J. E. SMITH.

ELECTRO MAGNETIC TELEGRAPH.

No. 35,571. Patented June 10, 1862.

Fig. 1.

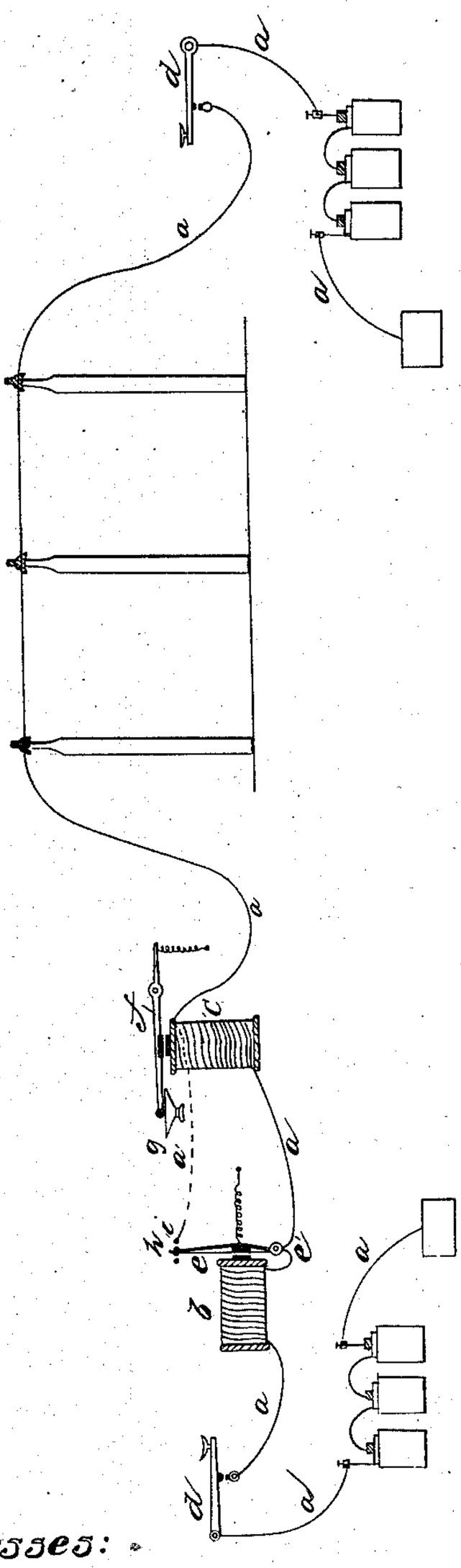
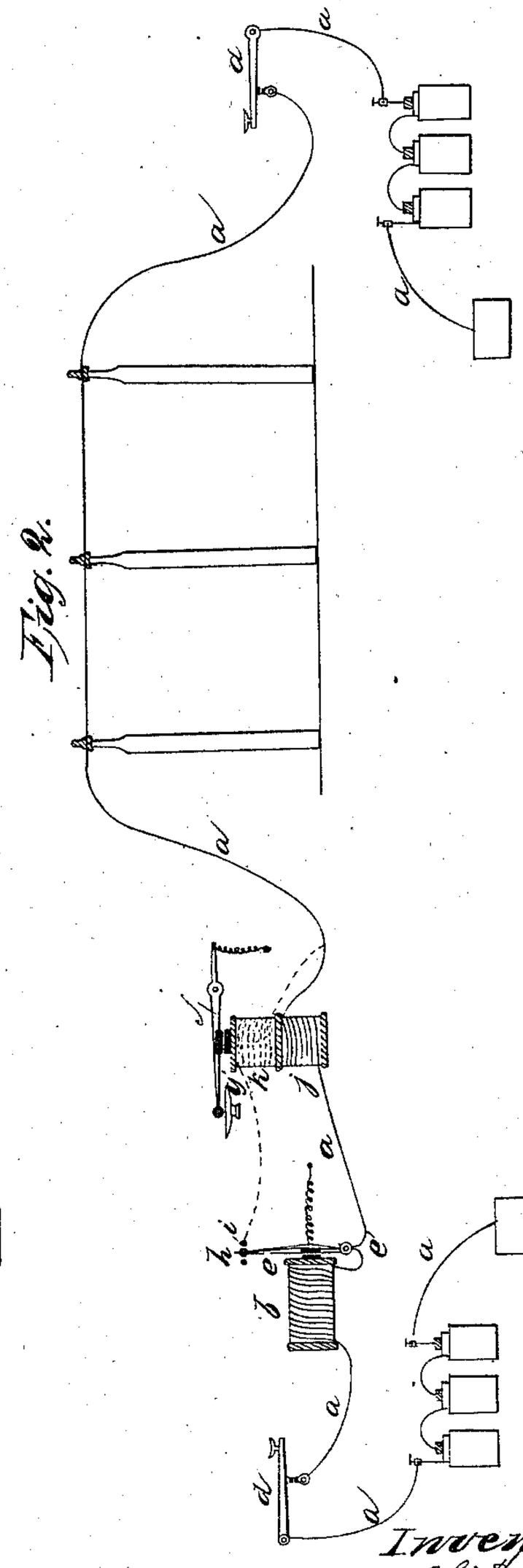


Fig. 2.



Witnesses:

John Gardson

Wm. A. Stubbeck

Inventor:

J. E. Smith

UNITED STATES PATENT OFFICE.

JOHN E. SMITH, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND C. T. & I. N. CHESTER.

IMPROVEMENT IN ELECTRO-MAGNETIC TELEGRAPHS.

Specification forming part of Letters Patent No. **35,571**, dated June 10, 1862.

To all whom it may concern:

Be it known that I, JOHN E. SMITH, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Electro-Magnetic Telegraphs; and I do hereby declare that the following is a full and correct description thereof, reference being had to the drawings annexed, making a part of this specification, and to the letters of reference thereon.

My said invention consists, chiefly, in an improved arrangement and combination of register or sounder magnets with receiving-magnets in a main telegraph-circuit, wherein the current of the main circuit used to actuate the register or sounder magnet is controlled and regulated by the receiving-magnet, the vibrating armature-lever of which is arranged to act as an automatic switch for the purpose of relieving the register or sounder magnets from the action of the escape or abnormal currents when the main circuit is opened. These escape-currents are familiarly known to all telegraphers as resulting from the return of battery-power to its source by reason of defective insulation, intensity of battery-power, and resistance of long conductors. I call them "abnormal," in contradistinction to the normal current which would result from the perfect and continuous passage of the battery-power from one end of the line to the other, which equalizes electro-magnetic power, and makes telegraphing easy and reliable at all times. The register or sounder magnets are relieved by establishing an additional metal connection from the wire of the receiving-magnet to the main line, through the armature-lever of the receiving-magnet, either directly to the metal conductor, avoiding the sounder-magnet, or to the main conductor through one of two equal helices surrounding the sounder-magnet, and in a direction opposite and antagonistic to the direction of the current passing through the other equal helix, which is always included in the main circuit, thus either diverting the abnormal currents from the sounder-magnet or passing them through the helices of the sounder-magnet in such manner as to neutralize or destroy their effect upon the magnet, thereby securing the mechanical force and action of a fully-discharged electro-magnet.

In order more particularly to describe my said invention, I will refer to the annexed drawings, wherein—

Figure 1 represents the parts combined and arranged so as to divert the abnormal currents from the sounder-magnets by the action of the armature-lever of the receiving-magnet; and Fig. 2 represents the parts arranged so as to divide and neutralize the abnormal currents, as before mentioned.

Letter *a* represents the main telegraph-conductor, embracing and including the helices of the receiving-magnet *b* and the register or sounder magnet *c*. *d* represents transmitting-keys.

Letter *e* represents the vibrating armature of the receiving-magnet, provided with reacting spring and other usual appendages; letter *f*, vibrating armature of sounder-magnet, with a cymbal, *g*, for which may be substituted a pen-lever of a recording-instrument, or any device for indicating or recording telegraph-signals or setting in action machinery for indicating or recording telegraph-signals. The main conductor *a* connects with the vibrating armature-lever *e* of the receiving-magnet at its fulcrum *e'*.

a' is a short conductor from a point near the end of the vibrating lever *e* to the main conductor *a*, Fig. 1, beyond and avoiding the sounder-magnet. When the armature-lever falls back by the action of its spring upon the opening of the main circuit in telegraphing, the end of the lever establishes a connection with the short conductor *a'* at the platina points *h i*, thus affording a short direct passage for the abnormal current through the vibrating lever of the receiving-magnet and short connection *a'* to the main line, avoiding entirely the helices of the sounder-magnet, and therefore relieving them entirely from the action of abnormal currents when the main circuit is open.

In Fig. 2 the sounder-magnet is represented as constructed with two equal helices, *j* and *k*, wound in opposite directions, the main conductor *a* running through the lower helix, *j*, and the conductor *a'*, instead of passing directly from the armature-lever of the receiving-magnet to the main conductor, avoiding the sounder-magnet, as in Fig. 1, connects with and includes the helix *k*, passing from it to

the main conductor. The helices *j* and *k* being wound in opposite directions and of equal length, the current divides and passes equally through both in opposite directions, when the lever of the receiving-magnet falls back and brings the two platina points *h i* in contact upon the opening of the main circuit.

The connecting-points *h i* should be provided with suitable adjustments, such as are used in such instruments for determining the length of vibration of the lever, which, in this case may be confined to the shortest length consistent with the practical separation of the platina points *h i*, because no deflagrating spark ever passes as in the operation of short circuits in which local batteries are included.

Instead of using the magnet which I have termed the "sounder" or "register" magnet to actuate instruments for recording or indicating telegraphic signs or signals, or for setting in action mechanism for printing, recording, or indicating telegraph signs or signals, it may be used to open and close short office-circuits in which a battery and register or sounder magnet is included in the same manner as such short circuits are now operated in connection with receiving-magnets not protected from the effect of abnormal currents when the main circuit is open; but, as sufficient power is obtained by the combination of sounder and receiving magnets in the main circuit hereinbefore described to work sounders or pen-registers with certainty and uniformity, I do not recommend the use of the additional short local-battery circuit just mentioned, because it involves needless trouble and expense, but only mention it to secure myself from attempt to appropriate my invention by disconnecting the second magnet from the direct connection with the sounder or register, and using it to indirectly operate such instruments through office-battery local circuits, which they would operate in an improved manner owing to their being relieved entirely from abnormal currents when the main circuit is opened.

I claim—

The combination of electro-magnets in a main telegraph-circuit, substantially as hereinbefore described, whereby the vibrating armature-lever of the first or receiving magnet is made to discharge or neutralize the escape or abnormal currents flowing through the second or working magnets when the main circuit is opened in the operation of telegraphing, substantially as set forth.

Dated New York, April 15, 1862.

JOHN E. SMITH.

Witnesses:

JOHN DAVIDSON,

WM. A. WHITBECK.