No. 695,991. Patented Mar. 25, 1902.

T. J. ZOELLER.

ELECTRIC SIGNALING AND CIRCUIT CONTROLLING APPARATUS.

(Application filed Feb. 9, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

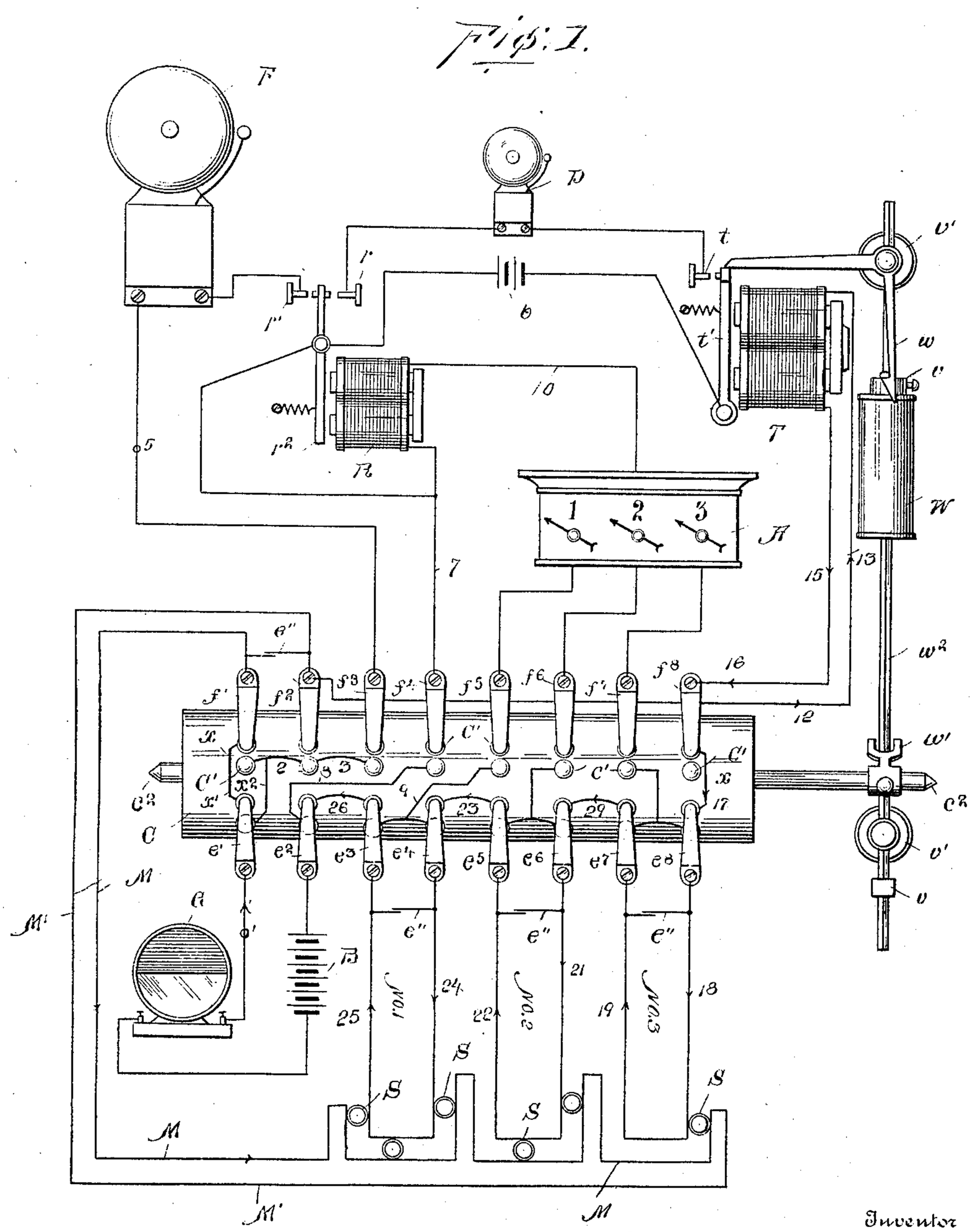

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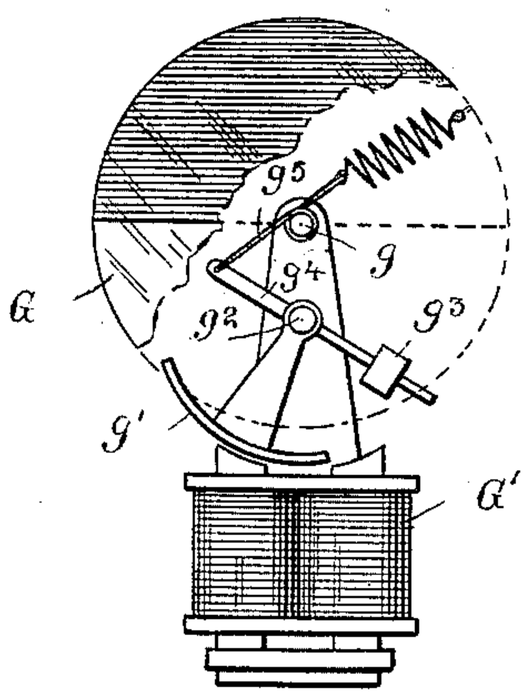
Fig. 3.



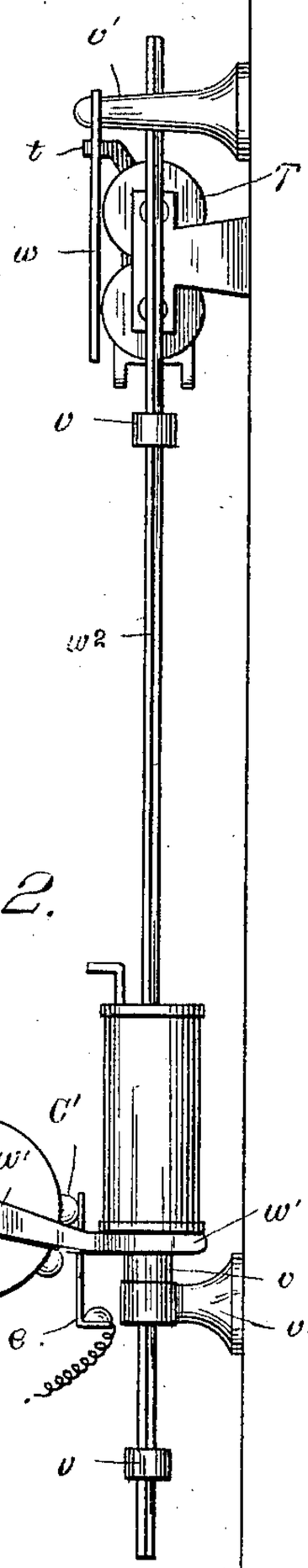


Fig. 4.

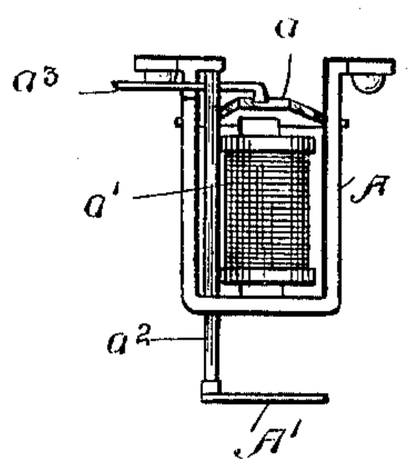
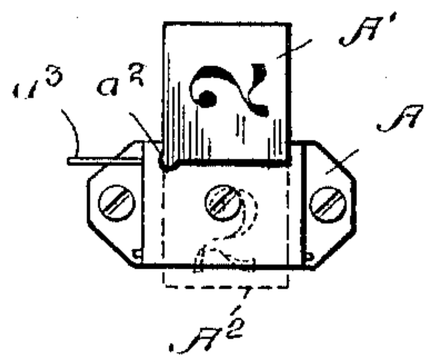


Fig. 2.

Fig. 5.



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UNITED STATES PATENT OFFICE.

THEODORE J. ZOELLER, OF NASHVILLE, TENNESSEE.

ELECTRIC SIGNALING AND CIRCUIT-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 695,991, dated March 25, 1902.

Application filed February 9, 1901. Serial No. 46,701. (No model.)

To all whom it may concern:

Be it known that I, THEODORE J. ZOELLER, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Electric Signaling and Circuit-Controlling Apparatus, of which the following is a specification.

My invention relates to electric signaling and circuit-controlling apparatus adapted to be used in connection with thermostats to give alarms of fire.

One object of the invention is to provide an electrical indicating apparatus in which the circuits will be constantly under test condition and in which instantaneous commutations of the circuits are obtained.

One feature of the invention is the employment of a falling weight to effect the commutation of the electric circuits and improved means for switching the circuits, whereby I avoid the use of the clock ordinarily employed in automatic fire-alarm devices and the danger incident to broken springs, clogged gearing, or other accidental disarrangement of the parts of the clock-train.

Another feature of the invention is a system of wiring and commutation of circuits so arranged that should a break occur in one or all of the circuits an alarm of fire could still be given, and as the fire advances from one section to another the advance will be indicated.

A further feature of the invention is a visual indicator, in combination with a gage, which displays at all times the electrical condition of the service, attracting the notice of the attendant, and assuring uniform attention to the system.

The construction of the apparatus will be fully described hereinafter in connection with the accompanying drawings, which form a part of this specification, and its points of novelty will be defined in the appended claims.

In the drawings, Figure 1 is a diagrammatic plan of the circuit in combination with commutating device, weight-releasing trip, indicator and electric gage, controlling a system divided into three parts or circuits representing the invention. This diagram shows the combination of several distinct members or parts; but this is done only for the sake of clearness of illustration, and in practice they are so combined as to make a single instrument. The diagram shows an apparatus controlling a three-section system; but the cylinder may be lengthened to accommodate and control a great many circuits. Fig. 2 is a detail view showing an end view of a trip-magnet, an elevation of the impact-weight, and an end view of the commutating-cylinder and impact-lever. Fig. 3 is a plan view of the electric gage, a portion of the visual disk, which is half black and half white, being cut away to show the suspension of the oscillating arm and armature. Figs. 4 and 5 are detail views of a simple number-displaying device, such as an annunciator-drop, used in combination with the system.

Like symbols refer to like parts wherever they occur.

Referring to Fig. 1, C is a cylinder of suitable insulating material oscillating on a trunnion-shaft c^2. This cylinder carries contact-buttons c', properly arranged and connected to each other, as shown by the heavy lines, for the purpose of changing the circuits. Resting on these contact-buttons are flat spring-pieces, (designated e' to e^8 and f' to f^8.) The spring-pieces are connected by wires to the different parts of the apparatus—viz., with an annunciator or indicator A, a small relay R, an alarm-bell F, a trip-magnet T, a current-gage G, and the main battery B. The springs are also in circuit with the circuits marked Nos. 1, 2, and 3 and the wires M and M', between which and the circuits Nos. 1, 2, and 3 are placed the thermostats S. The local battery b and its circuit are controlled by armatures t' and r^2 and the contact-screws t and r, which complete the circuit of the warning-bell D. When the magnet T receives current, its armature t' is held so as to lock the trip-lever w, which holds a weight W. This weight when released is free to slide down the rod w^2 and to strike the forked end of a lever w'. This lever is securely fastened to the trunnion-shaft c^2 and revolves with it and the cylinder C through a portion of its arc and is checked in its movement by striking a post v'. (See Figs. 1 and 2.) The rod w^2 is passed through the upper and lower supporting-posts v' and is free to slide up and down for a portion of its length, being con-

trolled by the collars v, Figs. 1 and 2, so that in returning the weight to its normal position, Fig. 1, the top of the weight strikes the upper collar, drawing the rod up, which movement by means of the second collar returns the lever w' and the commutating-cylinder to their normal position. The lower collar is adjusted to regulate the upward motion of the weight w and rod w^2.

Fig. 2 illustrates the action of the weight w after release, the impact having been delivered to the forked end of the lever w', revolving the cylinder, until the lever was checked by the lower post v'. This motion of the cylinder shifts the position of the contact-buttons C′ in relation to the contact-pieces e' and c and f' and c and of course changes the run of the circuits that will be traced out later.

Fig. 3: G is a disk of some light material, one half of which is white and the other half black, mounted on a rotatable shaft g, so that it can revolve through one-half of a circle. From a second shaft g^2 a curved armature g' swings freely and is acted upon more or less by a magnet G′, according to the strength of the current flowing through it. Extending from one side of the shaft g^2 is a small balance g^3, and from the other is an arm g^4, to which one end of a small cord g^5 is attached, and after being wound around the shaft g the other end of the cord g^5 is attached to a spring g^6. Any motion of the armature g' will thus be transmitted to the disk G. Placed immediately in front of the disk G is a glass disk, (not shown,) the lower half of which is blackened, so that from a distance it will appear as a solid black disk, provided no current is flowing through the magnet G′. When the current is passing, the disk G will take a certain position, disclosing from a small segment of white to a full half-circle, according to the strength of the current. This presents a very noticeable gage as to the condition of the battery, much more graphic than the mere swinging needle, and can be seen at a distance.

Figs. 4 and 5 show the design of a drop, being part of the indicator A of this system.

In Fig. 4, A is a U-shaped frame of iron supporting the magnet-spool a', which attracts an armature a, pivoted between the legs of the frame. Engaging with the armature a is a pin or arm a^3, which controls the revolving motion of the rod a^4, carrying the number-plate A′. This plate A′ is shown in Fig. 5, which is a view of the drop from above, having been turned half around. The dotted line A^2 shows the position of the number-plate after the arm or pin a^3 has been released by the armature a.

Referring again to Fig. 1, I will trace out the path of the current. Starting from the main battery B, passing through the gage G to contact-spring e', across x' to f', and around the main line M, and back through M′ to the spring f^2, then through wire 12 13 to magnet T, and back on wire 15 16 to f^8, across on wire marked x to e^8, around circuit No. 3 (wires 18 19) to e^7, crossing on wire 29 to e^6, and around circuit No. 2 (wires 21 22) to e^5, crossing on wire 23 to e^4, and around circuit No. 1 (wires 24 25) to e^3, crossing on wire 26 to e^2, and back to battery. Thus we have all the wires, that is, the main line M and Nos. 1, 2, and 3 circuits and magnet T, all in series. The magnet T and its armature prevent the trip from releasing the weight W. For convenience I will term the wires making the circuits 1, 2, and 3 as "section-wires." Now should one of the thermostats S be exposed to heat and made to close the circuit between the main line M and one of the section-wires—say No. 1—the magnet T will be shunted and its armature will release the trip w and drop the weight W, which will strike the lever w' and revolve the cylinder, as before stated. Following the path of the current, after the thermostat has closed the circuit, say, in section No. 1 before the weight has fallen it will pass through the gage G to the spring e', across x' to f', down the main line M, across the thermostat to section No. 1, wires 24 or 25, and to e^3, to 26, and e^2 to battery, leaving out or shunting the magnet T; but after the weight has fallen and the cylinder C revolved, so that the springs rest on the second set of contact-buttons, the circuit is as follows: from battery B through gage G to e', across x^2 and wires 2 and 3 to f', f^2, and f^3, then dividing, a part of the current going through f^3 and wire 5 to the fire-bell F, when its circuit is completed, and a part down the main line M to thermostat, to section No. 1, (wires 24 25,) and springs e^3 and e^4, across cylinder on 9 to f^5, through an annunciator A, drop No. 1, on wire 10 to small relay R, which closes the fire-bell circuit through the armature-contact and screw r', and down on 7 to f^4, across on 8 to e^2, and back to battery. Instead of a closing thermostat should a break occur in a wire it would also release the weight W; but without a closed thermostat no current would flow through the indicator nor the magnet R, but the circuit of the local battery b would be closed and a current flow through the armature t' to contact-screw t, through bell D to the screw r, to contact-point on armature r^2, and back to battery b, which would continue to give warning of the fault on the bell D until repairs were made. To locate the break, open spring-keys e'' or in connection with the terminals of the main-line and section wires by pressing them one after another. The magnet T will actuate its armature when the proper key is pressed that closes or crosses out the broken line. While making this test, the weight must be held at normal position, so that the contact-cylinder C will be held in its normal condition, Fig. 1. The resistance of the magnet T is greater than the combined resistance of the relay R and a drop-magnet

of the annunciator A, thus insuring that if there is enough current to lock the trip by the magnet T there will be more than enough to give the proper signal by A, R, and F, as mentioned. The bell D rings in case of a broken wire; but it also announces other faults, such as a swinging cross, a weak or damaged main battery, or a loose connection.

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

1. The combination of a commutating-cylinder, its contact-points and spring contact-pieces, with a drop-indicator and a relay, and circuit-wires normally in closed-circuit series and adapted to be thrown into a number of closed loops in parallel.

2. The combination of an oscillating commutator-cylinder; contact-buttons and spring-pieces resting thereon, with circuit-wires normally in closed-circuit series and open spring-keys, connecting the terminals of the wiring system.

3. In an electric-alarm system operated by a continuous-current battery, the combination with an indicator and alarm-bell, of a controlling-magnet, a locking-trip adapted to be held in its normal position by said magnet, a movable guide-rod, a dropping weight located on said guide-rod, an oscillating cylinder for controlling the current and adapted to be operated by said dropping weight, said guide-rod having a stop adapted to bring the cylinder to its normal position when the said weight is elevated.

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

THEODORE J. ZOELLER.

Witnesses:
JNO. D. ANDERSON,
THAD DAVIS.