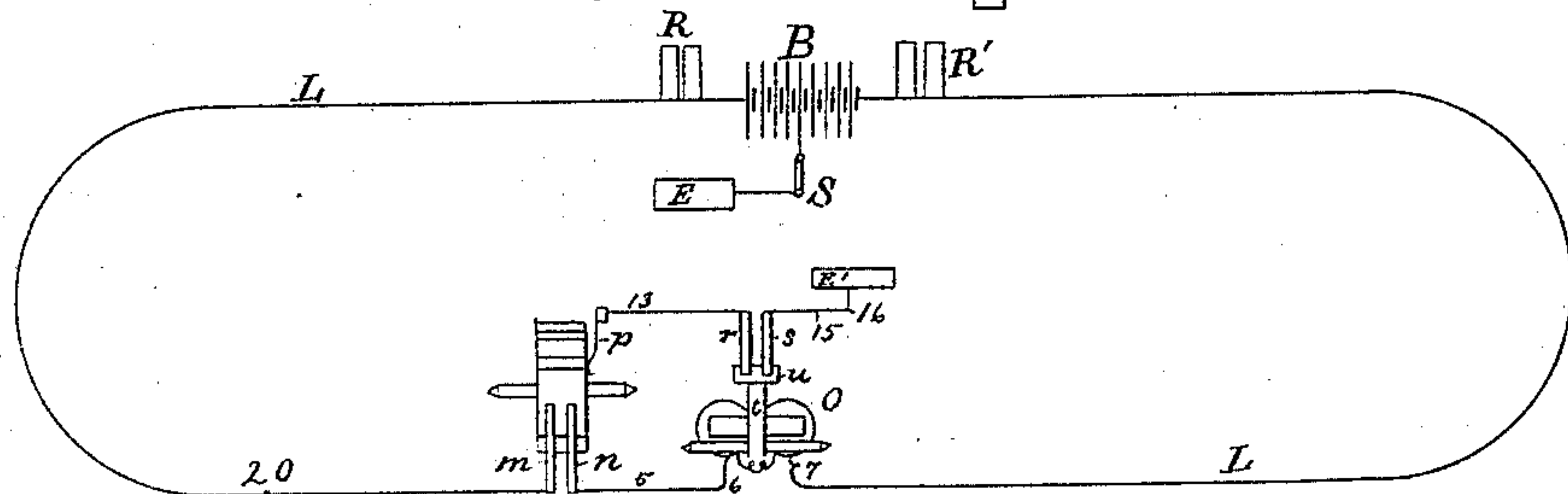
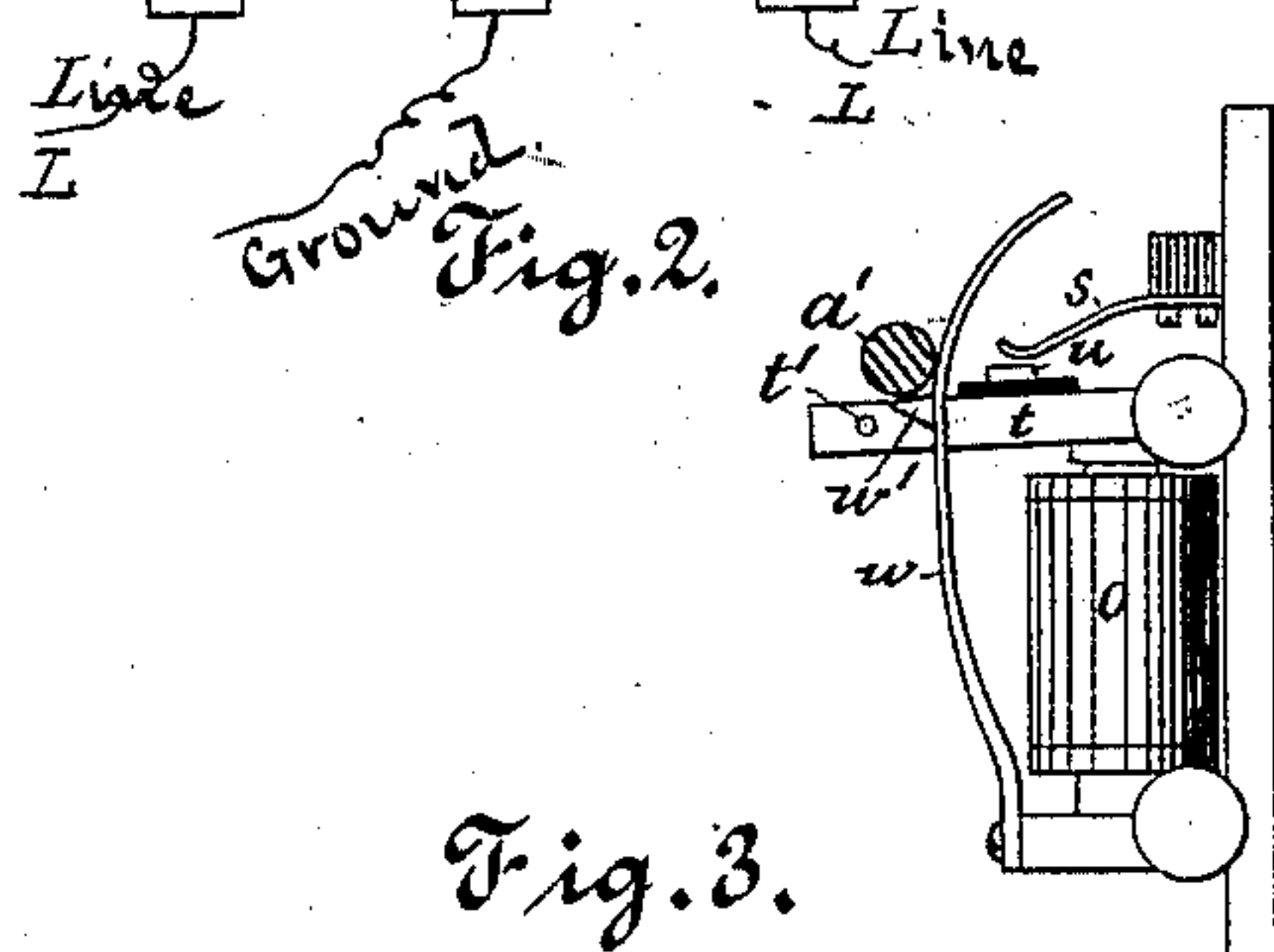
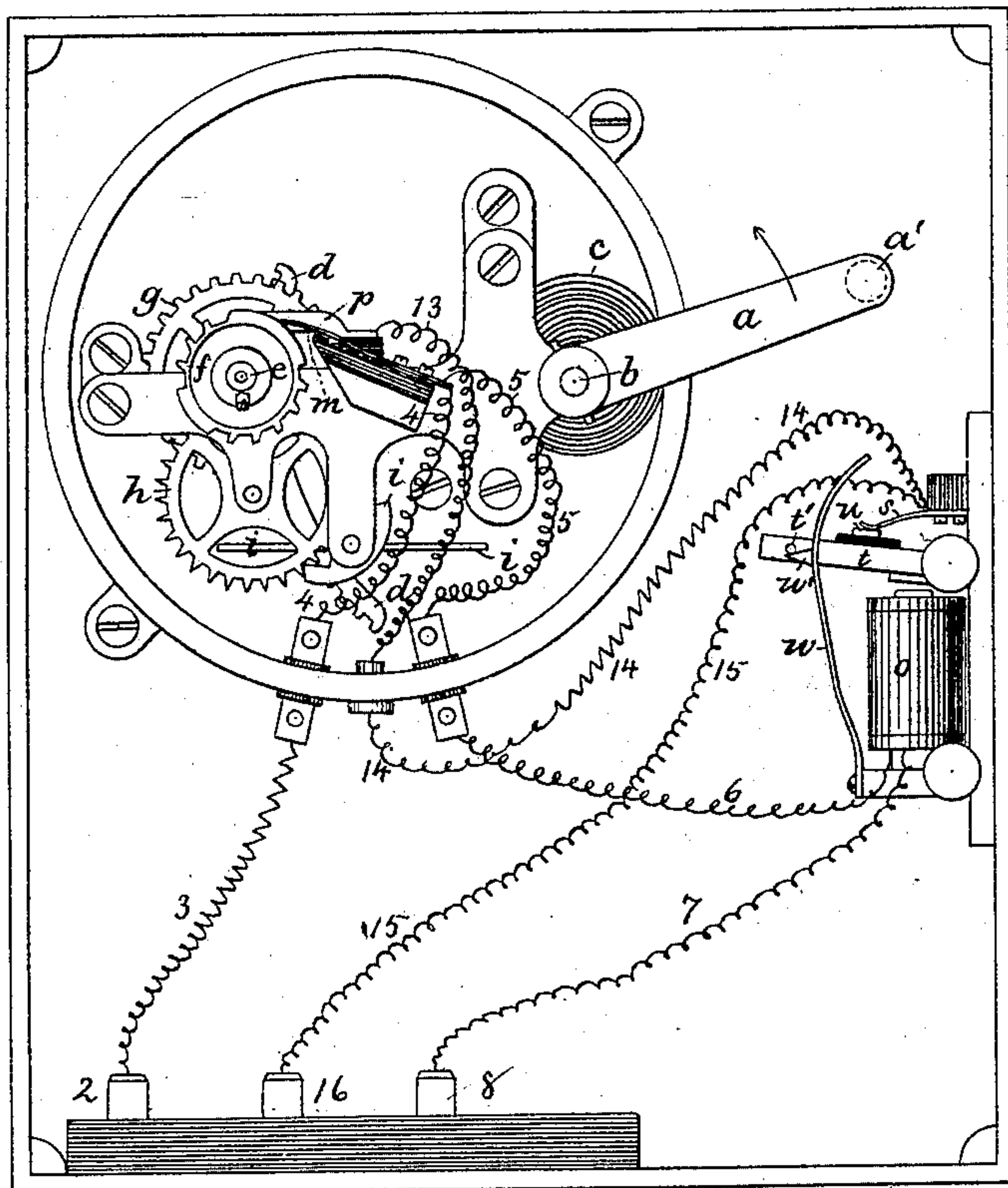


(No Model.)

E. ROGERS.
FIRE ALARM TELEGRAPH.

No. 285,076.

Patented Sept. 18, 1883.
Fig. 1.



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UNITED STATES PATENT OFFICE.

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FIRE-ALARM TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 285,076, dated September 18, 1883.

Application filed April 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWIN ROGERS, of Brookline, county of Norfolk, State of Massachusetts, have invented an Improvement in Fire-Alarm Telegraphs, of which the following description, in connection with the accompanying drawings, is a specification.

My invention, relating to fire-alarm telegraphs, has for its object to cause a ground-circuit to be made automatically if the metallic circuit be broken when the box is operated to send a signal, the ground-connection being removed if the regular or main metallic circuit is complete, and it being applied only at the box which is operated.

The invention consists, partly, in the combination, with the usual break-wheel for automatically breaking the main or metallic circuit, of a ground branch so connected with the said break-wheel as to have its connection with either end of the metallic circuit controlled by the said wheel, the said ground branch also being provided with an electric switch or circuit-closer controlled by an electro-magnet in the main metallic circuit and by the mechanism or starting-lever of the box in such manner that if the main circuit be broken and the starting-lever subsequently operated the said switch will close the said branch circuit to the ground; but if the circuit be closed when the said starting-lever is operated the said grounding branch will not be closed by the switch, and the box will consequently operate in the regular main circuit exactly as if not provided with my improvement.

The invention also consists in the combination of the said switch controlled by an electro-magnet in the main circuit and by the mechanism of the box with a locking device to engage the said switch and retain it in the position governed by the condition of the said electro-magnet when the pull is operated, regardless of the subsequent changes in condition of the said magnet produced in the operation of the box to send its signal.

Figure 1 is a front elevation of a signal-box provided with this invention, showing the grounding-circuit in operation, the main metallic circuit having been broken when the box was started; Fig. 2, a detail showing the

switch in the position assumed when the box is not in operation, and Fig. 3 a diagram showing the circuit through the said box and the central station where the signals are received from it.

The main portion of the signal-box (shown in Fig. 1) may be of any usual construction, it being shown as essentially the same as in Letters Patent No. 92,275, July 6, 1869, to which reference may be had, the pull or starting lever *a* being mounted on a shaft, *b*, connected with an actuating-spring, *c*, in such manner that the movement of the said lever *a* in the direction of the arrow, Fig. 1, winds up the said spring, which, by its elastic force, causes the said pull *a* to return in the direction opposite the arrow.

The shaft *b* is provided with a segmental gear, *d*, meshing with a pinion on an arbor, *e*, carrying the break-wheel *f*, the said pinion having a ratchet-connection with the said arbor, so that it turns loosely thereon when the lever *a* is moved in the direction of the arrow, winding up the spring *c*, but causes the said arbor *e* to turn with it when the said lever *a* and connected parts *b d* move in the opposite direction actuated by the spring *c*.

The arbor *e* is provided with a gear, *g*, meshing with a pinion on the arbor of the scape-wheel *h*, which, in connection with the pendulum or governor *i*, regulates the movement of the said arbor and break-wheel *f*, mounted thereon.

The main line *L* enters the box at the binding-post 2, which is connected by wires 3 4 with the contact-spring *m* resting on the metallic periphery of the break-wheel *f*, by which the circuit is continued to a corresponding spring, *n*, (see Fig. 3,) and by wires 5 6 to the switch-magnet *o*, the other terminal of which is connected by wire 7 with the binding-post 8 and main line *L*, leading on to the next box or station.

A ground contact-spring, *p*, rests in contact with the side of the metallic periphery of the break-wheel *f*, and is in electrical contact therewith during its entire rotation, while the contact of the springs *m n* therewith is broken as each successive notch in the periphery of the said wheel passes under them. The said

grounding-spring is connected by wires 13 14 with a spring, *r*, a corresponding spring, *s*, (see Fig. 3,) parallel therewith, being connected by wire 15 with the binding-post 16, connected with the ground.

The coils of the tap-bell magnet may be included in the wires 3 and 15, if desired, to sound the signal caused by the break-wheel *f* in the usual manner. The armature-lever *t* of the ground-switch magnet *o* is provided with an anvil or contact-piece, *u*, for the springs *r* *s*, arranged to make electrical connection between them when the said armature is retracted or remote from the poles of its magnet, as shown in Fig. 1, but to leave the said springs insulated and the ground-circuit open between them when the said armature is held at the poles of its magnet, as shown in Fig. 2.

An arm, *a'*, connected with the starting-lever *a*, rests on the armature-lever *t*, holding it up to the said magnet *o* when the box is in its normal condition, the spring *c*, having run down it, overcoming the retractor of and holding the said armature-lever at the poles of its magnet, and retaining the ground-circuit broken at *r s*, as shown in Fig. 2, whether the main line is broken or not and the magnet *o* magnetized or not. A locking device, *w*, shown as a spring-arm, provided with a wedge-like point, *w'*, also has its end engaged by the arm *a'*, and is held thereby disengaged from the cooperating pin or projection *t'* on the armature-lever *t* when the said starting-lever is in its normal position, as shown in Fig. 2. When the said starting-lever *a* is raised, as shown in Fig. 1, the locking device *w w'* will engage the said pin *t'* and retain the armature-lever *t* in whatever position it may be when the said lever *a* is raised—that is, if the main line *L* be broken, the magnet *o* is demagnetized, and the armature-lever *t* will consequently not be attracted, and will follow the arm *a'* in its upward movement, the parts being so arranged that in such movement the projection *t'* will pass the point *w'* of the locking device before the said locking device is permitted by the said arm *a'* to move into the path of the said projection *t'*. If, on the other hand, the main line *L* is intact when the lever *a'* is raised, the armature *t* will be held by the attraction of its magnet *o* in the position shown in Fig. 2 until the locking device *w* is disengaged by the arm *a'* and engages the projection *t'* on the opposite side to that shown in Fig. 1. The said locking device will thus retain the armature-lever *t* in whatever position it may be when the arm *a* is raised. If the line be intact, it will retain it in the position shown in Fig. 2, and the ground-circuit will be open, and consequently inoperative, the box operating in the main line exactly as if not provided with the said ground-circuit. If, on the other hand, the main line be broken when the pull *a* is operated, the armature-lever *t* will be moved to and locked in the position shown in Fig. 1, closing the said ground-circuit, so that the break-wheel *f* will operate to

make and break the connection between the said ground-circuit and that one of the springs *m* or *n* which is connected with the unbroken portion of the main line *L*.

At the central station, where the signals are received from the box or boxes, the main battery *B* (see Fig. 3) in the main line *L* will have its middle portion connected with the ground, as shown in this instance by the switch *S*, and receiving-instruments or relays *R R'* will be placed in the main line *L* at either side of the said battery. The main line *L* is in this instance shown as broken at 20, so that all the magnets in the circuit, including the magnets *o* of all the boxes, are demagnetized. Consequently when the starting-lever *a* of any box is operated the armature *t* will be moved by its retractor to the position shown in Fig. 1, and locked there by the locking device *w*, thus retaining the grounding branch closed at *r s*, regardless of any subsequent changes in the condition of the magnet *o*. The circuit will thus be closed from the ground at *E* (see Fig. 3) through one portion of the main battery *B*, relay *R'* to the spring *n*, break-wheel *f*, spring *p*, wires 13 14, spring *r*, anvil-piece *u*, spring *s*, wire 15, and ground *E'*, connected with the binding-post 16. As soon as the break-wheel *f* begins to revolve the circuit will be broken between the springs *n* and *p* as each notch passes under the spring *n*, leaving it insulated in the usual manner, so that the signals will be given by the relay *R'* as if no accidental break had occurred in the main line *L*. If the main line had been broken at the other side of the box, the break-wheel *f* would have acted in a similar manner between the springs *m* and *p*, and the signals would have been given by the relay *R*. When the break in the circuit is at 20, or between the spring *m* and the main battery, the coils of the magnet *o* will be in the grounded circuit that is formed when the anvil-piece *u* connects the springs *r* and *s*; but the movements of the armature-lever *t* and the locking device *w* are so timed that the projection *t'* will have passed and been engaged by the projection *w'* of the locking device before the anvil-piece *u* touches the springs *r s*, and the upper inclined surface of the said projection *w'* will act with sufficient power to force the said armature-lever back and retain the circuit closed at *r s u*, in opposition to the attraction of the magnet *o* produced by the said closing of the circuit.

I am aware that a signal-box has been made in which a ground-connection is made at the signal-box when a signal is given, but the said ground-connection is made even when the main line is intact. The box, always operating in the same manner as the one herein described, operates when the main line is accidentally broken—a method of operation which is attended with difficulties which are overcome by my invention, in which the ground-circuit is employed only when the main metallic circuit fails, the said ground-circuit being applied

automatically when necessary, and being automatically retained inoperative when not needed.

By the term "starting-lever" or "pull" I mean the device that is moved by the operator when desired to have the box send its signal. The ground-circuit controlling switch *r s t u* has been described as controlled electrically by the current in the main circuit and mechanically by the starting-lever of the box, this being, in the present instance, the most convenient portion of the box-operating apparatus for accomplishing this result. It is obvious, however, that any other portion of the mechanism of the box, or that a special device operated thereby for the purpose, might be employed to mechanically control the said switch, it being necessary only that the said switch shall be held mechanically in one position when the box is at rest, regardless of the condition of its electrical controlling device or magnet, but that immediately when the box is started it shall be locked and retained during the subsequent operation of the box in a condition determined by the state of its electrical controlling device at the moment when the said box was started.

The herein-described signal-box will commonly be used in the system in which an operator is constantly in attendance at the central station, and the ground will normally be removed from the middle of the battery B, the switch S being open, and only one relay will commonly be employed in each circuit. When, however, the central operator discovers that a circuit is broken, he immediately switches on a ground-connection at the middle of the battery and places a relay in circuit at each end thereof, as shown in Fig. 3, the line remaining in this condition until the break is discovered and repaired.

I claim—

1. In a fire-alarm signal-box, the combination, with the break-wheel, its actuating mechanism, and starting-lever or pull, of a ground-circuit wire and electric switch or circuit-closer therein, automatically controlled by an electro-magnet in the main circuit, and by the said box mechanism, substantially as and for the purpose described.

2. In a fire-alarm signal-box, the combination, with the main normally-closed metallic circuit and break-wheel therein, of a grounding-circuit adapted to co-operate with the said break-wheel, a circuit-closer or switch in the said grounding-circuit, and a controlling electro-magnet for the said switch in the said main circuit, substantially as and for the purpose described.

3. The combination of the main metallic circuit, the signal-box therein, the grounding-circuit, the circuit-closer therein, and its controlling electro-magnet in the said main circuit, with mechanical controlling mechanism for the said circuit-closer, whereby it is removed from control of the said electro-magnet, except while the box is in operation sending a signal, substantially as described.

4. The grounding-circuit and circuit-closer therein, combined with devices for electrically and mechanically controlling the said circuit-closer, as described, and a locking device, whereby the said circuit-closer is retained in the condition assumed under the control of the electrical controlling device when the mechanical controlling device ceases to operate upon the said circuit-closer, substantially as described.

5. The break-wheel normally controlling the condition of the main metallic circuit, the grounding contact-piece having its connection with either portion of the metallic circuit controlled by the said break-wheel, and the electric switch or circuit-closer between the said contact-piece and the ground, combined with the switch-controlling electro-magnet, the starting-lever or pull of the box, and the locking device for the said switch, controlled by the said starting-lever, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN ROGERS.

Witnesses:

JOS. P. LIVERMORE,
W. H. SIGSTON.