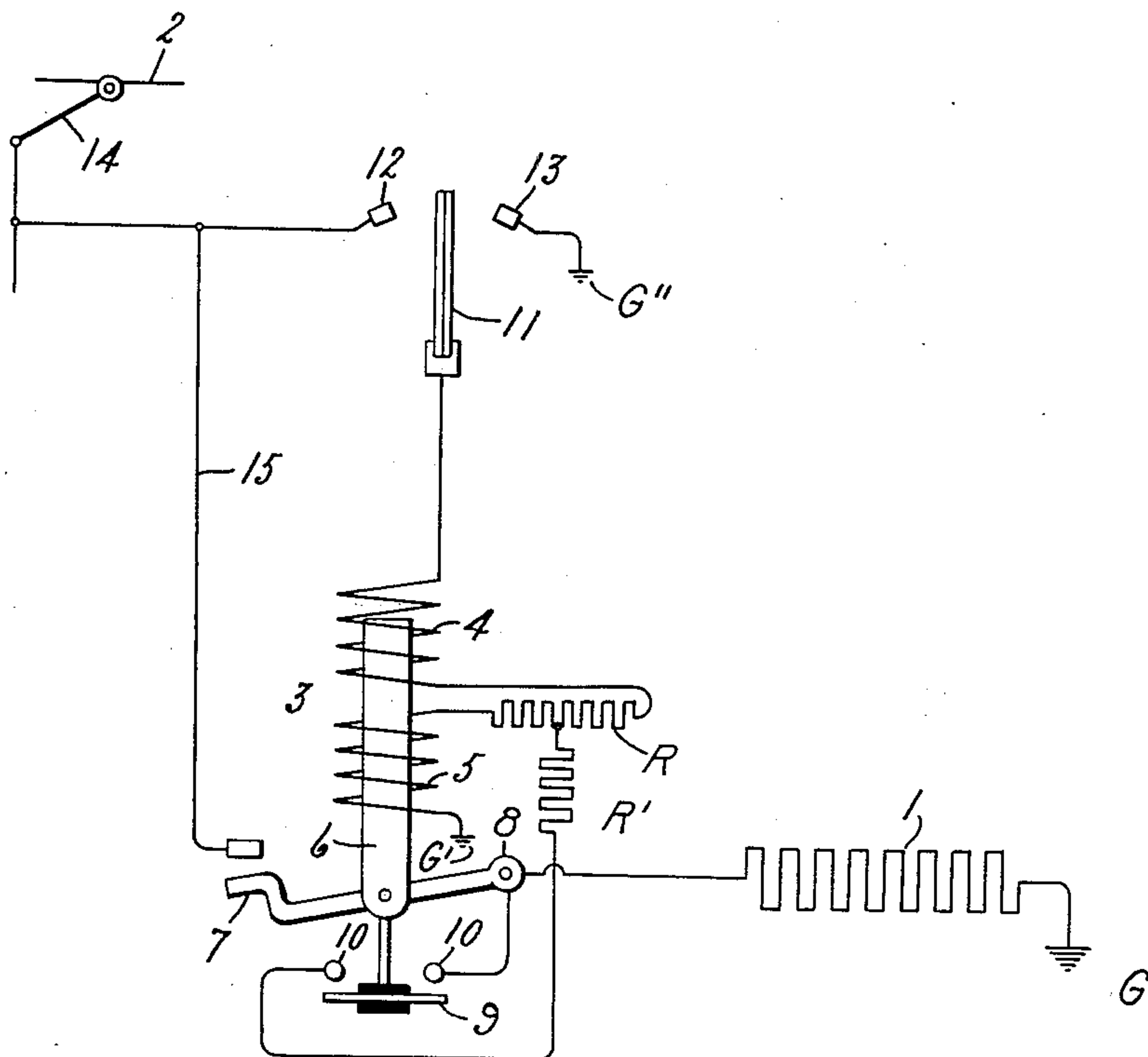


G. H. HILL.  
ELECTRIC HEATER.

APPLICATION FILED JULY 9, 1908.

910,682.

Patented Jan. 26, 1909.



Witnesses:

J. Earl Ryan  
J. Ellis Glen

Inventor:

George H. Hill,

by *Wm. H. Davis*  
Atty.

# UNITED STATES PATENT OFFICE.

GEORGE H. HILL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## ELECTRIC HEATER.

No. 910,682.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed July 9, 1908. Serial No. 442,721.

*To all whom it may concern:*

Be it known that I, GEORGE H. HILL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

This invention relates to electric heating devices and has for its object the provision of means whereby a device of this character may be maintained at a substantially even temperature, and excessive heating of the device prevented in a reliable, safe and efficient manner.

One of the objects of my invention is to provide a regulator for an electric heater which will prevent the temperature from rising and falling above and below a predetermined point.

In carrying out my invention I employ a thermostatic switch for this purpose, which is arranged to control the circuit of an electromagnetic circuit closer for the coil of the heater. The thermostat is so arranged that there is practically no sparking upon its contact when the circuit is broken by the thermostatic element. Furthermore the contactor is deenergized or rendered inoperative by arranging the windings so that they will be opposed to each other when the thermostatic element reaches the limit of its movement in the direction to cut out the heater.

In the accompanying drawing I have shown my invention embodied in concrete form in a somewhat diagrammatic manner.

For purposes of illustration I have shown the device in connection with a street car, although it is perfectly obvious that it is not limited to this particular application.

Referring to the drawing, 1 designates the heating coil for an electric heater, one end of which is connected to ground at G. This coil is connected with the trolley 2 by means of the contactor 3 consisting of two coils 4 and 5 operating upon a core 6. This core actuates a contacting arm 7 pivoted at 8 and also moves a bridging contact 9 towards and from the contacts 10. One end of coil 5 is connected to ground at G' while the other end is connected with a resistance R. The coil 4 likewise has one end connected to the resistance R while the opposite end is connected with the thermostatic element 11 arranged to vibrate between the two contacts

12 and 13. The thermostatic element is of the well-known compound element type and requires no description here, it being clearly understood that upon changes of temperature the element may bend to make contact with either one of the contacts 12 or 13. The latter contact is connected to ground at G' while the former is connected with the trolley pole 14.

The arrangement of circuits and mode of operation are as follows: When the temperature, as for instance on a street car, reaches a certain point, the element 11 will close the circuit of the heater at 12 as follows: from the trolley 2, contact 12, element 11, coils 4 and 5 to ground. The two coils of the contactor thus being energized, the contact arm 7 is raised and the circuit of the heating coil is closed from the trolley through conductor 15, contact arm 7 and heating coil 1 to ground. At the same time the two contacts 10 are bridged so that current also passes from the pivotal point 8 across contacts 10, resistance R', a portion of resistance R, which may be in the form of a rheostat, coil 5 and back to ground. Coil 5 is sufficiently strong to hold the contactor closed when the circuit of coil 4 is opened, but not necessarily strong enough to close it. As the temperature rises, element 11 will move away from contact 12 with practically no spark since the circuit is already closed through coil 5, and coil 4 is practically short-circuited. When the temperature reaches the point where the heater should be cut off, the element 11 engages contact 13. This causes the current to pass through the two coils 4 and 5 in opposition to each other as follows: from the trolley, conductor 15, arm 7, contacts 10 through resistance R', whence the current divides, going in one direction through coil 4 to ground and in the opposite direction through coil 5 to ground. These coils therefore neutralize each other and the core drops and cuts out the heater. In this manner the temperature may be maintained within a narrow range without danger of overheating or drawing an arc on the thermostat.

While I have described my invention as constructed and used in a specific manner, it should be understood that I do not limit my invention thereto except in so far as it is limited by the scope of the claims annexed hereto.



What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. An electric heater comprising a heating element, an electromagnetic circuit-closing device therefor arranged to control its own circuit, and a thermostat for controlling the circuit of said device.

2. An electric heater comprising a heating element, an electromagnetic circuit-closing device therefor having both operating and holding circuits and arranged to close its own holding circuit, and a thermostat for closing the operating circuit.

3. An electric heater comprising a heating element, an electromagnetic circuit-closing device therefor having both operating and holding windings and arranged to close its own holding winding, and a thermostat for closing the circuit through both windings.

4. An electric heater comprising a heating element, an electromagnetic circuit-closing device therefor having double windings, and a thermostatic switch arranged to connect said windings to operate in unison in one position and in opposition in the other.

5. An electric heater comprising a heating element, an electromagnetic circuit-closing

device therefor having operating and holding windings and arranged to close a circuit through its own holding winding, and a thermostatic switch arranged to connect said windings to operate in unison in one position and in opposition in the other.

6. An electric heater comprising a heating element, an electromagnetic circuit-closing device therefor having double windings and arranged to close a circuit through one of said windings, and a thermostatic switch arranged to connect said windings to operate in unison in one position and in opposition in the other.

7. An electric heater comprising a heating element, a thermostat controlling the circuit thereof, and an automatic switch in said heater circuit arranged to short-circuit the thermostat when the heater reaches a predetermined temperature.

In witness whereof, I have hereunto set my hand this 8th day of July, 1908.

GEORGE H. HILL.

Witnesses:

FRANK J. SEABOLT,  
HELEN ORFORD.