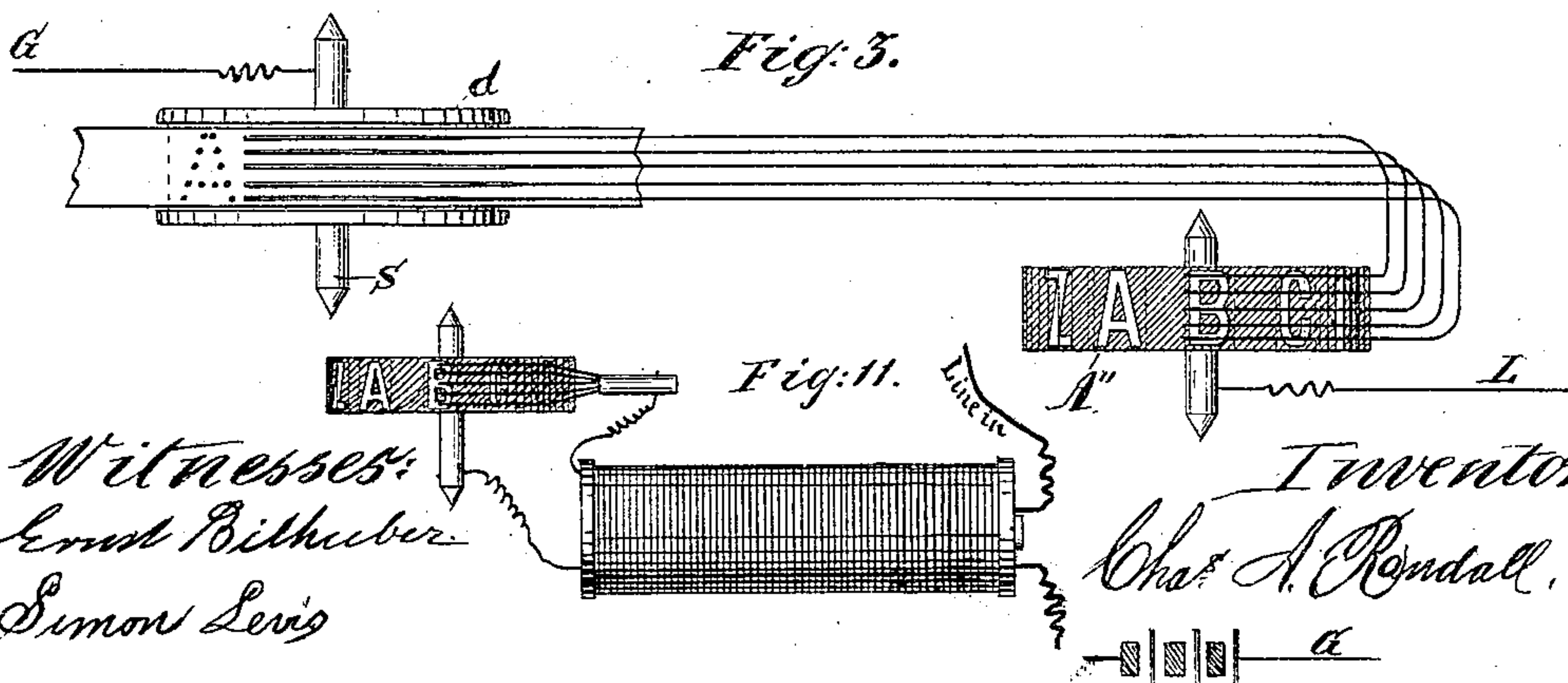
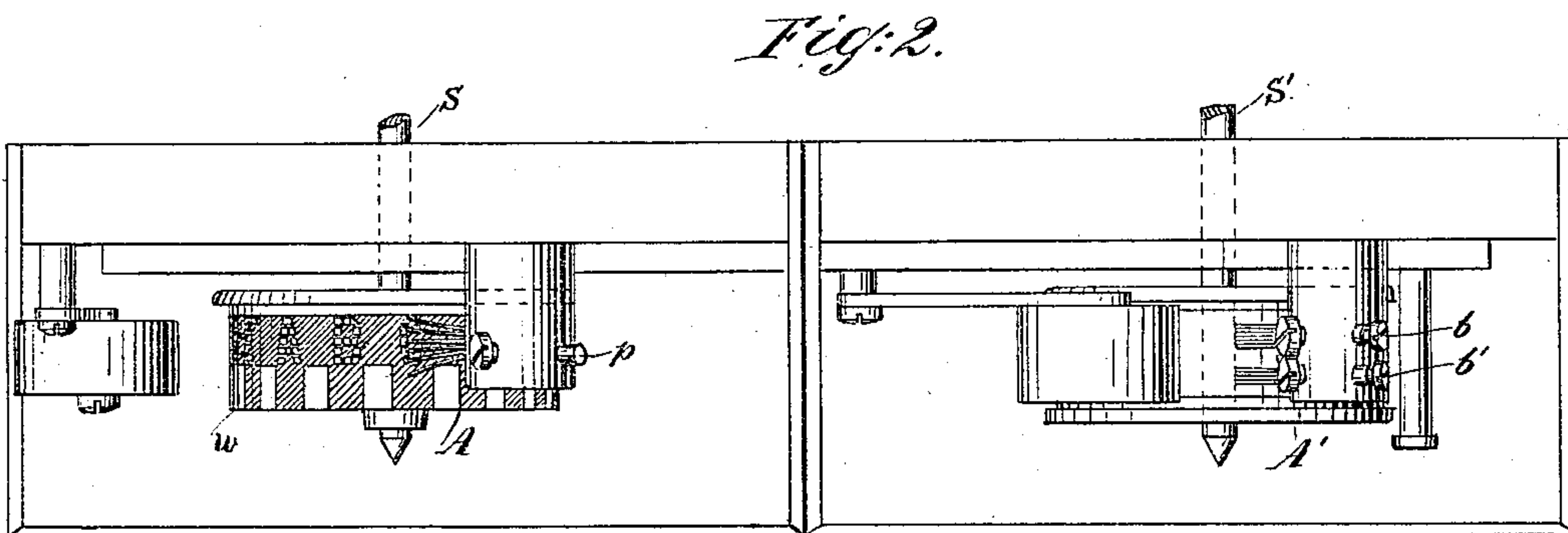
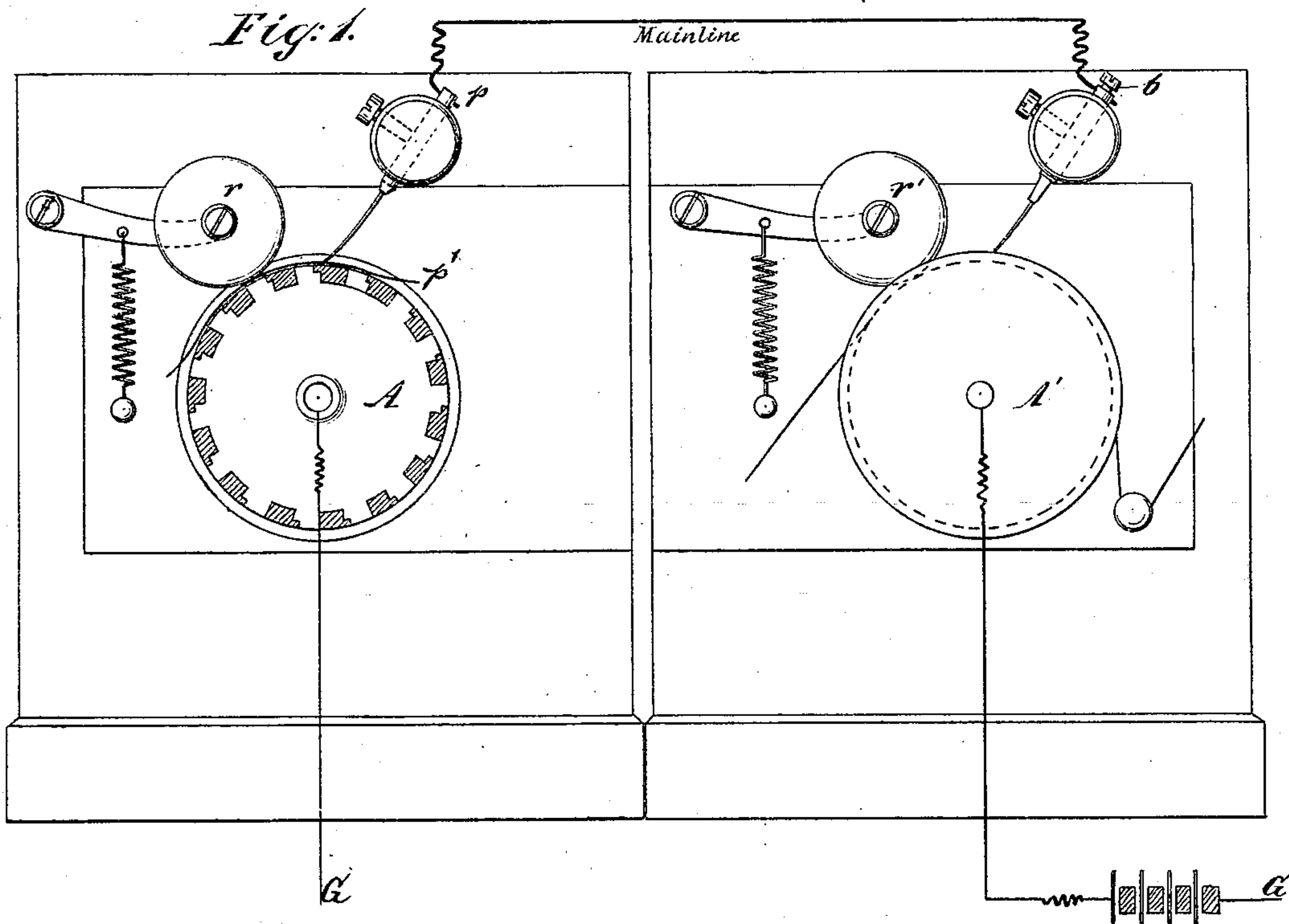


C. A. RANDALL.

CHEMICAL-TELEGRAPH.

No. 191,176.

Patented May 22, 1877.



Witnesses:
Ernst Bilhuber
Simon Lewis

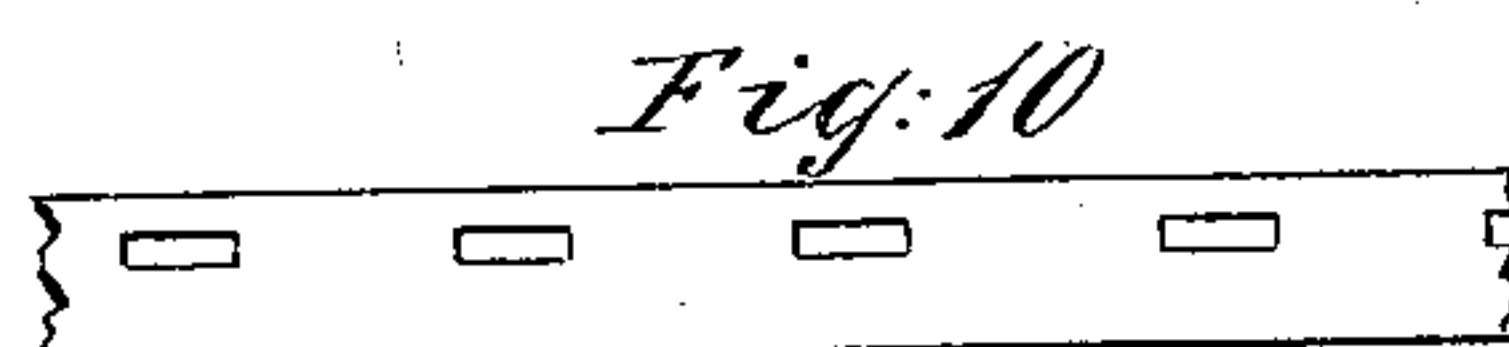
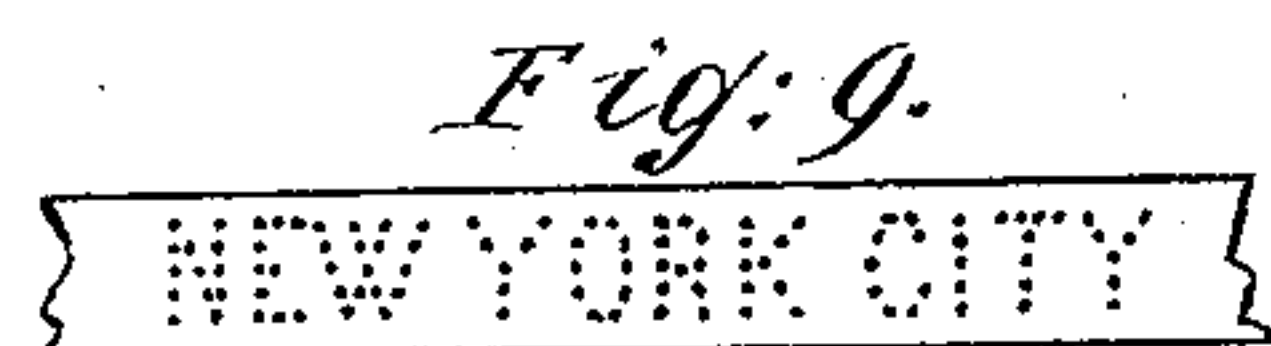
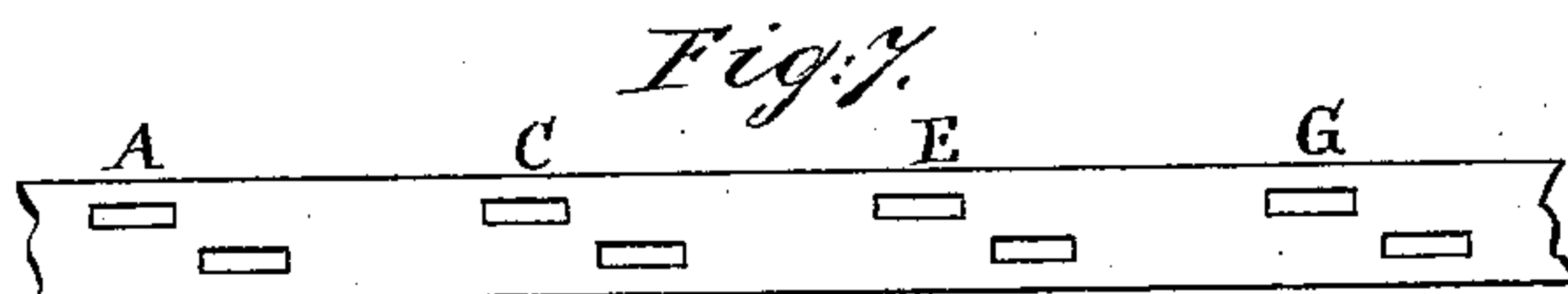
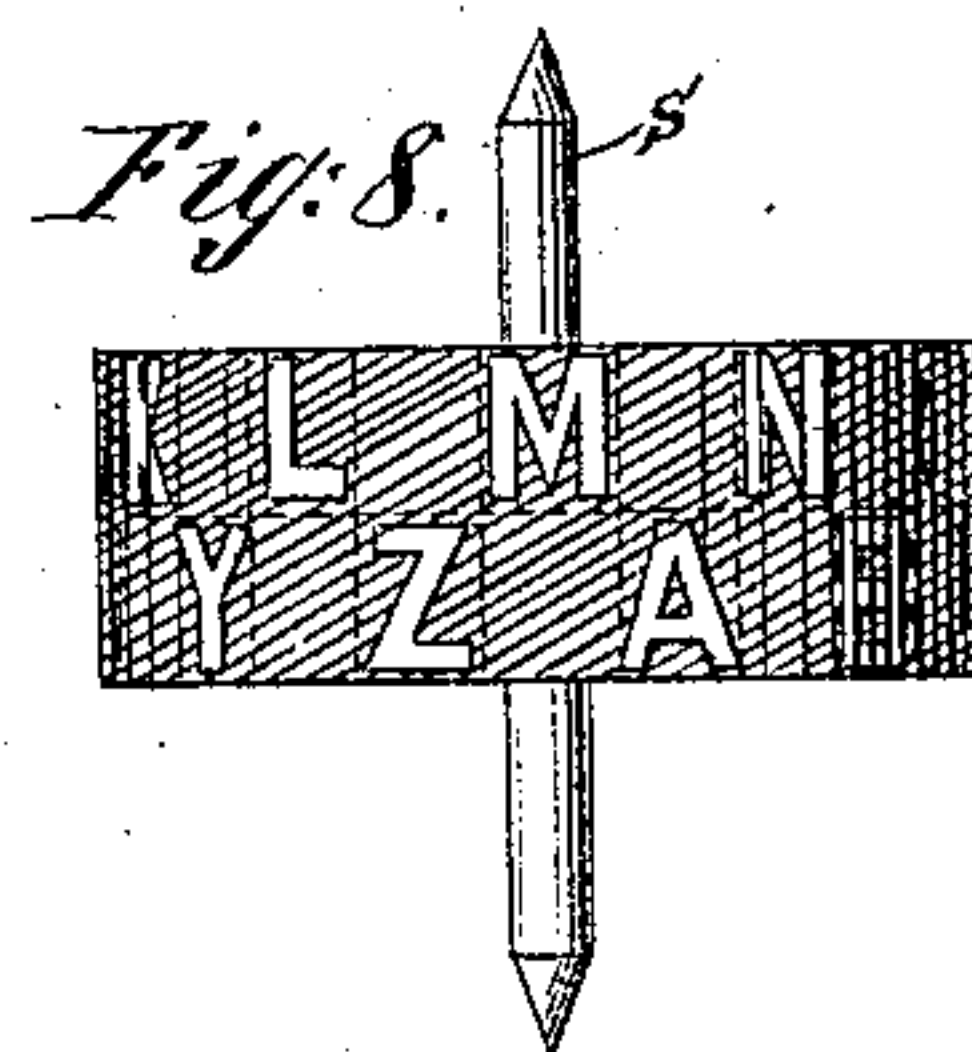
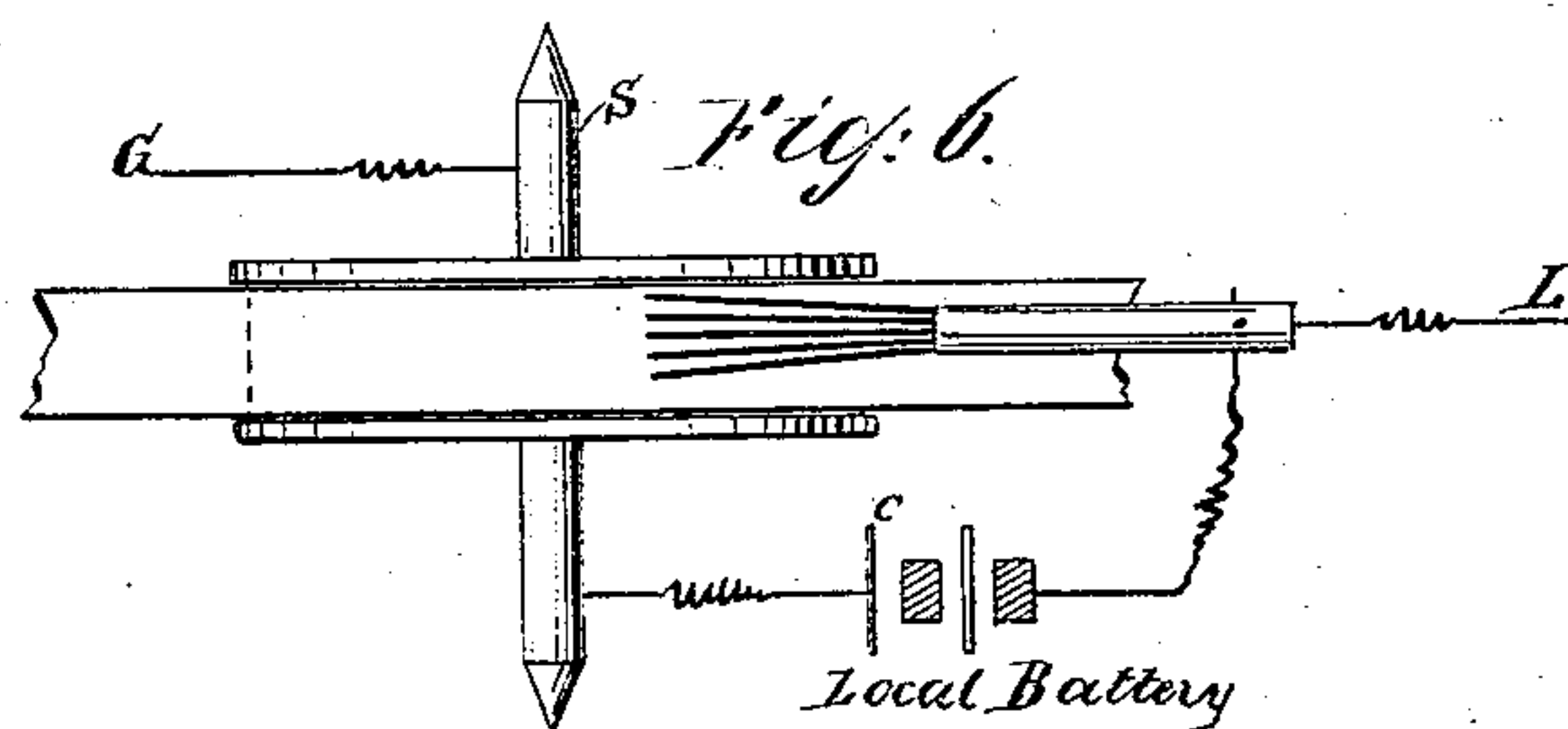
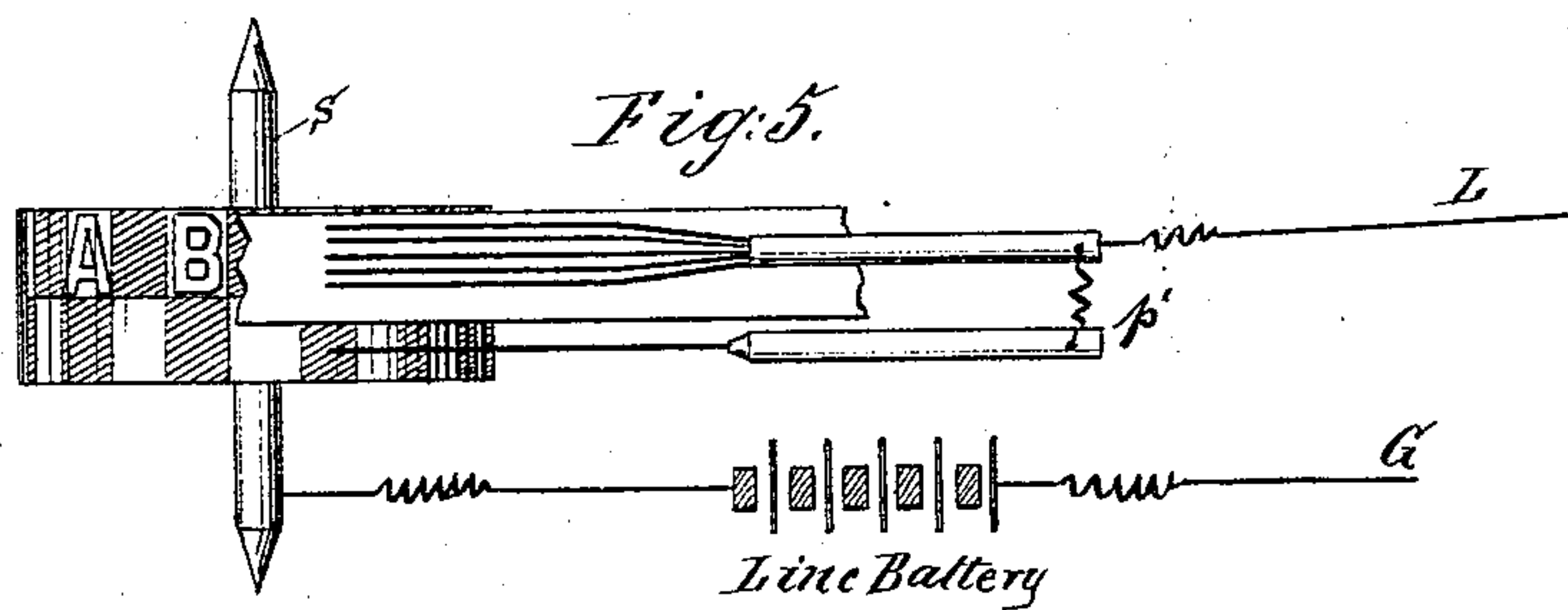
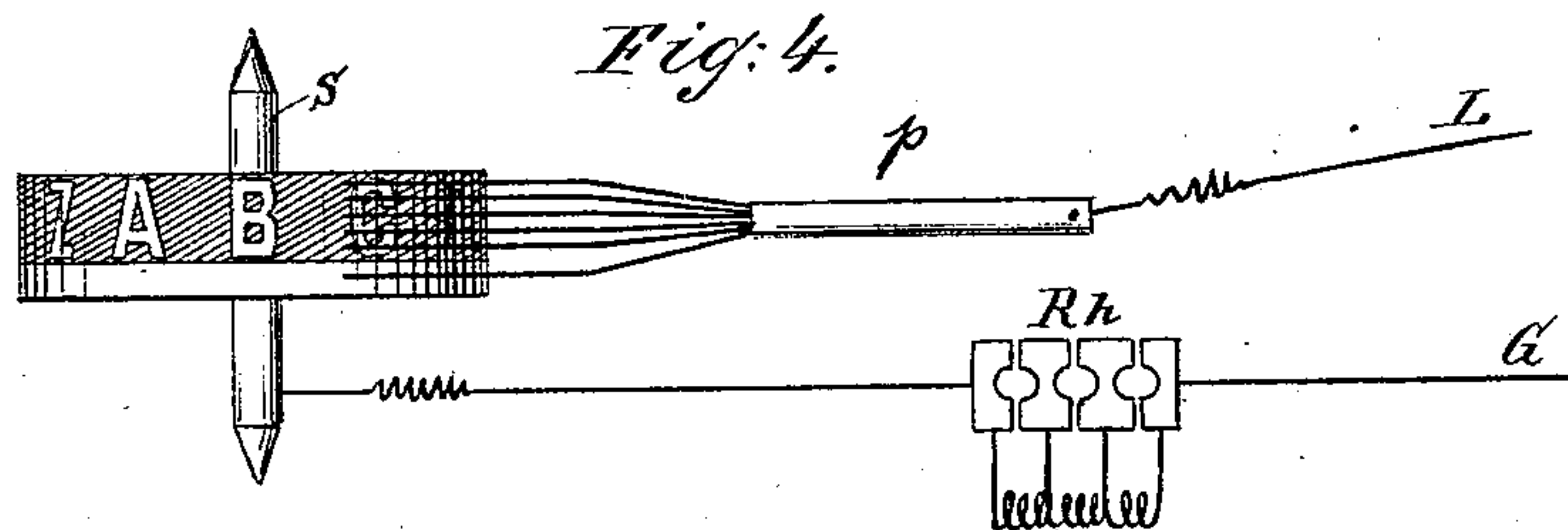
Inventor:
Chas. A. Randall.

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UNITED STATES PATENT OFFICE.

CHARLES A. RANDALL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN CHEMICAL TELEGRAPHS.

Specification forming part of Letters Patent No. **191,176**, dated May 22, 1877; application filed October 16, 1876.

To all whom it may concern:

Be it known that I, CHARLES A. RANDALL, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Chemical Telegraphs, and in apparatus connected therewith, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing.

In chemical telegraphs heretofore the recording has usually been done in characters that required translating before being suitable for commercial purposes.

This has been a serious objection to the so-called automatic chemical systems, the translating having required so much time, labor, and expense, and having also been a source of many errors.

In the automatic systems a serious difficulty has also arisen from the prolongation of the characters, tending to a continuous mark, and thereby becoming illegible.

It has also been attempted to produce Roman letters on chemical paper; but in all telegraphic instruments of this class known to me several line-wires must be employed in order to produce the desired result.

This invention relates to a Roman-letter chemical-telegraph system, and is an improvement upon other chemical telegraphs, in that, first, I am enabled to transmit the same number of letters with one-third the number of electrical impulses over the line, as I obtain a letter at each impulse, while in the Morse characters an average of three impulses to a letter is required; second, transmitting impulses of equal duration and of opposite polarity when desired, instead of long and short impulses, much longer circuits can be worked; third, the prolongation of the characters, or "tailing," is positively prevented; fourth, the message is printed in a reliable manner, in clear Roman letters, ready for delivery, saving labor and delay, usual heretofore; fifth, any number of instruments can be worked in the same circuit.

This invention consists, first, in the receiving apparatus; second, in the method or system of circuits and devices connected therewith to prevent tailing; third, in specially-perforated paper; fourth, in a transmitting

apparatus and its line-wire, of a recording apparatus, which, after having received an electrical impulse of one polarity from the transmitting-station, produces, automatically, an electrical impulse of the opposite polarity.

The arrangements of the various parts of this invention will be more fully understood by reference to the accompanying drawings, forming part of this specification, in which drawings—

Figure 1 is a side elevation. Fig. 2 is a plan view. Figs. 3, 4, 5, and 6 show plan views of modifications of receiving apparatus. Figs. 7 and 10 show fillets of perforated paper. Fig. 8 shows the compound type circuit wheel. Fig. 9 shows a fillet of receiving-paper. Fig. 11 shows induction-coil, &c.

Like figures indicate like parts in all the drawings.

In the drawing, Fig. 1 represents the sending and receiving instruments at each end of the main line, connected to the battery at sending-station, and to the ground at receiving-station.

A represents the receiver, and A' the sender. A, in the receiving apparatus, I term a "type-circuit wheel," and it may be constructed as follows: either in sections of metal insulated from each other, with the letter engraved thereon, as shown in drawings, Fig. 2, or the letters may be engraved upon the periphery of an ordinary circuit-wheel, with an insulated portion of the wheel between each letter, as shown in Figs. 3, 4, and 5.

A' in the sending apparatus is the transmitting-drum, and, as shown, represents a metallic wheel, over which the perforated paper is carried. *b b'*, Fig. 2, are the transmitting-brushes to make contact with the drum A' through the perforations in the paper.

The drum A' and the type-circuit wheel A may be driven by any suitable motive power, such as trains of wheels and weights, electric engines, or other power, and should be governed to run isochronously, or nearly so.

I propose also to use a unison device, by which, at a given number of revolutions, any slight variance may be corrected automatically.

This will be the subject of a future application.

The paper for transmitting may be perforated with any suitable perforations; but when perforated, as shown in Fig. 10, with single perforations, but one transmitting-brush will be required, and the impulse will be transmitted from one pole of the battery. For the transmission of alternate currents the paper must be perforated, as shown in Fig. 7, and two transmitting circuit-closers or brushes, *b* *b'*, must be used in connection with the battery or batteries.

But one perforation is required for a letter, and the perforation must have the same relation to each other as the letters on the type-circuit wheel—that is, in perforating the word "How," the distance between each perforation must be the same as between the same letters on the type-circuit wheel.

The type-circuit wheel may, however, run twice as fast as the perforated paper is fed, and thus the distance between the perforations will be lessened one-half; but the distance between the perforations must be relatively the same as before.

In the receiving apparatus I employ a receiving-pen constructed with a number of points or wires. Preferably I have used five, but do not confine myself to any particular number.

This pen is in contact with the receiving chemical-paper strip *p**, Fig. 1, and the incoming current divides at the pen, and passes through the paper from each point as the metallic letters, in whole or in section, pass under the same, Fig. 2, thereby recording the characters in a series of dots, as shown in Figs. 3 and 9.

In Fig. 2 I have shown the type-circuit wheel upon the same shaft, *s*, with an ordinary circuit-wheel, *w*, an insulated portion of one wheel coming opposite a metallic portion of the other.

I have also shown an extra wire from pen *p*, drawing upon the said circuit-wheel.

This I may make use of to advantage in several ways. As shown in Fig. 2, it simply puts the line to ground at every contact with the metallic parts of said circuit-wheel, serving to discharge the line.

In Fig. 4 I have shown a solid metallic wheel in lieu of the circuit-wheel *w* and the extra wire or circuit-closer in contact therewith.

The extra wire may or may not be in contact with the chemical paper.

In this arrangement the main line *L* is continually to ground, and the incoming current, dividing at the pen *p*, Fig. 4, will pass through the extra point, as well as the recording-points, of the pen; and to prevent too much of the current passing that way, and yet virtually keeping the line to ground, I have shown the adjustable resistance *R h*, so as to properly adjust the amount of current passing to ground.

In Fig. 6 I have shown a single type-circuit wheel, with chemical paper passing over the

same, and the recording-pen in contact therewith. In connection with the same I have shown a small local battery, from which the current passes through the paper in an opposite direction to the recording-current without marking the paper. By either of the methods described, under the arrangement as shown in Figs. 2, 4, 6, the line is properly discharged, "tailing" is prevented, and the letters recorded in a clear and distinct manner.

In Fig. 5 I have shown the same arrangement of the type-circuit wheel and ordinary circuit-wheel, as shown in Fig. 2. In this case, however, the circuit-wheel serves to transmit a negative impulse from the line-battery, through the extra pen *p'*, to line *L* at each contact of the metallic portion of the circuit-wheel with the circuit-closer *p'*. This serves to make the recording clear and distinct, and also to partially discharge the line.

The best result, however, will be obtained by making an extra perforation in the transmitting-paper after each recording perforation, as shown in Fig. 7, which may be availed of to put the line to ground at the sending-station after each recording-impulse is sent. By this method the line will be more perfectly discharged.

In the drawing I have shown an induction-coil, Fig. 11, the construction of which is well known, and requires no further description.

The special features in its use are the combining of a small battery at the receiving end to act with the main battery at the sending end of the line, so that a current of greater quantity may be made to pass over the inside wire of the induction-coil, thereby increasing the induced current, and, also, the combination with the same of the receiving type-circuit wheel.

The induction-coil, offering but slight resistance to the main current, may also be used at intermediate offices, and the recording-current induced, and a greater number of instruments worked in a single circuit.

In Fig. 8 I have shown a double type-circuit wheel with the beginning of one alphabet at or near the center of the alphabet on the other wheel.

By thus arranging the letters they are in a more convenient form for use, as the necessity of making a complete revolution to repeat a letter will be avoided.

In combination with this double type-wheel, perforations similar to those shown in Fig. 7 could be used to the greatest advantage, as currents of opposite polarities may thus be alternately transmitted, and each impulse make its own record.

In Fig. 3 I have shown a modification of the receiving apparatus.

A'' represents the type-circuit wheel, with a series of circuit-closing pens in contact therewith. *d* represents a metallic receiving drum or wheel, with the chemical paper passing over the same, and a series of pens in con-

tact therewith. These pens are in metallic contact with the circuit-closing pens bearing upon A". In use the incoming current passes from the line L to the wheel A", and from the metallic portions of the letters on the wheel through the point or points presented to it, and thence over the respective circuit or circuits to the pen or pens in contact with the receiving-paper to the drum and shaft s, to ground at G, recording the letter, as before explained.

That the recorded letters may not be separated too widely, the receiving-drum d may run considerably slower than the type-circuit wheel A". Upon circuits of ordinary length the paper may be fed step by step by any proper device.

I also contemplate using an induced current to produce the proper spacing of the paper.

While I have shown and described this apparatus in connection with perforated paper, I do not desire to confine myself thereto, as I contemplate applying the same to use in combination with an ordinary lettered-key transmitting apparatus, similar to that used in the House or Hughes printing-telegraph, it being well adapted to the same, and advantageous in several particulars over the printing-telegraphs requiring electro-magnetic or mechanical power to effect the printing.

The type-circuit wheel may be constructed by forming the letters on the periphery of the wheel by a series of iron or steel pins set in the same, which may be readily replaced when the points have been used or consumed.

In use the wheel would make direct contact with the paper, and the incoming current, passing through the wheel and paper to ground, would record such letter upon the paper presented there at the time of the passage of the impulse.

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

1. The combination, in a chemical telegraph, of a suitable transmitting apparatus with a single line-wire, and a receiving-drum composed of a circuit-wheel, the metallic sections of which represent the letters of the alphabet, so that by a single impulse of electricity any desired letter can be recorded upon chemical paper passing over the type-circuit wheel, substantially as set forth.

2. The combination, in a chemical telegraph, of a circuit-wheel, the metallic sections of which represent the letters of the alphabet, with a transmitting-strip provided with perforations, the distances of which from each other correspond to the distances between the successive letters to be recorded, substantially as described.

3. The method herein described of splitting up the electric current in the receiving-station by combining a series of receiving-pens connected to one and the same line-wire with the type-circuit wheel, substantially as set forth.

4. The combination, with a transmitting apparatus and with its line-wire, of a recording apparatus, which, after having received an electrical impulse of one polarity from the transmitting-station, produces automatically an electrical impulse of the opposite polarity, substantially as described, and shown in Fig. 5.

5. The combination, with a type-circuit wheel, of an induction-coil and a battery in the receiving-station, the induction-coil being connected to the line-wire, the battery, the stylus, and the circuit-wheel, substantially as described, and shown in Fig. 11.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

CHARLES A. RANDALL. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.