J. A. LATIMER.

ELECTRIC CONTROLLER.

APPLICATION FILED MAR. 2, 1911.

1,040,359. Patented Oct. 8, 1912.

FIG. 2

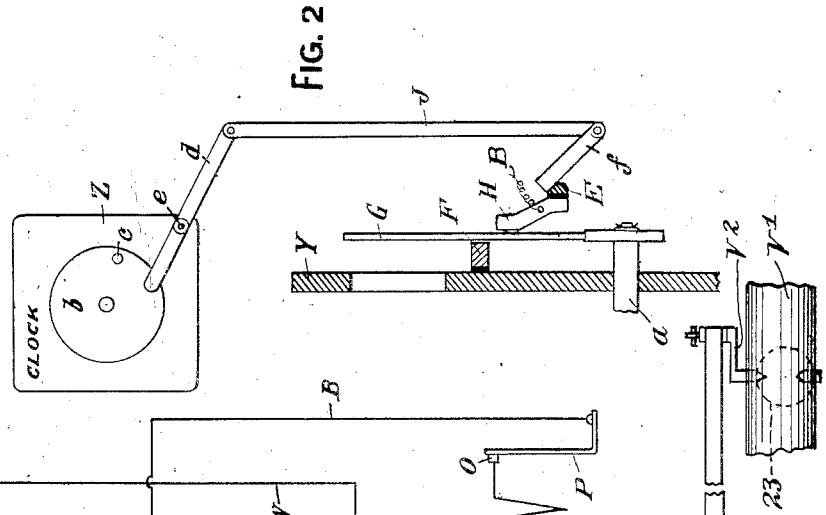
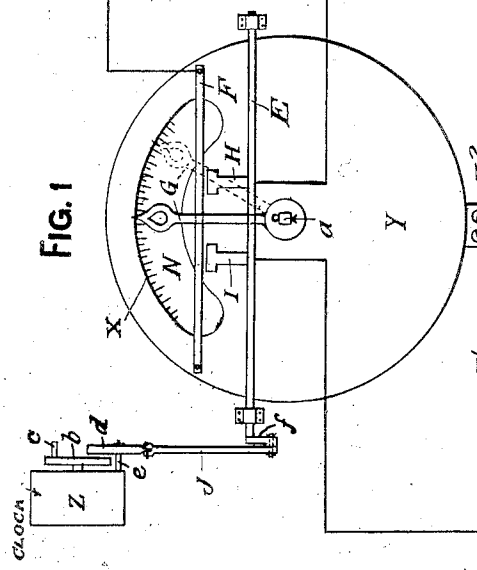


FIG. 1



WITNESSES:

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ELECTRIC CONTROLLER.

1,040,359. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed March 2, 1911. Serial No. 611,758.

To all whom it may concern:

Be it known that I, JAMES A. LATIMER, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention relates to electric controllers for regulating the heat of furnaces, the temperature of molten fluid, and the operation of valves, dampers, switches, and the like.

One object of my invention is to provide an electric controller to be used with pyrometers, thermometers, thermostats, or other measuring devices in order to operate valves, switches, dampers, or the like.

Another object is to provide a controller which can be used with standard measuring instruments, such, for example, as pyrometers, thermostats, and thermometers, the indicating hand or needle being employed to complete the circuit when in certain positions.

Referring to the accompanying drawing, Figure 1 is a diagrammatic view showing one form of my invention applied to an indicator, such, for example, as are used with pyrometers. Fig. 2 is a vertical section through the center of the cover plate Y, looking toward the left on Fig. 1.

On the drawing, Y represents the front plate of an indicator having the oscillatory hand or needle G secured to the shaft *a* and movable in front of the scale N but not in contact therewith. The shaft *a* is actuated by the proper apparatus for the purpose required, such apparatus constituting no part of this invention. Shafts bearing indicating needles are very common in instruments for recording heat, such as pyrometers, thermostats, and thermometers, but I do not confine my invention for use with such instruments, as it is applicable to other apparatus, even where no indications are displayed.

To the front of the plate Y and behind the needle G, I secure the bar F which should be a conductor of electricity. In front of the needle G I place the horizontal rock-shaft E having the upstanding arms H and I at opposite sides of the needle G when the latter is in its medial positions. These arms oscillate with the shaft E but they are shorter than the distance between the bar F and the shaft E in order that they may not engage the said bar. The arms normally stand in front of the path of the needle, so that the latter may pass behind them, without engaging them.

Z^3 represents a pyrometer having the electric conductors Z′ connected to the terminals shown on the block Z^2 on the plate Y. I have not shown the mechanism connected to the conductors Z′ and the needle G to cause the latter to oscillate as the temperature of the pyrometer Z^3 changes, because such mechanism is well-known.

Z represents a clock having the rotating disk *b* provided with the pin *c* which engages at each revolution one end of the lever *d* pivoted between its ends at *e*, the remaining end of the lever *d* being connected by the link J to the arm *f* secured to one end of the shaft E and projecting at the opposite side thereof from the arms H and I. Every time the clock Z causes the pin *c* to actuate the lever *d*, the arms H and I are caused to move toward the path of the needle, and if the needle should be back of the arm H or I when the clock causes the said arms to oscillate toward the path of the needle, the needle would be pressed by the arm H or I against the bar F, thereby closing a circuit through one or the other of the solenoid coils K or L which circuit will now be described.

The wire C is connected to the positive side of a source of electricity and to the conducting bar F. The arms H and I, which are insulated from the shaft E, are connected by the respective wires B and A to the switches P and Q, respectively. These switches are shown as flat springs, but they may be of any known construction.

M is the common core, plunger or armature of the coils K and L, having their adjacent ends connected to the wire W which is connected to the negative side of the source of electric energy hereinbefore mentioned. The remaining end of the coil K is connected to the fixed contact N of the switch Q, and the remaining end of the coil L is connected to the fixed contact O of the switch P. The plunger M carries a pair of pins T, between which one end of the lever R extends, this lever being pivoted between its ends, as at S. The lower end of the lever R is adjustably connected by the pin U to the bar V, which is connected to any apparatus to be controlled, as a gas, air, water, or oil valve, or a stack or furnace damper,

motor or a belt shifter. The plunger is such that at one limit it opens the switch Q, and at the other, the switch P. I have shown the bar V connected to the crank-arm V^2 secured to the butterfly valve 23 in the pipe V′ which may be supposed to convey gas for heating material, to whose influence the pyrometer may be subjected.

The operation of my invention will be more readily understood if it be assumed that the needle is indicating an actual operation, such as the temperature of molten spelter through which wire is passed to galvanize it. In such a case the indicator needle is so sensitive and the actuating force is so weak that it is not practicable to permit the needle to be normally in contact with the bar F or any other object because its movements would be retarded or prohibited. This explains why I clamp the needle between a pair of contacts when the needle is in certain extreme positions, as hereinafter to be described. The clock Z is regulated, for example, to actuate the arms H and I every ninety seconds. Let it be assumed that the bar V in the position shown is holding widely open the gas valve 23 which permits gas to pass to the burners which heat the spelter. When the spelter is heated above a predetermined degree, it is assumed that the needle will move to the right from the position shown; and when heated below the said degree, it will move to the left from the said position. So long as the spelter remains at the predetermined temperature, the needle will remain in the central position shown in full lines, but when the temperature rises the needle moves to the right. As long as the temperature is not high enough to cause the needle to move behind the arm H, there will be no circuit closed through the coil L and the gas valve will remain in its original open position; but if the temperature of the spelter rises so as to cause the needle to stand back of the arm H, as shown in dotted lines, the arm H will at its next oscillation engage the needle and push it against the conductor-bar F, whereby the following circuit is established: from the positive wire C through the bar F, the needle G, the arm H, the wire B, the switch P, the contact O, and the coil L to the negative wire W. The current in this circuit energizes the coil L which causes the plunger M to move to the right, thereby opening the switch P and permitting the switch Q to close. The opening of the switch P opens the said circuit and prevents the current therein from burning the needle when the contact of the arm H therewith is broken by the pin *c* passing beyond the end of the lever *d*. The closing of the switch Q places the apparatus in condition for energizing the coil K when the needle G is pushed by the arm I against the bar F.

The movement of the plunger M to the right causes the bar V to move to the left, which, it is assumed, partially closes the gas valve 23. The temperature of the spelter will now fall causing the needle to move to the left. If its temperature should drop too much, the needle would place itself behind the arm I, and at the next oscillation of the arm, a circuit would be closed through the coil K, which would return the plunger M and the bar V to the positions shown. The circuit through the needle would thus be immediately opened, the switch P would be set for the actuation of the plunger M when the needle again comes behind the arm H, and the rod V would cause the gas valve to be opened further.

I have given the above illustration of one use to which my invention may be put, but it is readily seen that the method of making electric contacts at the terminals of the wires A and B may be varied greatly. I do not desire to be limited to the precise means shown for closing the circuits alternately through the coils K and L; nor to the precise mechanism shown for controlling the switches or actuating the bar V or its equivalent. Various devices may alternately close the circuits through the wires A and B differing considerably from those shown.

I claim—

1. An electro-magnet, an armature therefor, a movable element, an electric contact co-extensive with the range of the said movable element, a clamping element co-extensive with a portion only of the said range and arranged to press the movable element against the said contact and close the circuit of the electro-magnet, and means for actuating the clamping element toward and away from the movable element.

2. An electro-magnetic device having an armature, circuits connected thereto to cause the armature to move in opposite directions, an element movable in opposite direction from a medial position, an electric contact in the said circuit co-extensive with the range of movement of the said element, a clamping element at each side of the said medial position co-extensive with a portion only of the said range and arranged to press the movable element against the said contact and thereby close the circuit of the electro-magnet through the said contact and the movable element, when the movable element is between the contact and either of the clamping elements, and means for actuating the clamping element toward and away from the movable element.

3. An electro-magnet, an armature therefor, a circuit for the magnet, a movable indicator needle, a fixed contact co-extensive with the range of movement of the needle, said needle being out of contact with the said contact, a clamping element co-exten-

sive with a portion only of the said range and located on the opposite side of the needle from the contact, and means for causing the clamping element to move intermittently across the path of the needle and to press the same against the contact whenever the needle comes between the contact and the clamping element, the circuit of the electro-magnet being completed through the contact and the clamped needle.

4. An electric circuit, a movable electric conducting element, electric contacts in the said circuit at opposite sides of the path of the movable element, one contact being coextensive with the range of movement of the movable element and the other being co-extensive with a portion only of the said range, and means for causing one of the contacts to move across the path of the movable element and to clamp the movable element between the contacts, when the movable element moves opposite the shorter contact, and thereby completing the said circuit.

Signed at Youngstown, Ohio, this 28th day of February, 1911.

JAMES A. LATIMER.

Witnesses:
E. A. HENDERSON,
W. H. WILSON.