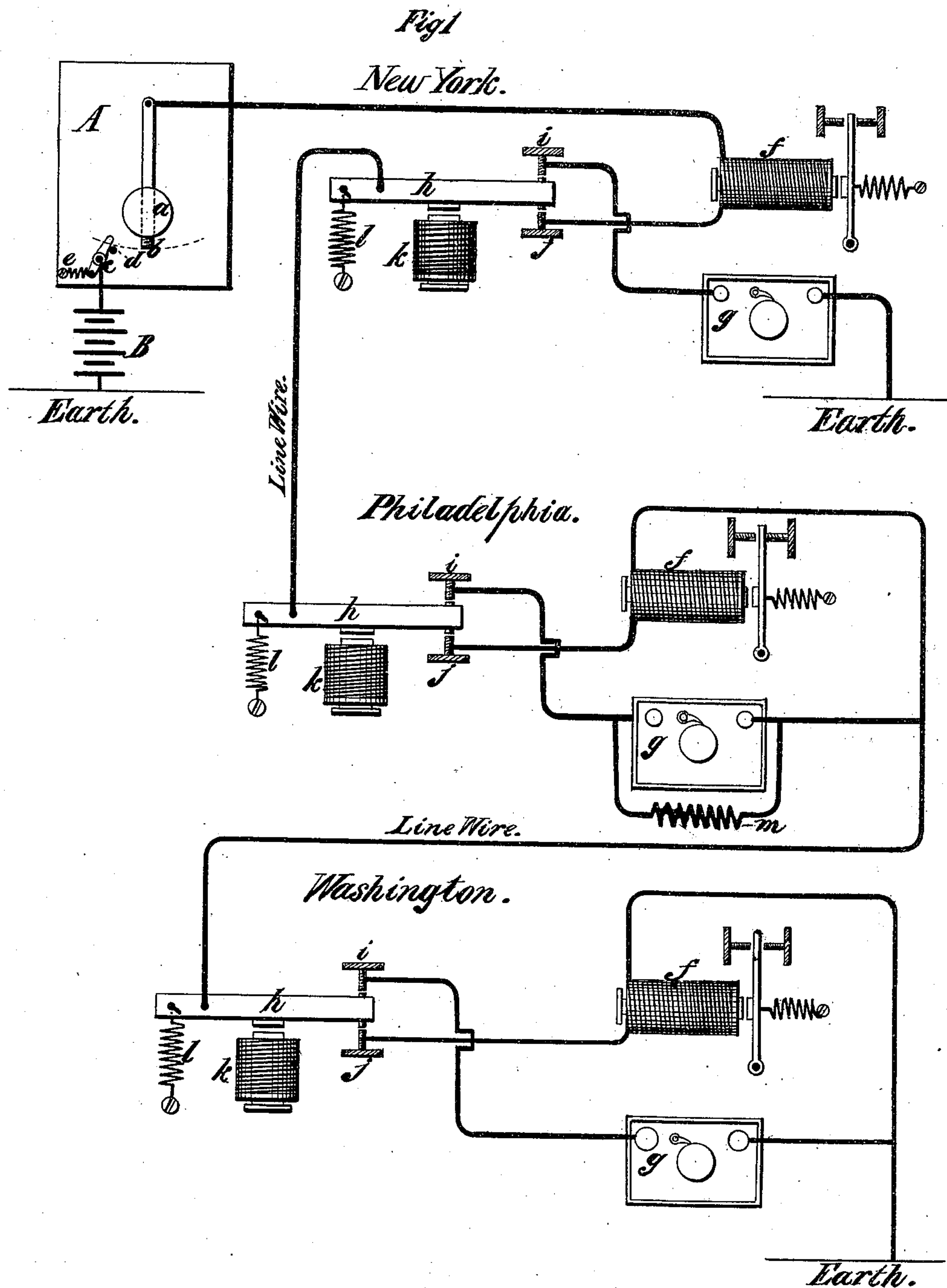


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REGULATOR FOR AUTOMATIC TELEGRAPHS.

No. 195,235.

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IMPROVEMENT IN REGULATORS FOR AUTOMATIC TELEGRAPHS.

Specification forming part of Letters Patent No. 195,235, dated September 18, 1877; application filed June 29, 1877.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, have invented certain new and useful Improvements in Regulators for Autographic Telegraphs, of which the following is a full, clear, and exact description.

The object of my present invention is to regulate, in an improved manner, two or more instruments placed in a telegraphic circuit, by means of a pendulum or other device having great uniformity of motion, and operating independent of the instruments, which periodically transmits over the line an electrical impulse to control the instruments in circuit without requiring the use of two line-wires, (one for transmitting the message, and the other for regulating the instruments,) and without interference of the regulating-currents with the transmission when a single line-wire is employed.

My invention is applicable to any autographic telegraph whose isochronous operation depends upon the transmission of a regulating-line current or currents, and to the isochronous regulation of a number of instruments in a single circuit, whereby the message transmitted may be dropped at a number of stations upon the line, the latter feature being of special importance in the transmission of general orders and press dispatches.

I am aware that independent pendulums have been locally employed to regulate autographic instruments mechanically isolated from each other, no current being transmitted over the line, but the pendulum at each station regulating the instrument at that station.

I am also aware that, as in systems of my own and others' invention, one instrument has been made to transmit impulses of electricity over the line to regulate another distant instrument.

I am further aware that two line-wires have been used—one to transmit the message, and the other to transmit the regulating-currents.

I am furthermore aware that the transmission and regulation have been effected over a single wire by interspersing the message-impulses with regulating-impulses.

In the two last-mentioned arrangements the duplicity of wires is a most serious objection, and the interspersing of the message-impulses with the regulating-impulses is not only fatal to the appearance of the message, but is attended by a great loss in speed.

In my invention the regulation is done but once in a revolution of the cylinder carrying the message, and this at the end of that revolution and in the manner shown, so that the regulation never occurs when the transmitting or receiving style is bearing upon the message, and the received message is devoid of flaws.

The principles of autographic telegraphs are so well understood that I have deemed it unnecessary to dwell upon the same, or, in the drawings, to show more than the positions of the instruments.

The operation of my present invention will be clear to any person skilled in the science of autographic telegraphy, particularly upon reference to Letters Patent No. 171,051, dated December 14, 1875, granted to me, and No. 184,302, dated November 14, 1876, granted jointly to me and James G. Smith, wherein are described instruments whose isochronous action is maintained by the transmission of a line current.

For the most satisfactory operation of my present invention I prefer to employ a pendulum caused to vibrate by a weight and clock-work; but I do not limit myself to such employment, as, obviously, I may have recourse to any apparatus having regularity of motion.

In the drawings accompanying and forming a part of this specification, A is a pendulum, provided with the usual weight *a*, and having at its lower extremity a platina contact-point, *b*. The battery B, one pole of which is connected to earth, has connection with a pivoted metallic lever, *c*, which is normally held in position against the stop-pin *d* by a spiral spring, *e*. At each complete vibration of the pendulum the point *b* and lever *c* come in contact, whereby momentary connection is established between the pendulum and battery B. A second lever, like *c*, may be placed upon the opposite side of the pendulum, and also con-

nected with the battery, so that the pendulum shall establish two connections at each complete vibration, if desired.

For the purpose of showing the operation of my invention I have indicated three sets of instruments, located, respectively, in New York, Philadelphia, and Washington, *g* representing the transmitting or receiving apparatus, however constructed; *f*, the relay or other electro-magnetic device, by means of which the isochronous action of the instrument is maintained; and *h*, *i*, *j*, *k*, and *l*, the circuit-changer, by means of which the line circuit is periodically changed from the transmitting or receiving apparatus *g* to the electro-magnetic regulating apparatus *f*.

For the purpose of illustration, let it be assumed that the message is being transmitted from New York to Washington, and a copy dropped at Philadelphia. Let it be further assumed that the message to be transmitted and the receiving-blanks are placed upon revolving cylinders (Letters Patent No. 184,302) of instruments *g*. The cylinders of all the instruments complete their revolutions inside the time that the pendulum *A* occupies in moving from and returning to contact with lever *c*, when they come to a stop for an instant, lasting until the pendulum makes its connection with the lever, whereby a current is transmitted over the line, which, actuating the relays *f f f*, releases all the instruments simultaneously when they start, and at the end of their revolution are again arrested and released in like manner, and so on indefinitely, the isochronous operation of as many instruments as may be conveniently placed in the circuit of the line being thus assured.

The operation of the circuit-changer is as follows: The armature-lever *h* of electro-magnet *k* is in all cases connected to the line-wire. When the cylinders of the instruments *g g g* are released by the contact of the pendulum *A* with lever *c*, the lever *h* of the circuit-changer is released by electro-magnet *k*, which is actuated by a local battery, and, rising by reason of the retraction of spring *l*, makes connection with the upper contact-point *i*. So soon as the cylinders of instruments *g g g* have completed, or are about to complete, their revolution, (Letters Patent No. 171,051,) electro-magnets *k k k* attract their armature-levers *h h h*, and thus, removing them from contact with points *i i i*, cause them to form connection with lower contact-points *j j j*, whereby the circuit of the line is established through the regulating-magnets *f f f*. During the passage of the pendulum from and to lever *c*, the transmitting-circuit is established. At or just prior to contact of the pendulum with lever *c* the regulating-circuit is established. The transmitting-circuit is from the earth through instrument *g*, (batteries not shown,) upper contact-point *i*, and armature-lever *h*

at New York, and thence to the line-wire; through armature-lever *h*, upper contact-point *i*, and instrument *g* at Philadelphia, and thence onward to the line-wire; and to armature-lever *h*, upper contact point *i*, and instrument *g* at Washington, and thence to earth. The regulating-circuit is from the earth by way of battery *B* to lever *c*, pendulum *A*, relay *f*, lower contact-point *j*, and armature-lever *h* at New York, and thence to the line-wire; from armature-lever *h*, lower contact-point *j*, and relay *f* at Philadelphia, and thence onward to the line-wire; and from armature-lever *h*, lower contact-point *j*, and relay *f* at Washington, and thence to earth. Around the intermediate instrument *g* at Philadelphia I place a shunt, containing an adjustable resistance, *m*, for regulating the quantity of current passing through the instrument.

The regulating operation of a line of autographic telegraph under my system would be by a constant periodic succession of beats of the pendulum *A*, transmitting electrical impulses over the line, so that any two stations on the line might transmit messages to each other, the instruments thereat being governed by the terminal regulator *A*. Preferably, however, I arrange a pendulum at every station, to be called into requisition at each station when that station transmits to another, or at each station when that station receives from another.

The circuit-changer *h i j k l*, fully shown and claimed in Letters Patent No. 171,051, I have shown in the present instance merely for convenience.

It is obvious that for the purposes of my present invention I may employ any form of circuit-changer, electro-magnetic or mechanical with equally good results.

One great advantage of my present invention is that the message received is a very accurate copy of the original, and as many copies of the same as desired may be dropped at intermediate stations.

Having thus described my invention, what I claim as such, and desire to secure by Letters Patent, is—

In an autographic telegraph in which the transmitting or receiving apparatus is regulated at the end of each revolution thereof, the combination of two or more transmitting and receiving instruments, provided with commutators which put the line-wire alternately to the transmitting or receiving apparatus and to the regulating apparatus, and an apparatus independent thereof which periodically transmits an electrical impulse over the line for the purpose of regulating the motion of such instruments.

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Witnesses:

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