

No. 764,592.

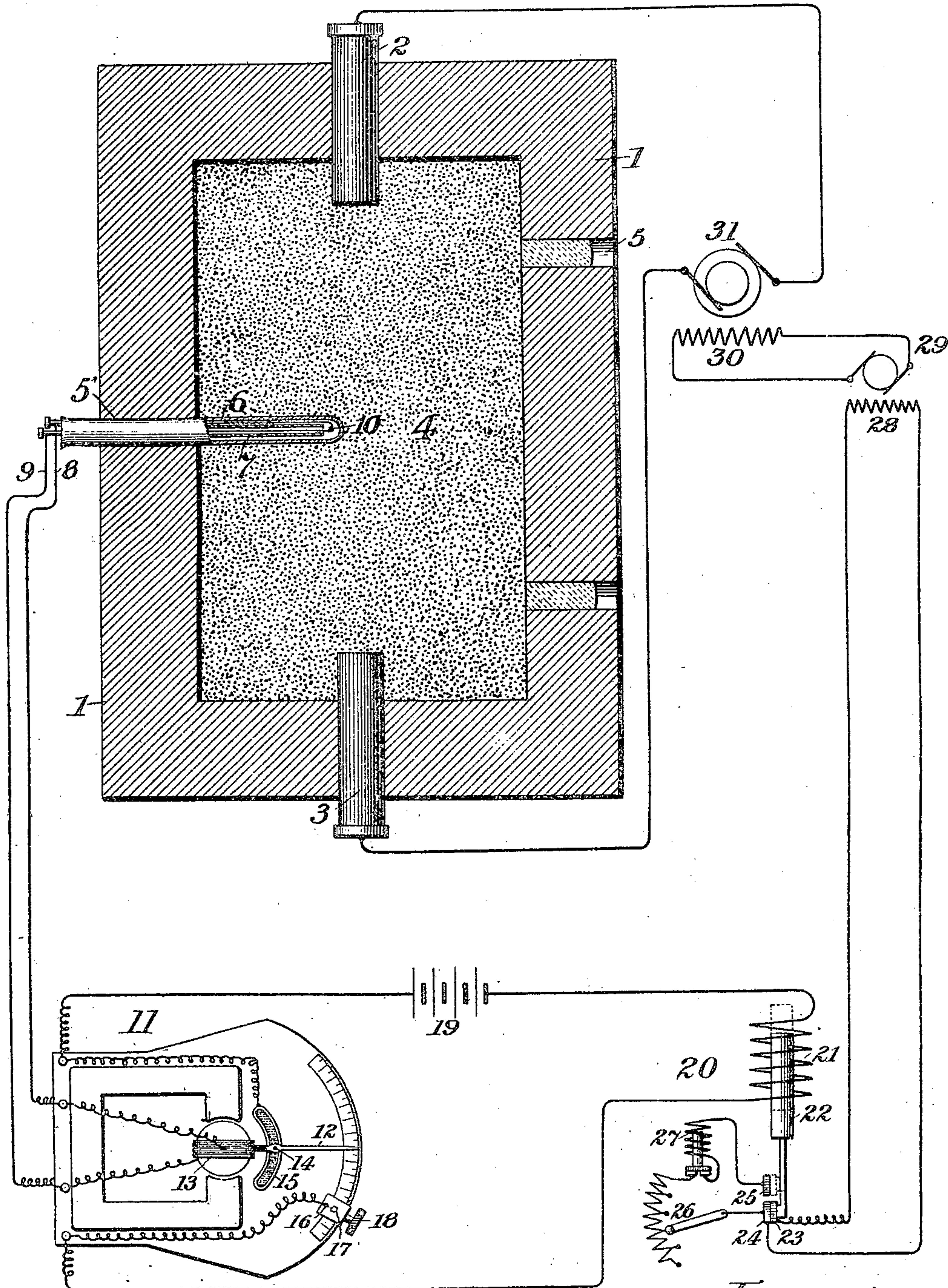
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W. McA. JOHNSON.

SYSTEM FOR THE CONTROL OF ELECTRIC FURNACES.

APPLICATION FILED NOV. 16, 1903.

NO MODEL.



Witnesses:

R. A. Balderson,
Julia B. Hill

Inventor:

Woolsey McA. Johnson,
Byrnes & Dowdell,
Att'ys.

UNITED STATES PATENT OFFICE.

WOOLSEY MCA. JOHNSON, OF LAHARPE, KANSAS.

SYSTEM FOR THE CONTROL OF ELECTRIC FURNACES.

SPECIFICATION forming part of Letters Patent No. 764,592, dated July 12, 1904.

Application filed November 16, 1903. Serial No. 181,316. (No model.)

To all whom it may concern:

Be it known that I, WOOLSEY MCA. JOHNSON, a citizen of the United States, residing at Laharpe, in the county of Allen and State of Kansas, have invented certain new and useful Improvements in Systems for the Control of Electric Furnaces, of which the following is a specification.

This invention is a system for the control of electric furnaces, and comprises a suitable pyrometer or other device capable of responding to and indicating temperature changes within the furnace, regulating means for the furnace-circuit, and means connected with the pyrometer or indicating device for operating said regulating means.

I will describe my invention as embodied in a pyrometer or indicating device and a regulator of simple construction; but it is to be understood that my invention is not limited to devices of the particular types herein indicated as suitable.

For a full understanding of my invention reference is made to the accompanying drawing, in which the figure is a diagrammatic view of an electric furnace with my controlling system applied thereto.

In said figure the electric furnace 1 is indicated as of the resistance type, the current passing between electrodes 2 3 through a body 4 of the material or charge to be treated. It will be understood, however, that my system is applicable to any type or class of electric furnace.

The furnace is preferably provided with a plurality of openings 5, which are normally closed by plugs except when serving for the introduction of the pyrometer. The pyrometer is shown as of the Le Chatelier type and comprises concentric cylinders 6 7 of refractory material, such as magnesia or siloxicon, the end of the outer cylinder being sealed over the open end of the inner cylinder. The wires 8 9, which may consist, respectively, of platinum and of platinum alloyed with ten per cent. of rhodium or of nickel and iron or of other suitable dissimilar metals, are located within the respective compartments formed by the concentric cylinders and are united by soldering or otherwise at or near the inner

end of the pyrometer, as indicated at 10. The outer ends of said wires are connected to binding-posts upon the pyrometer, and from these binding-posts electrical connection is made to the binding-posts of a suitable galvanometer 11. This galvanometer may, if desired, be provided with a scale, which may be conveniently graduated in degrees of temperature as determined for the particular instrument. The indicating-needle 12 is preferably of platinum, is insulated from the movable coil 13, and is provided with a metallic contact 14, dipping into mercury 15. A second contact 16, preferably also of platinum, is secured to a movable block 17, the position of which upon the scale may be adjusted by means of a rack and pinion operated by the milled head 18. The mercury 15 and the movable contact 16 are terminals of an electric circuit which includes a storage battery or other generator 19 and the solenoid 21 of a suitable electromagnetic regulator 20. Said electromagnetic regulator comprises in the form diagrammatically illustrated a solenoid 21, having a soft-iron core 22, which is adapted to be raised when the circuit is closed through the solenoid, as will be readily understood. Said core carries a contact 23, which in the position assumed by the core when the circuit is broken at the galvanometer 11 is adapted to close the circuit through the field 28 of the exciter 29, which furnishes current to the field 30 of the furnace-dynamo 31. When, however, the circuit is closed at the galvanometer, the contact 23 is brought by the movement of the core into operative relation with a second contact 25. In this position a variable resistance 26 and an electromagnetic cut-out 27 are thrown into the circuit.

The operation of my device is as follows: Differences of potential in the wires 8 9 corresponding to definite temperatures within the furnace-chamber are indicated by definite positions of the galvanometer-needle 12, as is well understood. The pyrometer is introduced into that portion of the furnace-chamber in which the reaction is proceeding or into such other portion as may be found to have a definite temperature relation thereto. I preferably introduce the pyrometer into the

reacting mass within the chamber at what may be called its "critical point." By means of the milled head 18 the adjustable contact 16 is then brought to the point of the galvanometer-scale which corresponds to or slightly exceeds the temperature desired. As the furnace temperature rises to this degree the needle 12 makes electrical contact with the point 16, thereby completing the electric circuit through battery 19 and coil 21. By the movement of the soft-iron core 22 the contact 23 is immediately shifted from 24 to 25, thereby introducing into the field of the exciter the variable resistance 26 and the electromagnetic cut-out 27. These elements may be of any known or suitable type, and are preferably so constructed and adjusted that the electromagnetic cut-out will break the circuit only in case the resistance proves insufficient to quickly reduce the furnace temperature.

It will be understood that it is not essential to employ in connection with my system of control a graduated scale or equivalent means for determining the absolute or relative temperature within the furnace. It is essential merely that a moving element actuated by or constituting a part of the pyrometer shall be capable of bringing into operation a suitable device for regulating or controlling the furnace-circuit. The term "indicating device" is herein employed to designate an element of this character.

It will be further understood that my invention is not limited to the details of construction or circuit connections herein described by way of example.

I claim—

1. A system for the control of electric furnaces, comprising a pyrometer, an indicating device connected therewith, a regulating device for the furnace-circuit, and means connected with said indicating device for operating said regulating device, substantially as described.

2. A system for the control of electric furnaces, comprising a pyrometer, an adjustable indicating device connected therewith, a regulating device for the furnace-circuit, and means connected with said indicating device for operating said regulating device, substantially as described.

3. In combination, an electric furnace, a portable pyrometer adapted to be inserted therein, an indicating device connected with said pyrometer, a regulating device for the furnace-circuit, and means connected with said indicating device for operating said regulating device, substantially as described.

4. In combination, an electric furnace, a portable pyrometer adapted to be inserted therein, an adjustable indicating device connected with said pyrometer, a regulating device for the furnace-circuit, and means connected with said indicating device for operating said regulating device, substantially as described.

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

WOOLSEY McA. JOHNSON.

Witnesses:

A. M. EWING,
ARTHUR W. COX.