art of telegraphy that much of the improvements may be applied to other systems with advantage. Hence, while it is described with special reference to the automatic chemical system, we do not limit ourselves to its use therewith in those particulars capable of being used with other systems.

Previous to our invention paper for automatic telegraphing has been perforated in two rows for various purposes—in some cases so perforated that the dots were all made from one row of perforations, and the dashes all from another row. The perforations have also been made in two rows, but not alternately. The perforations have also been made in two rows, for the purpose of transmitting alternate currents of the same duration, for the purpose of working electro-magnets, the dash being made by the space between the perforations, as in the patents of Siemen and Wheatstone. The perforations have also been made in two rows, with the perforations in one row coming between each and every perforation in the other row, (in which case the extra perforations are necessarily all dots,) for the purpose of transmitting a current of opposite polarity to the recording-current upon the line after each recording impulse, as in the Patent No. 153,064.

Our invention consists in perforating the paper in such a manner that the alternate perforations forming the character or characters representing the letter or letters of the message for transmission are in two rows. For

instance, as shown, the dot for "A" is in one row and the dash in another, and the dash and one dot for "B" are in one row and the other two dots in another row; or their positions may be reversed, the fact of having each alternate perforation in a different line being the essential feature. In combination with this perforated paper, we use a drum or wheel, driven in any of the well-known ways, and two brushes or circuit-closers, connected to the opposite pole of one or two batteries, by which means alternate negative and positive currents of electricity are transmitted over the circuit, the number of long and short impulses being about the same on both sides, or from each polarity, thereby keeping the wire or conductor more positively free from induced or static charges and from being "clogged," and the receiver freer from "tailing," than if only a short impulse were transmitted after each recording current, or than if a battery of an opposite nature or polarity to the recording current were flowing on the line whenever the recording current is broken, as in the patent of G. Little, No. 108,495, of October 18, 1870, and others, besides preventing any possibility of short-circuiting, and burning and destroying of the pens or brushes, as is the case in some of the devices patented, and also dispensing with an extra row of perforations for the purpose of connecting the discharging or reverse battery, thereby reducing the number of perforations and the number of impulses to each character, effecting at once a saving in paper, by shortening the space required for a perforated character, simplifying the perforating apparatus, and doubling the speed with the same number of impulses, as only four impulses are required for "B," instead of eight, each and every impulse being availed of for recording, so that, if by any system recording can be effected at one thousand words per minute, allowing three impulses to a letter, and five letters to a word, making fifteen thousand recording impulses, and as many discharging, equaling, or compensating impulses, whether from a relay-magnet, reverse-battery, or condenser, making thirty thousand impulses to record one thousand words, by this system we shall be enabled to record two thousand words in the same time, or just

twice as many, as we use every impulse for recording.

Our invention further consists in the method of receiving, which consists in making the record in two adjacent lines, each alternate recorded dot or dash, or integral portion of a symbol or character, being in a different line, so that the recording is less liable to blurring or running together, and is made plain, distinct, condensed, and more readable, thereby facilitating the copying, and with less liability to errors, and effecting a saving in the chemical paper.

In order, however, to enable those skilled in the art to make and use our improvements, we will describe the same more in detail, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a top and plan view, showing the circuits and connection. Fig. 3 shows two styles of perforated paper. Fig. 4 shows the style of recording; Fig. 5, a detached view of the brushes for closing the circuit.

Like letters indicate similar parts in all the figures.

A is a frame, through which passes the shaft B, upon which is secured the drums C D, one of these drums being insulated from the other. E F G are binding-posts, to which the battery and ground connections are made. H is a rubber stud secured to the frame A, through which pass the brushes or circuit-closers I K, which are connected by wires *e f* to binding-posts E F, and thence to the negative and positive end of the battery or batteries. L M are the receiving-pens, attached to a piece of rubber, N, and thereby insulated from each other, and so constructed as to bear upon the receiving-drum D, or the receiving-paper when in use. The pen L is connected, by wire G', to the frame A, and the pen M, by wire O, to the binding-post G, thence to ground.

The wire connection G', from the frame or sending-drum C, may represent a circuit of any length that it may be practical to work.

P represents the perforated paper, perforated with the letters "A" and "B," and R represents the chemical receiving-paper, with the letters "A" and "B" recorded.

The operation and arrangement of circuits are as follows:

Referring to Fig. 1, post E is connected to the zinc end of the battery Z, and post F to the copper end of the battery C. From post E a wire, *e*, leads to the brush I, and from post F a wire, *f*, to brush K. From either stylus or brush the circuit is through the perforations in the paper to the drum C, shaft B, frame A, wire or circuit G', pen L, through receiving-paper, to drum D, pen M, wire O, to post G, to ground. If, now, the paper be fed over drum C, the stylus or brush K falls into the perforation, closing the circuit, the circuit being from battery to post F, wire *f*, brush K, drum C, shaft B, frame A, wire G', pen L, drum D, pen M, and wire O, to post G, and

then to ground, making on suitably-prepared paper R, passing over D, a record, the length being determined by the perforation then used. If, now, the paper is further fed along, the style or brush I falls into the perforation, closing that circuit, the circuit being from battery to post E, wire *e*, through brush I, drum C, shaft B, frame A, pen L, drum D, pen M, and wire O, and post G, to ground; or from battery to ground, to post G, thence over wire O, pen M, drum C, pen L, wire G', frame A, shaft B, drum C, brush I, and post E, to the battery, leaving its record on the paper R, so that each alternate impulse, whether of long or short duration, makes its record.

We have shown only apparatus worked by manual means, and have not shown devices for drawing the paper; but it is well understood that other than manual means may be employed in any of the well-known ways for rotating the drum, and as the devices for feeding the paper are old, we have not deemed it necessary to complicate the drawing by showing them.

While we have shown two circuit-closers or brushes, only one may be used by having the contact-surface wide enough to cover both rows of perforations, and the drum C in two parts, insulated from each other.

Other modifications may also be made without departing from the principle of our invention.

The perforations may be formed as indicated in Fig. 3, in which they all consist of circular apertures, the dash being formed by three holes and the dot by one, instead of the ordinary long and short perforations.

We are well aware that paper perforated in two rows has been used before, and that the alternate poles of one or two batteries have been used in combination with such paper, as in the patents of Bain and Settle and others; but we do not know of paper perforated or used as described.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In automatic chemical telegraphs, a fillet of paper or other non-conducting material, perforated substantially as described, so that the consecutive perforations forming the characters or integral portions thereof are in separate lines or rows, substantially as described, for the purpose specified.

2. A fillet of paper or other non-conducting material for direct-recording chemical telegraphs, perforated in two or more lines or rows, when the consecutive perforations forming the characters or integral portions of the characters corresponding to the message serve to transmit alternately negative and positive currents, substantially as set forth.

3. In automatic chemical telegraphs, the combination of one or more batteries, perforated paper, transmitting and receiving apparatus, when each succeeding impulse is of an opposite polarity, and serves to record the

whole or part of a character corresponding to the message upon chemically-prepared paper, substantially as described.

4. In automatic chemical telegraphs, in combination with perforated paper and transmitting apparatus, the receiving apparatus, provided with two pens or their equivalent, so arranged and connected that the integral portions of the symbols or characters are record-

ed in separate and distinct lines, substantially as shown and described.

In testimony that we claim the foregoing, we have hereunto set our hands.

THEODORE M. FOOTE.

CHARLES A. RANDALL.

Witnesses:

A. H. NORRIS,

JAMES L. NORRIS.