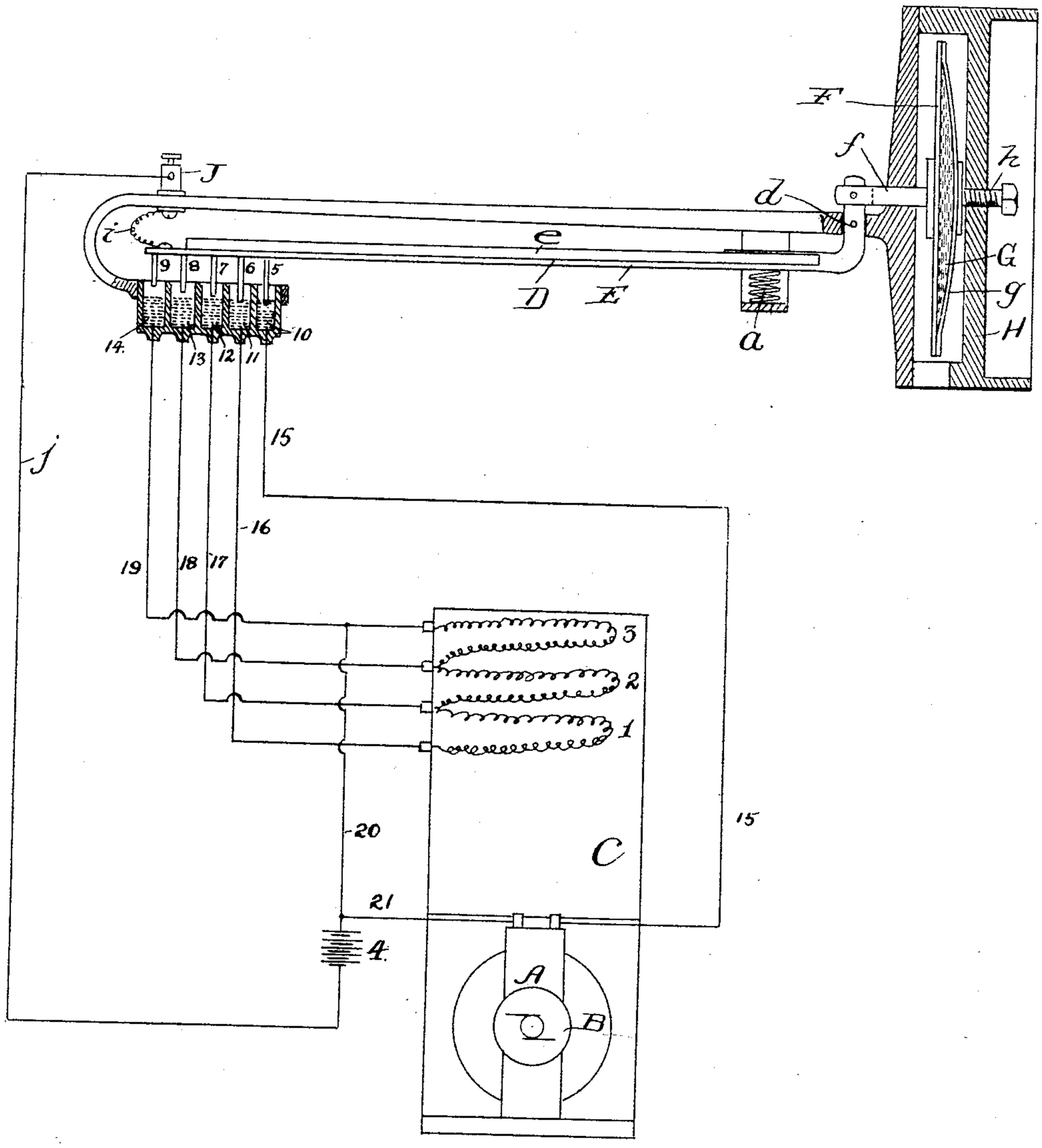
(No Model.)

A. M. BUTZ.

TEMPERATURE REGULATOR FOR ELECTRIC HEATERS.

No. 510,889. Patented Dec. 19, 1893.



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TEMPERATURE-REGULATOR FOR ELECTRIC HEATERS.

SPECIFICATION forming part of Letters Patent No. 510,889, dated December 19, 1893.

Application filed December 24, 1892. Serial No. 456,224. (No model.)

To all whom it may concern:

Be it known that I, ALBERT M. BUTZ, a citizen of the United States, residing in Oak Park, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Temperature-Regulators for Electric Heaters, of which the following is a specification.

This invention relates to an improved apparatus for regulating the temperature created by electric heaters, and is adapted more especially for use with that class of heaters in which a current of air set in motion by a fan is forced into contact with electric resistance coils by which it is heated, and is then circulated in the room or building to be warmed.

The nature of the invention is fully described below, and is also illustrated in the accompanying drawing which gives a diagrammatic elevation of the apparatus.

In the drawing A may represent an electric motor driving a fan B located in an air box, flue or passage the outlines of which are shown at C. In proximity to the fan and in the line of the air current created thereby, and preferably within the passage C are located a plurality of resistance coils 1, 2, 3, more or less in number, which are joined together in series, and also provided with separate connections by which they are supplied with the electric current, so that all or only a portion of the coils may be heated according to the amount of heat required.

4 is a battery or other source of electric energy and it is connected by proper wires with the resistance coils, and it may also be connected with the motor A, so as to drive the latter if desired. These wire connections are in circuit with the temperature regulating parts of the apparatus and will be more fully set forth in the description of the latter now to be given.

D is a thermostatic bar having a bent up end pivoted at *d*. It is preferably composed of the steel strip E and the rubber strip *e* properly cemented to the strip E. This bar being located in the room or apartment the heat whereof is to be regulated, its free end is of course deflected according to the state of the temperature of the room, and in order to increase the amount of motion thus communicated to the free end, I combine with the bar a mercurially operated diaphragm F also located in the apartment or room and subject to the same changes in temperature as the bar, and connect the bent up end of the bar with such diaphragm by a mechanical connection such as the stem *f*. The bar and diaphragm thus joined constitute in effect a compound thermostat. The diaphragm forms one side of a mercurial chamber G, the other side whereof may consist of the concave disk *g*, and both may be supported in and inclosed by a suitable case H, and a set screw *h* may also be used to regulate the position of the diaphragm chamber relative to the bar. A spring *a* is also placed under the bar to insure its return after it has been deflected downward. The free end of the bar is electrically connected by the wire *i* with a binding post J as shown, and a wire *j*, extends from this post to one pole of the battery. The current received from the battery by these connections is transmitted to the resistance coils by means of a series of pins 5, 6, 7, 8, 9, depending from the under side of the free end of the bar, and made of graduated lengths, as indicated. These pins are located over and adapted to dip into a corresponding series of mercury cells 10, 11, 12, 13 and 14. The number of pins and cells will of course correspond with the number of resistance coils employed, and where the motor is driven independently of the current energizing the coils, one of the pins and one of the cells illustrated will be rendered unnecessary.

The cells are all filled to the same height with mercury, and from cell 10 a wire 15 leads to one side of the motor; from cell 11 a wire 16 leads to one end of coil 1; the wire 17 connects cell 12 with one end of coil 2; the wire 18 connects cell 13 with one end of coil 3 and wire 19 connects cell 14 with the other end of coil 3. A return wire 20 intersects wire 19 and leads to the battery, and the motor is also connected with this return wire by the wire 21.

In order that the pins 5, 6, 7, &c., may dip into the mercury successively and not simultaneously they are graduated in length, pin 5 being the longest, pin 6 somewhat shorter, pin 7 still shorter and so on.

This being the construction of the apparatus, the operation is substantially as follows:—Supposing the parts to be in the posi-

tion indicated in the drawing, which is the position assumed when the room is too cold, the current divides between the pins 5 and 6, so that part passes through the motor and energizes it, and part passes to the coil 1, and from thence through the series of coils and back to the battery by wires 19 and 20. The heating apparatus is thus allowed to give out the maximum amount of heat, and until the heat in the room acts upon the thermostat and forces pin 7 into contact with the mercury. This results in sending the current to coil 2, and cuts out coil 1 so that the amount of heat produced is reduced correspondingly. And as the heat increases still further, pin 8 is brought into contact, so that the current is carried directly to coil 3, leaving out both coils 1 and 2, and still further lessening the heat produced. When the heat in the room reaches the normal, the bar will have brought pin 9 into the mercury, thus cutting out all the coils, and allowing the current to return direct to the battery, and in the construction shown this does not interfere with the motor which may remain in continuous motion.

It will be understood that electrical resistances other than those in the coil form may be substituted for the coils shown without departing from the spirit of my invention; also that I am not to be limited in my claims to the construction of the thermostat shown, nor to the use of the apparatus in the heating of air, nor to its use in connection with a fan.

I claim—

1. The combination with a plurality of resistances connected together and adapted to be used for heating purposes, a plurality of circuits corresponding to and supplying said resistances, and a thermostatic device adapted to complete said circuits and to cut out the resistances successively as the temperature approaches the desired degree, substantially as specified.

2. The combination with an electric heater employing a plurality of electrically connected heating resistances, of corresponding current supply circuits, and means for automatically completing said circuits and cutting out said resistances successively as the temperature approaches the desired point, substantially as specified.

3. The combination of a plurality of heating resistances, and corresponding circuits, the resistances being connected together so that all are heated when the current is supplied to the first one of the series, and an automatically acting thermostat adapted to divert the current from the first resistance to the second and thus cut out the first resistance as the heat approaches the required degree, substantially as specified.

4. The combination with the resistances and their circuits, of the thermostat having a series of graduated pins corresponding to the resistances, and the series of mercury cells into which the pins may dip and serve to complete the circuits successively, substantially as specified.

5. The combination with the resistances and their circuits of the corresponding mercury cells and a compound thermostat having graduated pins adapted to dip into said cells and complete the circuits successively, substantially as set forth.

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