(No Model.) 2 Sheets—Sheet 1.

B. E. J. EILS.

QUADRUPLEX TELEGRAPH.

No. 293,956. Patented Feb. 19, 1884.

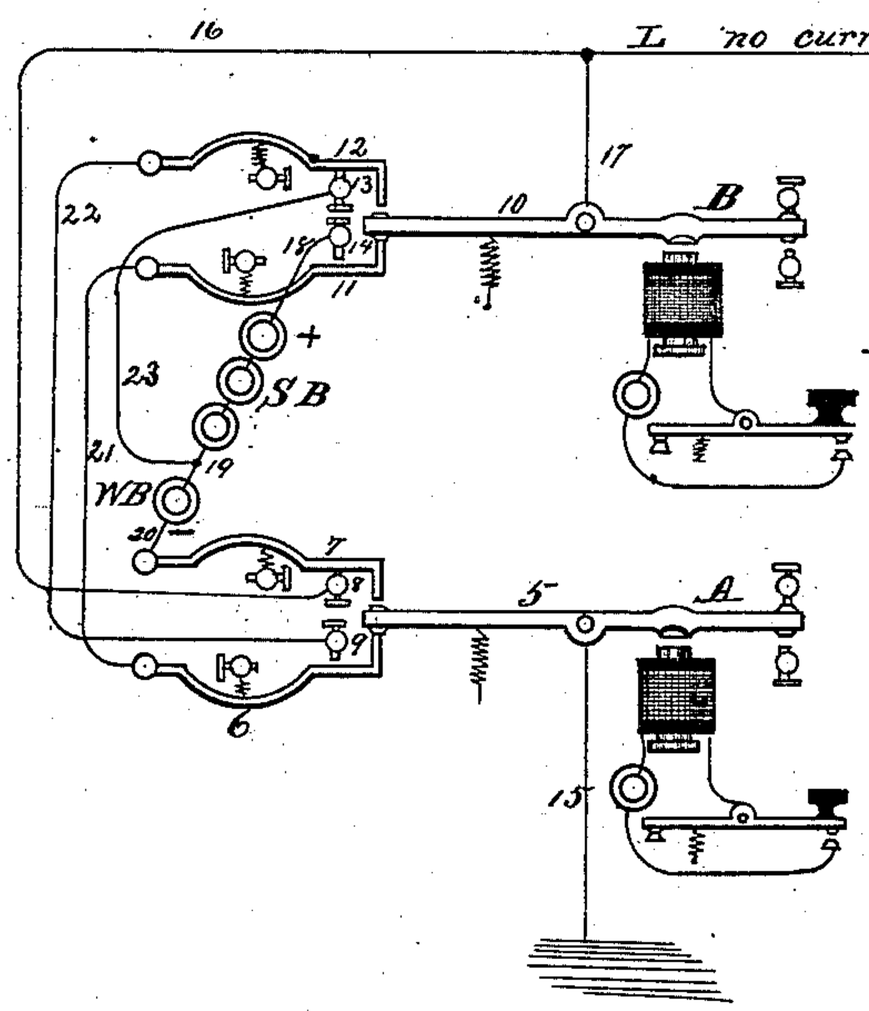


Fig. 1

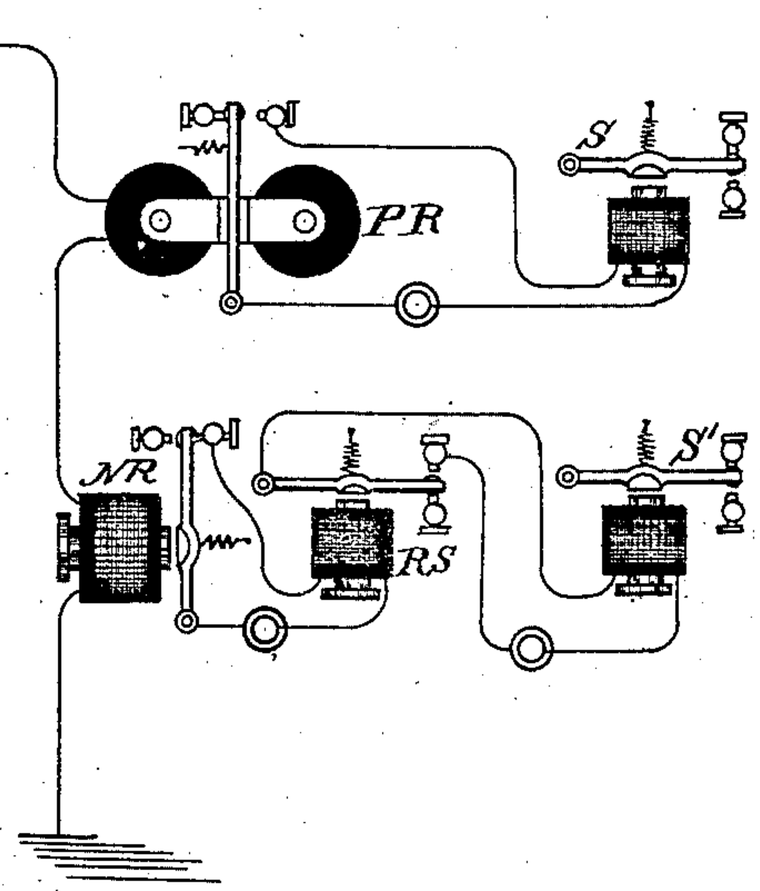
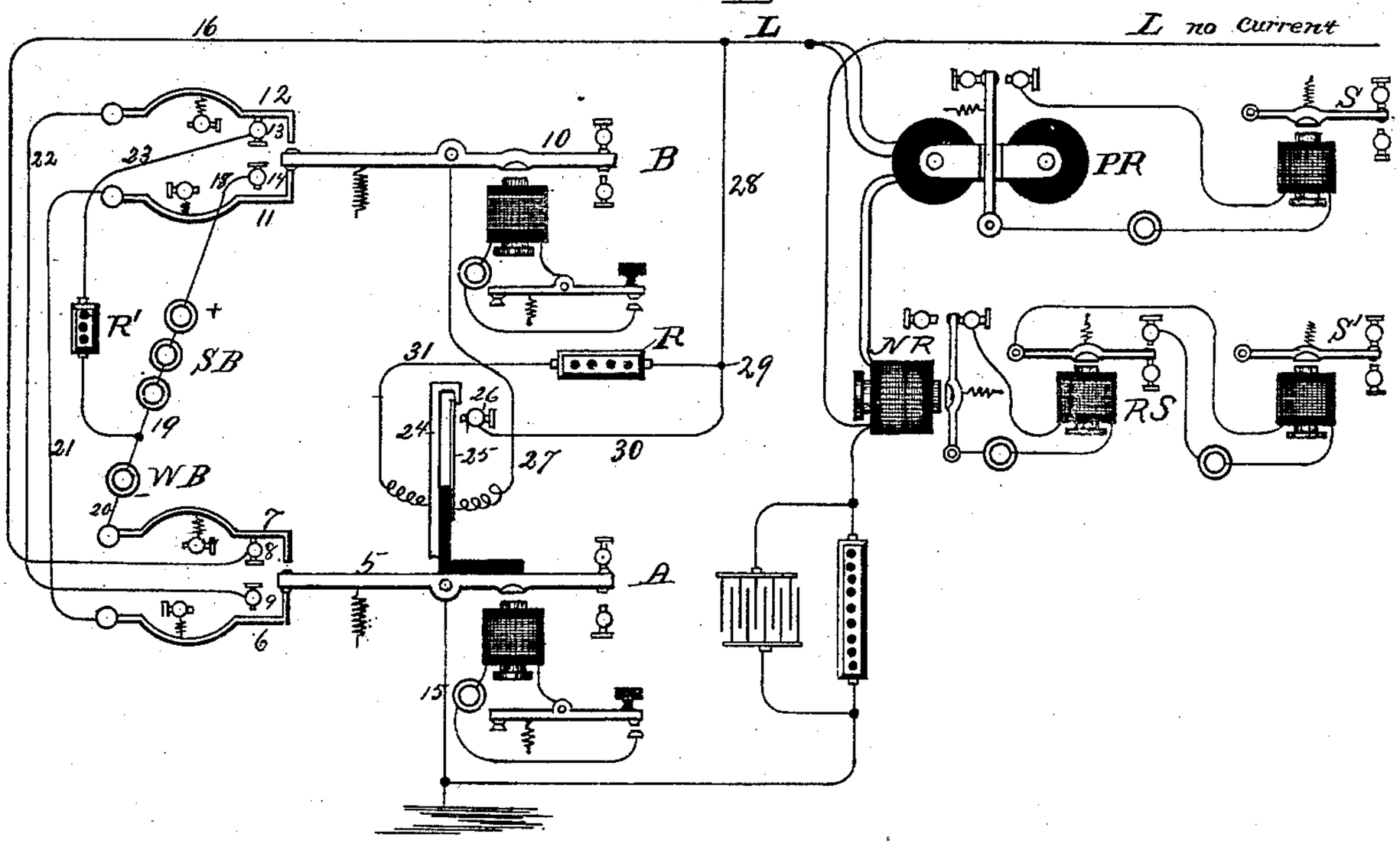


Fig. 5.



WITNESSES:
E. F. Walker
Ed. Neale

INVENTOR.
B. E. J. Eils

(No Model.) 2 Sheets—Sheet 2.

B. E. J. EILS.

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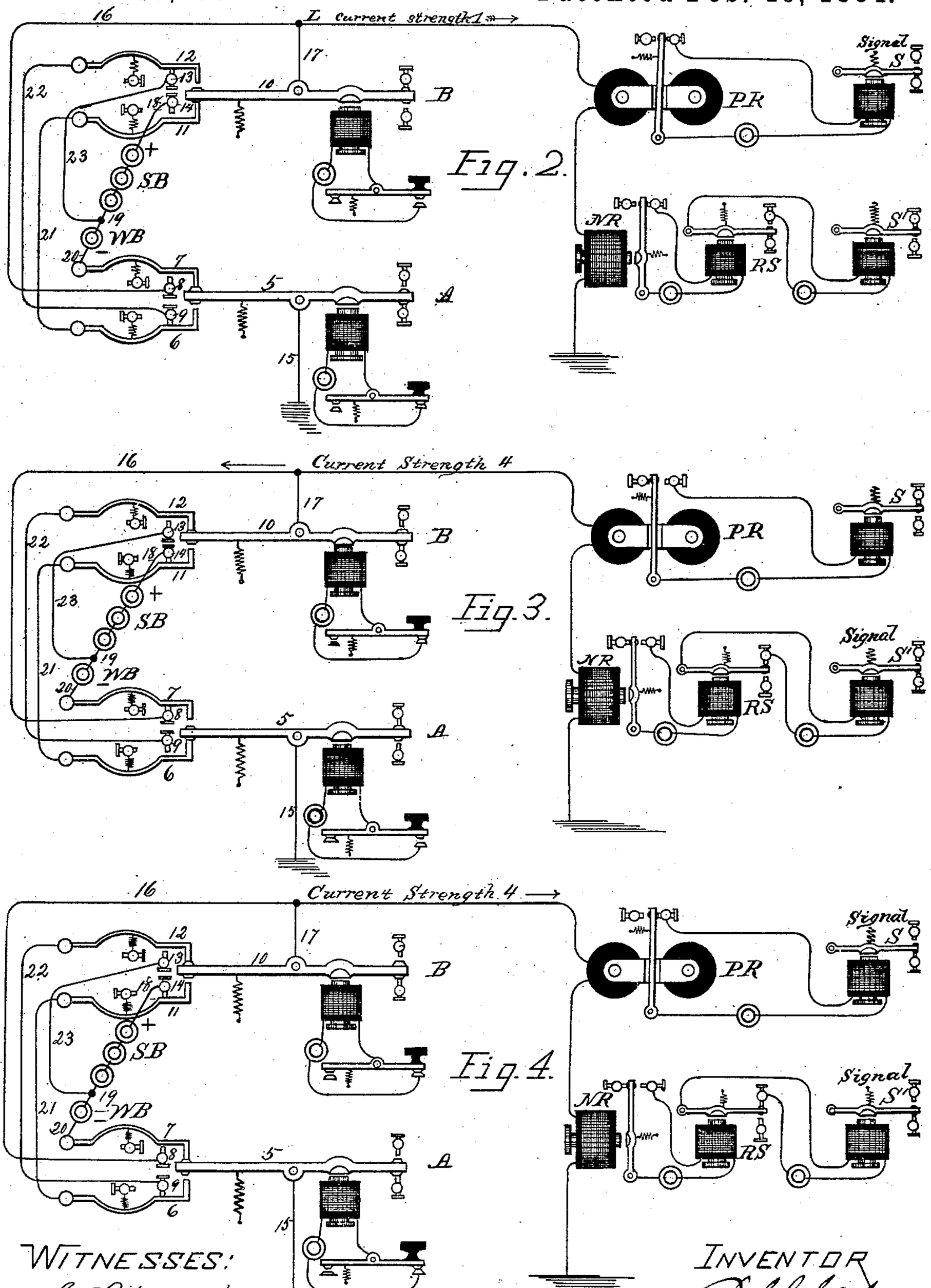

Fig. 2.

Fig. 3.

Fig. 4.

WITNESSES:
E. F. Walker
L. A. Neale

INVENTOR
B. E. J. Eils

UNITED STATES PATENT OFFICE.

BETTE E. J. EILS, OF WASHINGTON, DISTRICT OF COLUMBIA.

QUADRUPLEX TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 293,956, dated February 19, 1884.

Application filed March 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, BETTE EDWARD JULIUS EILS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Quadruplex Telegraphs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to that class of diplex and quadruplex telegraphs in which there is normally no battery in the main-line circuit, and in which the respective signals or messages are transmitted by the operation of two continuity-preserving keys or transmitters; and it relates more especially to a telegraph which embodies such an organization of two unequal batteries or sections of a battery and two keys or transmitters that the separate closure of one key will cause the line to be charged with a current of, say, positive polarity from the weaker battery; the separate closure of the other key will cause the line to be charged with a current of negative polarity from the combined batteries, and the closure of both keys will cause the line to be charged with a current of positive polarity from the combined batteries. The known transmitting system of this character requires two ground-connections, one from each key or transmitter.

My improvement consists in so organizing the transmitting system that but a single ground-connection from one of the keys or transmitters is required.

In order that my invention may be clearly understood, I have illustrated in the annexed drawings, and will proceed to describe, the best form thereof at present known to me.

The four figures of the drawings are all similar diagrams of a diplex telegraph embodying my invention, Figure 1 showing the position of the parts when both keys are open; Fig. 2, that when one key alone is closed; Fig. 3, that when the other key alone is closed, and Fig. 4 that when both keys are closed.

The keys or transmitters A and B are preferably operated each by a special electro-magnet, local battery, and finger-key in the manner well known. Transmitter A has five points—namely, lever 5, contact levers or springs 6 and 7, and contact-screws 8 and 9. Transmitter B is precisely like transmitter A, its lever being marked 10, its contact levers or springs 11 and 12, and its contact-screws 13 and 14. Lever 5 is connected to earth by wire 15. The main line L is connected to contact-screw 8 by a branch, 16, and also to lever 10 by a branch, 17. The positive pole of battery S B is connected by wire 18 to contact-screw 14, while its negative pole is connected by wire 19 to the positive pole of battery W B, whose negative pole is connected by wire 20 to contact-spring 7. Contact-spring 6 is connected by wire 21 to contact-spring 11, and contact-spring 12 is connected by wire 22 to contact-screw 9. Contact-screw 13 is connected by wire 23 to wire 19.

For the purposes of explanation let the electro-motive force of battery W B be represented by 1, and that of battery S B by 3. At the receiving-station the main line is connected with one end of the helix of a polarized relay, P R, the other end of which is connected with one end of the helix of a neutral relay, N R, whose other end is connected to ground. The polarized relay responds to all currents of positive polarity irrespective of tension. The neutral relay responds to all currents of strength 4, emanating from the combined batteries, irrespective of polarity. The polarized relay, in opening and closing a local circuit connected therewith, operates a sounder, S. The neutral relay, in opening and closing a local circuit connected therewith, operates a relay-sounder, R S, which in turn opens and closes another local circuit to operate a sounder, S′, the relay-sounder being connected up, as shown, and used to bridge over reversals of the flow of the line-currents in manner well understood, so as to prevent mutilation of the signals made by sounder S′.

The operation of this diplex telegraph is as follows: When both transmitters are open or at rest, as shown in Fig. 1, no battery is in circuit and both sounders at the receiving-station stand open; but the route from earth to line at the transmitting-station is uninterrupted, being composed of the conductors marked, respectively, 15, 5, 6, 21, 11, 10, and 17. When transmitter A is closed while transmitter B remains open, as shown in Fig. 2, battery W B

is in circuit and sounder S gives a signal, the negative pole of said battery being connected with the earth by the conductors 20, 5, and 15, while the positive pole thereof is connected with the line by the conductors 19, 23, 13, 12, 22, 9, 6, 21, 11, 10, and 17, so that the line is charged with a current of positive polarity of strength 1, which operates the polarized relay P R at the receiving-station. When transmitter B is closed while transmitter A remains open, as shown in Fig. 3, both batteries S B and W B are in circuit and sounder S′ gives a signal, the positive pole of battery S B being connected with the earth by the conductors 18, 14, 11, 21, 6, 5, and 15, while the negative pole of battery W B is connected with the line by the conductors 20, 7, 8, and 16, so that the line is charged with a current of negative polarity of strength 4, which operates the neutral relay at the receiving-station. When both transmitters A and B are closed at the same time, as shown in Fig. 4, both batteries S B and W B are again in circuit, charging the line with a current of strength 4; but the current is now of positive polarity, so that both the polarized relay and the neutral relay will be operated, and sounder S give a signal as well as sounder S′, the negative pole of battery W B being connected with the earth by the conductors 20, 7, 5, and 15, while the positive pole of battery S B is connected with the line by the conductors 18, 14, 11, 21, 6, 9, 22, 12, 10, and 17.

I do not limit myself to the details of construction hereinbefore described. They may be varied in many ways without evading the scope of my claim of invention; nor do I confine myself to the use of galvanic batteries, since dynamo-electric machines or other generators or sources of electricity may be used instead. By equipping each station with transmitting as well as receiving devices and with an artificial line to balance outgoing currents in the well-known manner, my invention will assume the form of a quadruplex telegraph. When used as a quadruplex telegraph, suitable resistances should be inserted at each station in the conductors between the line and the earth equal to the resistance of the batteries, in order that the resistance of the whole main-line circuit may be the same in all positions of the keys or transmitters. One way of accomplishing this end is illustrated in Fig. 5, which shows transmitting devices precisely the same as exhibited in the other figures, except that a resistance, R′, is inserted in wire 23 equal to the resistance of battery S B, and that wire 17 is removed and the connection from line L to lever 10 made by the following means: Lever 5 is provided with an insulated arm, 24, which carries an insulated contact-spring, 25, adapted to make contact with a hook of arm 24 or with a contact-screw, 26. Contact-spring 25 is connected by wire 27 to lever 10. Line L is connected by wire 28 to post 29, which is in turn connected by wire 30 to contact-screw 26, and also by wire 31 to arms 24. A resistance, R, equal to the resistance of the combined batteries S B and W B is inserted in wire 31.

It will be readily observed that when both keys are open, as shown, the route from line to earth is through resistance R; that this resistance is cut out by the closing of either key; that resistance R′ is put in circuit whenever key A alone is closed; but that it is cut out whenever key B is closed, whether key A be closed at the same time or not.

It would be an obvious variation of my invention to have both sections of battery normally in circuit, one way of doing which would be to hold the keys or transmitters normally closed. In that case sounder S′ and its local circuit could be dispensed with and the relay-sounder R S used as the reading or signaling sounder.

Having thus described my invention, what I claim is—

The combination, substantially as before set forth, of a single main line, two unequal sections of battery normally both out of circuit, and two continuity-preserving keys or transmitters, one of which is directly and permanently connected to ground, and both being otherwise connected up, substantially as described, whereby if the electro-motive force of the weaker section of battery be represented by 1 and that of the stronger section by 3 the separate closure of one key will cause the flow of a current of strength 1 of a determinate—say positive—polarity, the separate closure of the other key one of strength 4 of negative polarity, and the closure of both keys one of strength 4 of positive polarity.

In testimony whereof I affix my signature in presence of two witnesses.

B. E. J. EILS.

Witnesses:
E. T. WALKER,
C. A. NEALE.