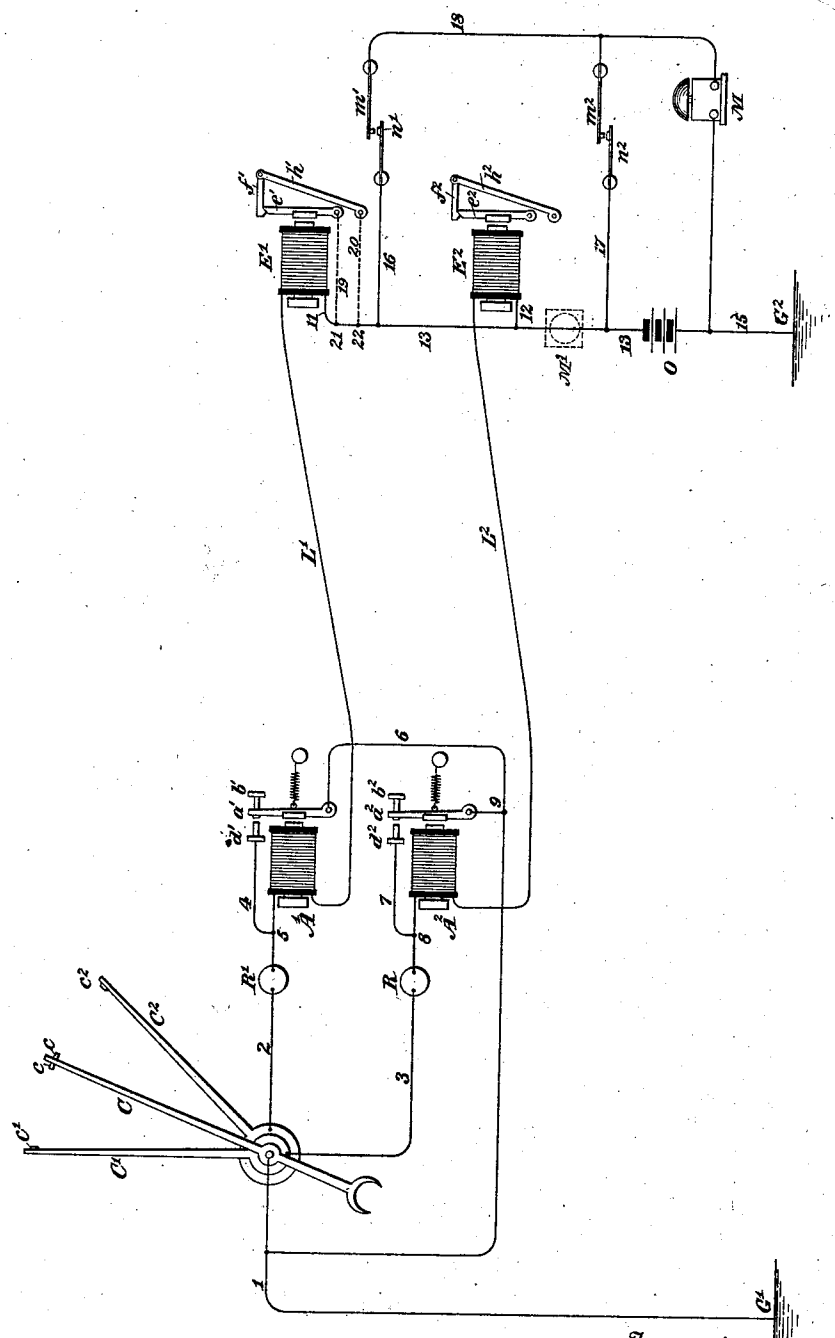
(No Model.)

C. L. CLARKE.

INDICATING APPARATUS.

No. 347,571. Patented Aug. 17, 1886.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES L. CLARKE, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO THE TELEMETER COMPANY, OF NEW YORK, N. Y.

INDICATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 347,571, dated August 17, 1886.

Application filed May 21, 1886. Serial No. 202,833. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. CLARKE, a citizen of the United States, residing in East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Indicating Apparatus, of which the following is a specification.

The invention relates to the class of apparatus employed for indicating undue variations in the expenditure of various forces—such, for instance, as gas and water pressures, heat, &c.

The object of the invention is to provide means for giving an indication when the maximum or minimum limit is reached, and causing an alarm to be sounded in a convenient reliable manner.

The invention consists in applying to a circuit-closing point adapted to be moved in one direction or the other by variations in the force or pressure to be limited two contact-points which are adjustable in their positions with reference to the circuit-closing point. Two conductors leading therefrom respectively include electro-magnets adapted to complete permanent shunt-circuits around the points, and other electro-magnets adapted to respectively operate devices for indicating whether the force is in excess or at a minimum. These indicating devices when operated serve to close a circuit through an alarm-bell or other audible signaling device, and at the same time to divert the current of the battery from the primary circuit-controlling device.

The accompanying drawing is a diagram illustrating the general organization of the apparatus.

Referring to the figure, C represents an arm capable of moving in one direction or the opposite under the influence of variations in temperature, the height of water in a reservoir, or any other similar variable quantities. The arm C carries two circuit-closing points, *c c*. Two contact-arms, C′ and C², are applied to the arm C, and are adjustable toward and from the same. They respectively carry contact-points *c′* and *c²*. The arm C is connected by a conductor, 1, with the earth at G′. The arm C² is connected by conductor 2 through the coils of an electro-magnet, A′, with the main line L′. The arm C′ is connected by conductor 3 through the coils of an electro-magnet, A², with the main line L². The electro-magnet A′ is provided with an armature, *a′*, which normally rests against back contact-stop, *b′*; but when the magnet is vitalized the armature is drawn against the front stop, *d′*. The stop *d′* is connected by conductor 4 with conductor 2 at a point, 5. The armature *a′* is connected by a conductor, 6, with the conductor 1, leading from the arm C. When, therefore, the electro-magnet A′ is vitalized, a shunt-circuit, is established around the points *c* and *c²*, through which the circuit is first closed, and the electro-magnet remains vitalized even though the contact-points be separated. For the purpose of preventing a current of unnecessary strength from traversing the more delicate points *c c′*, a resistance, R′, is included in the conductor 2 between the point 5 and the arm C².

The electro-magnet A² is provided with an armature, *a²*, and stops *b²* and *d²*, similar to electro-magnet A′. The stop *d²* is connected by a conductor, 7, with the conductor 3 at a point, 8, and the armature *a²* is connected by a conductor, 9, with the conductor 6. When, therefore, the electro-magnet A² is vitalized by contact of the point *c* with the point *c′*, a shunt-circuit is closed around these points. A resistance, R, is inserted in the conductor 3 for the same purpose as resistance R′ in the conductor 2. The main line L′ leads at a distant station through an electro-magnet, E′, and the line L² through the magnet E². The conductors 11 and 12, leading from these magnets, unite with a conductor, 13, leading from one pole of a battery, O. The other pole of this battery is connected by a conductor, 15, with the earth at G². The electro-magnet E′ is provided with an armature, *e′*, which is normally engaged by a latch upon an annunciator-drop, *h′*. The latch and the end of the armature have beveled contact-surfaces, which, while they serve to hold the annunciator-drop in its normal position so long as the electro-magnet is not vitalized, will, however, release the drop when the armature is attracted by the electro-magnet. The annunciator-drop, when

thus released, gives a visual signal, serving to indicate the presence of the current upon the line L′, and thus to direct attention to the fact that one limit—say the maximum—is reached by the force to which the apparatus is applied. The electro-magnet E^2 is in like manner equipped with an armature, e^2, a latch, f^2, an annunciator-drop, h^2, operating in the same manner under the influence of currents over the line L^2 for the purpose of giving an audible signal when either device is operated. Each drop is provided with a pair of contact-points, as shown at m' and n' and m^2 n^2, respectively. The point m' is normally away from the point n', but the weight of the drop h', which falls against it when released, will press the arm, carrying the point m' against the point n'. In a like manner the point m^2 is pressed against the point n^2 by the drop h^2. The points n' and n^2 are respectively connected by conductors 16 and 17 with the conductor 13, and points m' and m^2 are connected by the conductor 18 through an electro-magnetic bell, M, with the conductor 15. When, therefore, the contact-points of either pair touch each other, a circuit will be closed through the bell and an audible signal given. As it is desirable in some instances that the circuit of the main line should be interrupted immediately after the annunciator-drop has been actuated and the circuit through the bell alone should remain completed, the circuit may be arranged as indicated in dotted lines, to be normally completed through the drop h' and the armature e', the section of the conductor 13 between the points 21 and 22, from which the dotted conductors 19 and 20 lead, being removed. It is not always essential that the bell-circuit 18 be employed, but a bell may be included in conductor 13, as indicated in dotted lines at M′, its circuit being through the main line L′ or L^2. The electro-magnets A' and A^2 would then preferably be constructed sufficiently slow to prevent their armatures from falling away by reason of the short interruptions due to the vibration of the armature of the bell-magnet.

I claim as my invention—

1. The combination, with a circuit-controlling device operated by variations of force or pressure, of two circuits, the one or the other of which is completed accordingly as a maximum or minimum limit is reached, two electro-magnets respectively included in said circuits, shunt-circuits around said circuit-controlling device operated by said electro-magnets, respectively, two annunciator devices respectively operated by currents through said circuits, a signaling device, and a circuit therethrough completed by the operation of either of said annunciator devices.

2. The combination of a circuit-closing device consisting of an arm movable between two limits, contact-points at said limits, two mair lines leading from said contact-points, respectively, to one pole of a battery, the other pole of which is connected with the circuit-closing arm, two electro-magnets included in each of said lines, one of said electro-magnets in each of said lines serving when operated to close a shunt-circuit around the circuit-controlling device, and the other to operate a corresponding annunciator device, substantially as described.

3. The combination, substantially as hereinbefore set forth, with a device responding to variations in a variable quantity, of two circuits, the one or the other of which is closed at the limit of the variations in a corresponding direction, two indicating devices, respectively included in said circuits, an audible signaling device, and means for closing a circuit through the same by the operation of either indicating device.

4. The combination, substantially as hereinbefore set forth, of a movable circuit-controller, two main lines, through one or the other of which a circuit is completed at predetermined points in the movement of said circuit-controller, an annunciator in each circuit, a local circuit closed by the action of either annunciator, and an alarm device included in the local circuit.

In testimony whereof I have hereunto subscribed my name this 12th day of May, A. D. 1886.

CHAS. L. CLARKE.

Witnesses:

CAROLINE E. DAVIDSON,

CHARLES A. TERRY.