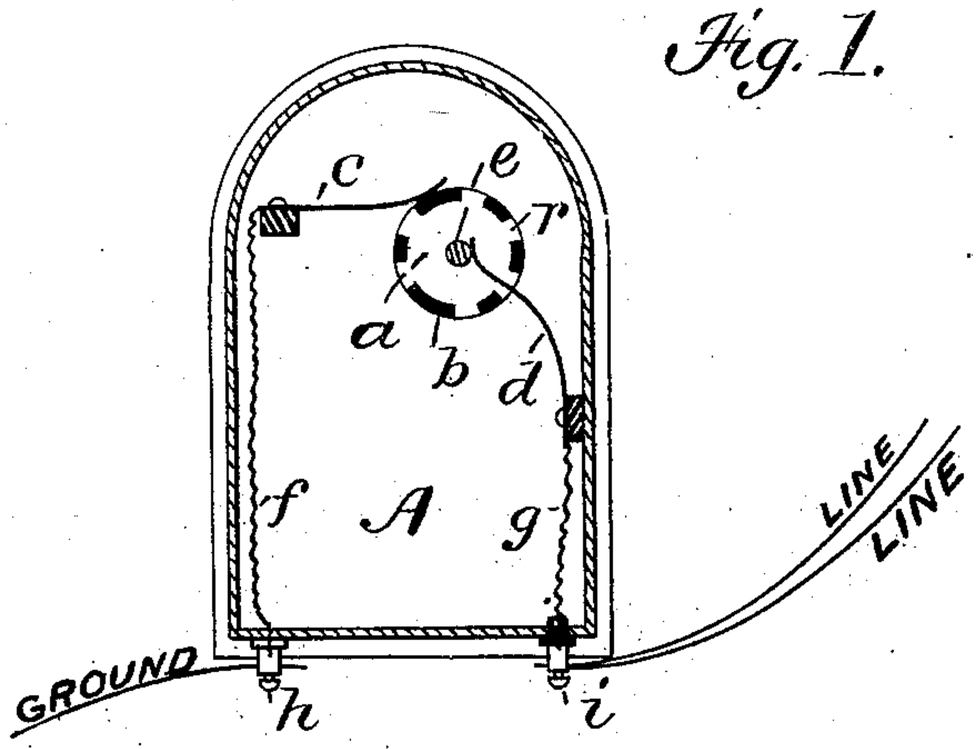
(No Model.)

T. D. LOCKWOOD.

FIRE AND DISTRICT TELEGRAPH.

No. 273,374. Patented Mar. 6, 1883.

Fig. 1.



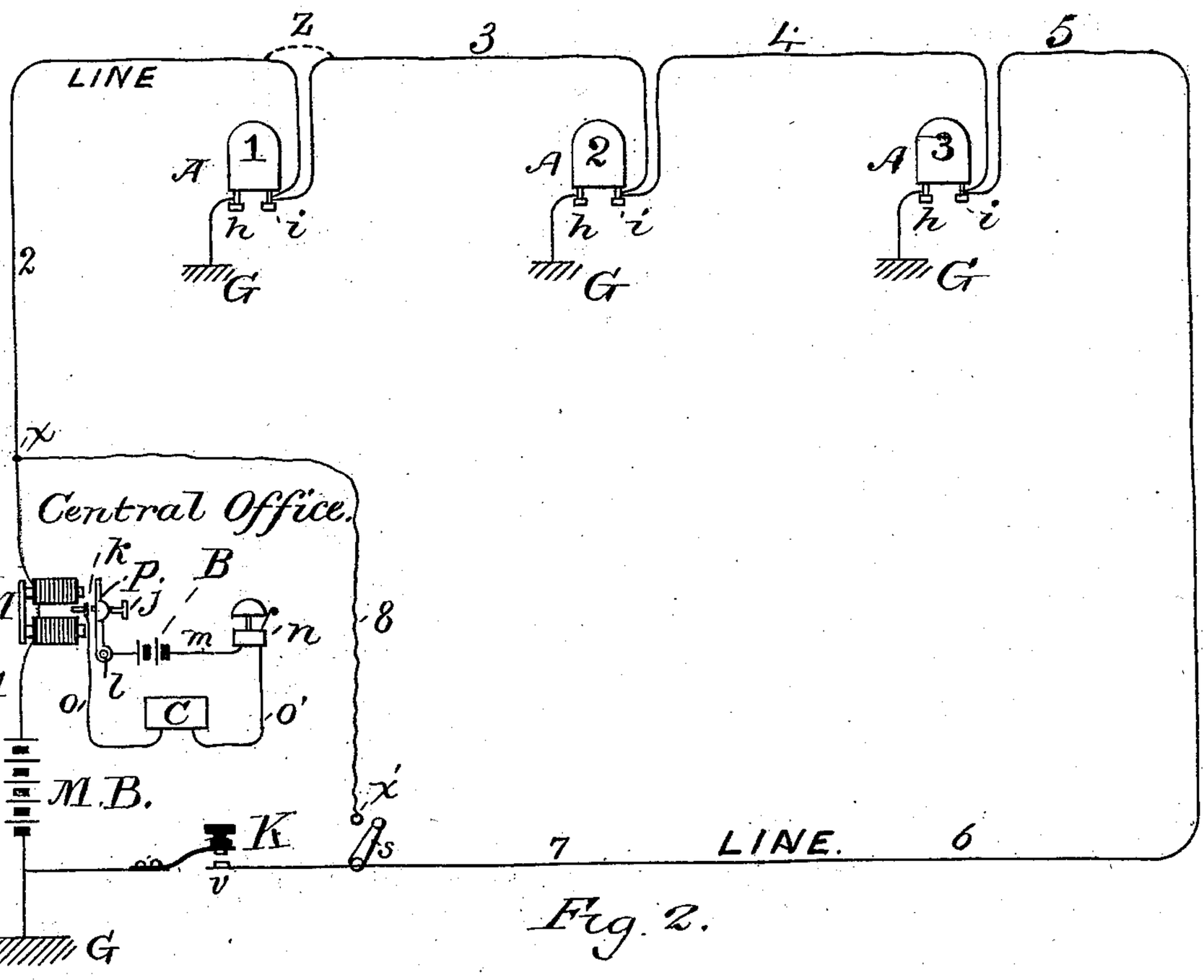


Fig. 2.

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FIRE AND DISTRICT TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 273,374, dated March 6, 1883.

Application filed November 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, THOMAS D. LOCKWOOD, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Fire and District Telegraphs, of which the following is a specification.

This invention relates to that class of telegraphs in which any desired number of houses or buildings are connected by means of electric wires with a central station for the purpose of giving warning of fires or accidents or of summoning assistance when needed. Such telegraphs are known as "district" telegraphs, and are generally constructed with a complete metallic circuit, which, leaving one pole of a battery after passing through the electro-magnet of an alarm-instrument, traverses the territory to be protected, being looped into a signal-box at each house, and returns to the opposite pole of the battery. To accomplish the desired end of giving alarm-signals of definite character, each house is provided with an automatic signal-box, by which a certain arbitrary signal or group of signals (preferably so arranged as to denote the number of said house) is transmitted to the central station whenever the apparatus in such box is designedly put in operation. The signals are produced by making and breaking the circuit, and thus it is necessary that the circuit shall normally be closed, and in practice each circuit is closed and complete in itself, each circuit, moreover, having its own battery, which is necessarily always in action, whether performing useful work or not.

The object of my invention is to provide an arrangement of circuits that will permit the use of the so-called "open-circuit" batteries—such, for example, as the well-known Leclanché type—and thus by causing the battery to be brought into action only when a call is being actually transmitted enable the same battery to be utilized for all the circuits entering any office. By so doing I effect a great saving in battery-power and a corresponding saving in space.

In the usual system now employed by district-telephone companies, in which it is necessary to operate metallic circuits, each continually closed on its own battery, the cost of such an enormous battery-power becomes a serious consideration. Much larger offices are required in order to provide accommodation for these batteries than would otherwise be necessary.

My invention consists in substituting for the constantly-closed battery-circuit an open circuit, which, though it leaves the district or central station from one pole of the battery in a similar way, and though it may be, and preferably is, returned to the district office for testing purposes, is left incomplete, the circuit being thus in a normally-open and inoperative condition.

It consists, further, in looping the said open circuit into the various houses or subscribers' stations and terminating each loop in one binding-screw of the signal-box, and also in furnishing a ground-connection to each signal-box, and in constructing the signal-box in such a way that the ground-connection forms one side of the signaling-circuit and the united loop of the line the other.

In the drawings which illustrates and forms a part of this specification, Figure 1 is a rudimentary signal-box embodying the principle of my invention, and Fig. 2 is a diagram showing the arrangement of circuit when constructed in accordance therewith.

In Fig. 1, A is the signal-box, and *a* the circuit-wheel thereof, which may, when a signal is to be sent, be rotated by any suitable mechanism or clock-train in a well-understood manner. The said circuit-wheel *a* has its periphery divided into alternate spaces of conducting and non-conducting material *r* and *b*, the whole forming during its rotation a definite signal, which, in the wheel shown, is the signal 24. The conducting-spaces *r* are all in electrical connection with the substance *a* and axis of the wheel, which are all of the same conducting material; and the non-conducting spaces *b* may be made of any suitable material let into the periphery; or they may be vacant spaces. To the line binding-screw *i* both wires of the entering loop from the line-wire are connected, and by the intervention of the wire *g* and contact-spring *d*, which at its free end bears on the arbor *e*, the circuit-wheel is in constant electrical connection with the line. Thus the circuit-wheel and its conducting-spaces constitute a normally-open terminal of

a branch from the main line, the said branch, however, only extending from the binding-screw *i* to the wheel, inasmuch as the main line is led also to the screw *i* by a loop, as clearly shown in Fig. 2. The binding-screw *i* is in the figure insulated from the frame of the box, which is usually made of metal. From the other binding-screw, *h*, a wire is led within the box to the flat circuit-spring *c*, which bears upon the periphery of the circuit-wheel, and to this binding-screw a ground-wire is attached, as shown. The flat spring *c* normally rests upon one of the non-conducting spaces of the wheel, and so long as it rests there it has no electrical connection with the line whatsoever. Although in these drawings and description I have shown both circuit-wheel and spring *c* as being connected by wires to their respective binding-screws, it is obvious that one of the binding-screws may be fastened to the metal of the frame or box, and thus make the connection through the substance thereof.

In Fig. 2 a main battery, M B, which is preferably one of that class known as "open-circuit" batteries, and which may be common to a number of circuits, has one of its poles connected with the ground, while to its other pole a wire, 1, is attached, which connects, after passing through the relay M, with the lines 2 3 4 5 6. The relay M, being in the main-line circuit, responds to all signals received thereon, and by its armature-lever *l*, which carries a contact-point, *p*, and which is capable of oscillation between the limit-screws *j* and *k*, the latter of which is also a contact-point, controls the circuit of a local battery, B, the said local circuit including the signal-bell *n* and the register C, the bell, battery, register, and contact-points being all connected by the wires *o*, *o'*, and *m*.

It is customary to place a great number of signal-boxes upon each circuit in district telegraph system, and any desired number may be arranged in my improved circuit. In the diagram I have shown but three, these, however, being amply sufficient to illustrate the nature of the invention. In the method of arrangement ordinarily practiced the circuit is looped into each station, one of the wires at every station being led into the screw-post *i* and the other to the screw-post *h*, so that the circuit-wheel and spring form actually part of the main circuit. By the improved construction of my invention it will be observed that although the circuit-wire is led in and out of each call-station, forming a loop of the main line, that loop extends no farther than the first binding-screw of the call-box, the continuation of the same to the circuit-wheel consisting of but one wire. At each station A the line is similarly looped to the binding-screw *i* of the call-box, and a ground-wire to the opposite binding-screw, *h*, as described. After thus looping to all the stations, the line is extended, as shown, back to the central station, where it terminates at the anvil *v* of the key K, which key, when pressed, closes the line-circuit, and may be employed as an instrument to test the continuity of the main line.

In the operation of this system, when the signal-box of any station is caused to become operative by the release of the clock-train (not shown) the circuit-wheel *a* rotates, and each time that the spring *c* comes into contact with one of the conducting-spaces the circuit of the main battery becomes momentarily complete, energizing the relay M and repeating, through its instrumentality the signal sent upon the signal-bell *m* and register C in the local circuit.

In the diagram I have shown a branch wire, 8, permanently attached to the main circuit at a point, *x*, just outside of the relay M, and extending as a normally-discontinuous branch to a point, *x'*, at or near the open terminal of the main-line wire. A button-switch, *s*, is pivoted or otherwise attached to the said return-wire of the normally-open main circuit, and may be turned onto the point *x'*. Instead of the button-switch *s* and point *x'*, any of the well-known equivalent connecting devices may be used—for example, two plates of brass, one attached to the branch wire 8 and one of them to the main wire 7—may be brought near to each other and connected, when required, by a metal plug or pin. This open branch wire and switch is for use in case of a break in the main-line wire. If the line-wire should be broken at any point—say at 4—between the stations 2 and 3, all the stations beyond station 3 would ordinarily be cut off from communication with the central office; but by the construction I show in such a case the severed end of the main line 5 6 7 would be, by turning the switch *s* onto the stud *x'*, placed in connection with the battery through the wire 8 and the point at *x*, and thus the call-signals transmitted from any station beyond 4 would be received, as well as when the line was intact.

I am aware that heretofore circuits have been constructed the main line of which has been left normally open; but in such cases the connection with each station-box has been made through single branch lines, and these branches were liable to be completely cut off and disconnected from the main line, and thus to cut subscribers completely off from communication with the main office or central station, as such a trouble would afford no signal of its existence. If my method of connection is used and a loop from any cause be cut across, it will be detected the first time the key K is pressed. As there will be a dissolution of continuity, no signal will be made on the relay. The switch *s* would then be at once turned to the point *x'*, so as to insure the reception of signals from the dissevered stations. The key K may be pressed at regular periods, which may be as frequent as found desirable.

If any of the subscribers' loops be from any cause—malicious or accidental—connected across by a wire, as indicated by *z* at station 1,

the signal will not be cut out, as would happen, were the circuit a closed-battery circuit, as the cut-out *z* has no power to interfere with the action of the circuit-wheel *a*, when rotated, to alternately make and break the earth-circuit through the instrument.

Another advantage of my invention is that the contacts in the main line are greatly decreased in number by such a construction, because, instead of having both binding-posts *h* and *i* and also the working contact between the circuit-spring *c* and the wheel *a* at each box in the said main circuit at each station, only one binding-screw contact—that of *i*—is so placed, whereby the chances of defective signaling are much diminished.

I make no claim upon the construction of signal-box described, as the signal-boxes in common use can be readily used in combination with such an arrangement of circuits as I have described; but

What I do claim is—

1. In a district or fire telegraph or signaling system, a main line connected with a battery at one terminal thereof and normally open at the other, the said main line extending from a central station and by means of loops into each of the several sub-stations or signaling-stations, (one loop for each signaling-station,) the two wires of each loop being united after entering the said sub-stations into a single normally-open branch in the call or signaling instrument at each sub-station, whereby the sub-station instruments are each included in a normally-open circuit between a loop of such circuit and a ground-wire, and whereby any disconnection or severance of any of the said loops may be readily detected at the central station, substantially as described.

2. The combination, in a district-telegraph system, of a normally-open main circuit, consisting of a main line extending from a central station to a series of sub-stations, a loop or double conductor extending into each sub-station from the said main line to one terminal of a signal-instrument, and a single branch from the inner extremity of each loop to a circuit-controlling device within the said signaling-instrument, a battery one pole of which is united to the earth and the other to the said main line, a ground-wire at each sub-station and a series of call or signal boxes—one at each sub-station—each connected with one main-circuit loop, as described, and containing circuit-controlling devices adapted to give definite signals by bringing the ground-wire into intermittent contact with the normally-open branch extension of the main-line loop, the whole constituting a district-telegraph system wherein signaling-instruments in a normally-open circuit may be maintained under the constant supervision of the central station, substantially as described.

3. A normally-open signaling-circuit connected with a grounded battery at a central station, constructed as described, with loops and normally-open branches entering each subscriber's station and extending throughout a given district back to the central station, combined with testing devices connected with the grounded side of the main battery and adapted to temporarily complete the main line, whereby the continuity of the same may be tested, as described.

4. The combination, substantially as hereinbefore described, with a normally-open main-line circuit extending to a number of sub-stations and back to a central station, a main-line battery, M B, therefor, and a receiving-relay, M, connected in the said normally-open main circuit, of the branch 8, permanently connected with the main circuit and branching therefrom at a point external to the relay, and the switch *s*, whereby the said branch 8 may be connected with the return-wire 6 7 of the main circuit, for the purposes specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of November, 1882.

THOS. D. LOCKWOOD.

Witnesses:

JOHN MURPHY,

GEO. WILLIS PIERCE.