

(No Model.)

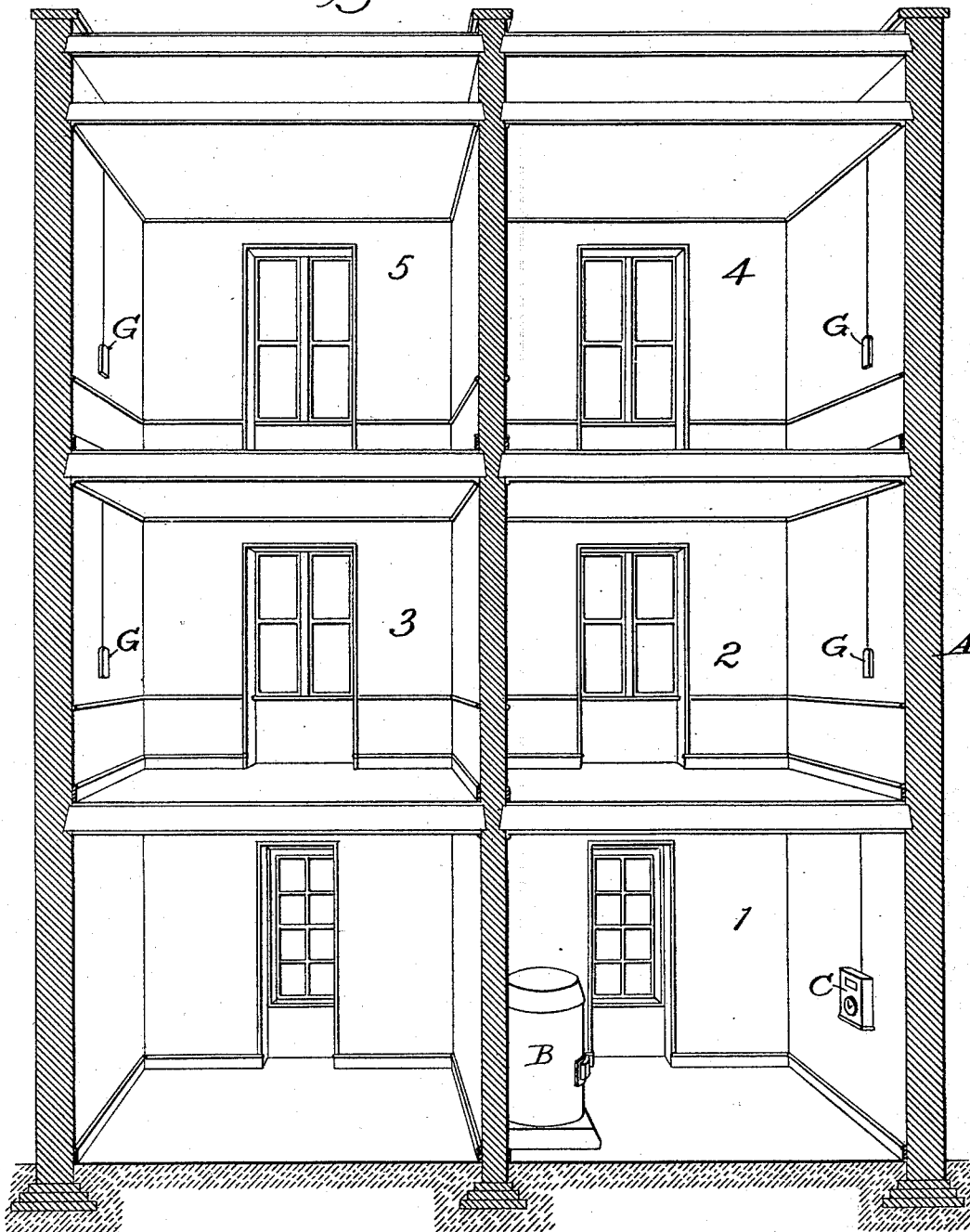
4 Sheets—Sheet 1.

J. BARTLETT.  
TEMPERATURE INDICATOR.

No. 489,212.

Patented Jan. 3, 1893.

*Fig. 1.*



*Attest:*

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Fig. 2.

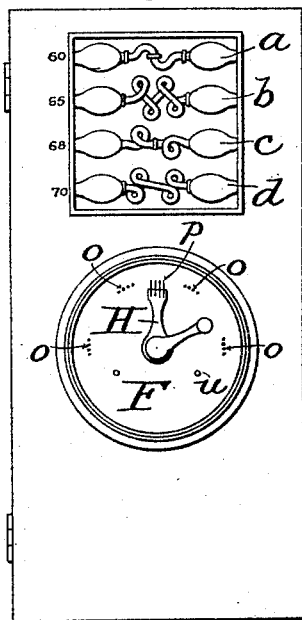


Fig. 3.

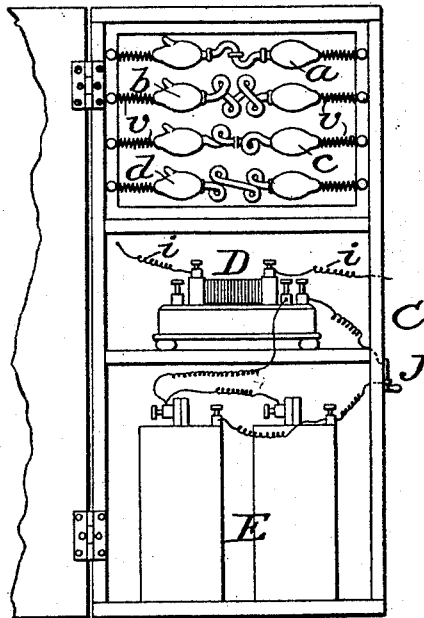


Fig. 4.

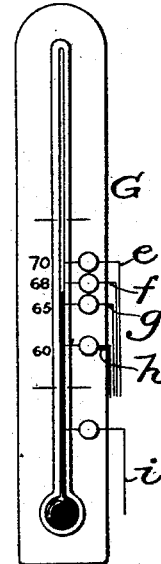


Fig. 5.

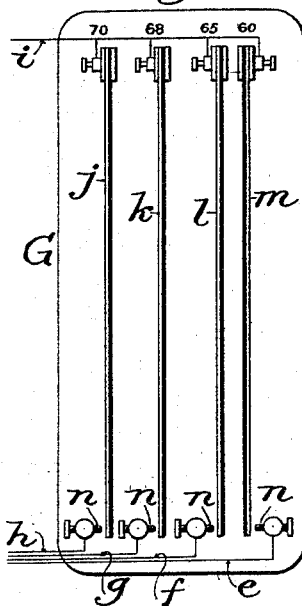
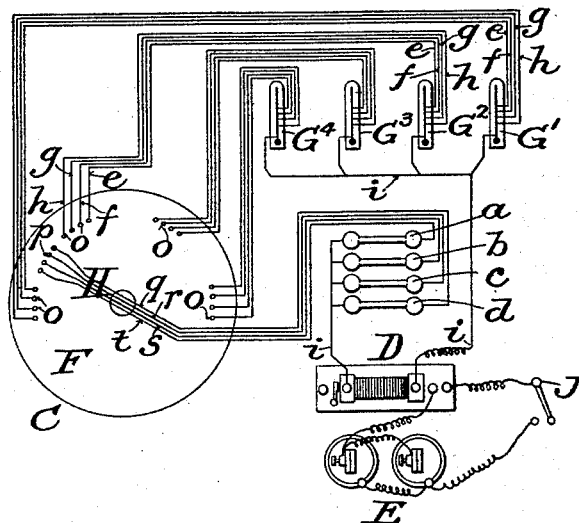


Fig. 6.



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Fig. 7.

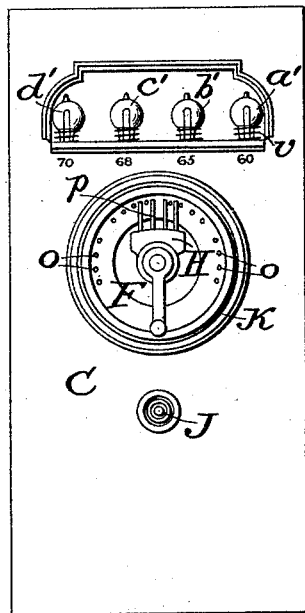


Fig. 8.

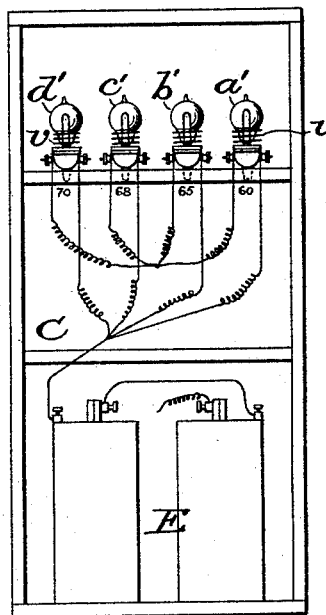


Fig. 9.

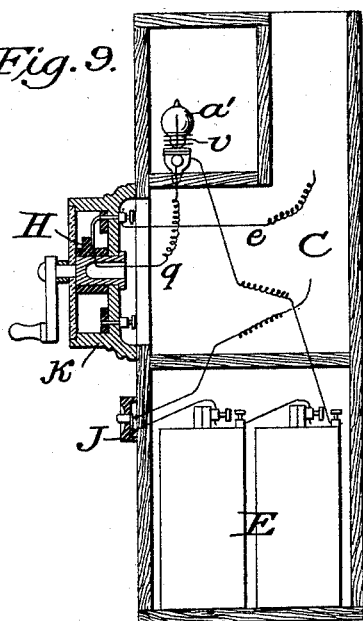
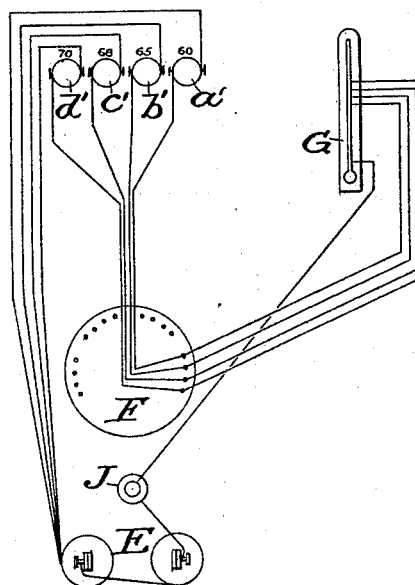


Fig. 10.



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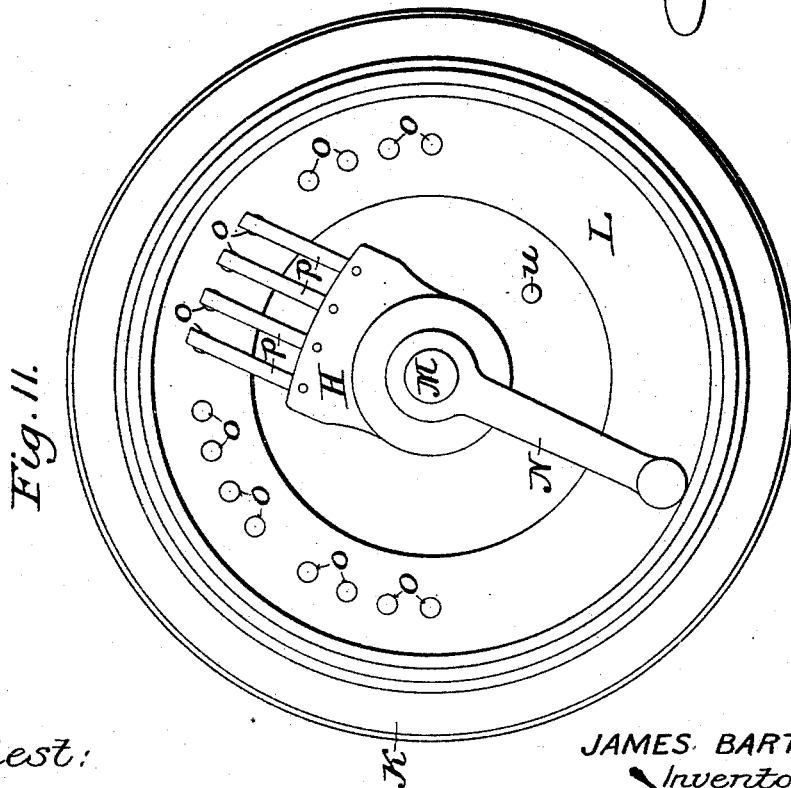
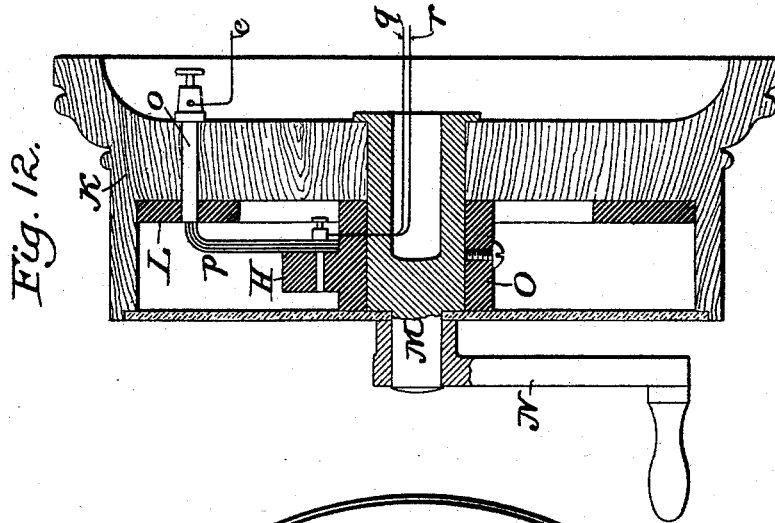
(No Model.)

4 Sheets—Sheet 4.

J. BARTLETT.  
TEMPERATURE INDICATOR.

No. 489,212.

Patented Jan. 3, 1893.



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# UNITED STATES PATENT OFFICE.

JAMES BARTLETT, OF TOLEDO, OHIO.

## TEMPERATURE-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 489,212, dated January 3, 1893.

Application filed August 23, 1892. Serial No. 443,863. (No model.)

*To all whom it may concern:*

Be it known, that I, JAMES BARTLETT a citizen of the United States residing at Toledo in the county of Lucas and State of Ohio, (temporarily in London, England) have invented certain new and useful Improvements in Temperature Indicators of which the following is a specification:

My invention relates to temperature indicators, or signaling devices whereby a person at one point or station, as the janitor or fireman of a building, may readily ascertain the temperature at another point or points, as for instance, the various rooms or apartments of the building.

The apparatus is susceptible of considerable variation in its practical embodiment, but in its preferred form comprises for each room or apartment a thermostat with a series of contacts corresponding to different degrees of temperature and covering such range as it is necessary or desirable to cover in the particular connection in which the apparatus is used,—a corresponding number of signals of any approved type, a separate wire or conductor connecting each contact point with its corresponding signal, a ground or return conductor, a battery or source of electric energy, and a switch by which the electric circuit may be opened or closed at will at the point where the information is to be given. If a thermostat be employed which makes contact with the several points successively, but with only one at any time, only one signal of the group will be displayed or given; but if arranged to make contact with a regularly increasing number then the signals will be displayed or given in the order in which the contacts are made, and a corresponding number will be displayed at one time, so that the observer will know that the temperature has reached the point indicated by the signal standing for the highest degree of any of those displayed.

In the accompanying drawings,—Figure 1 is a sectional perspective of a building, showing six rooms, four furnished with the thermostats, and a fifth containing the indicator or signal apparatus; Fig. 2, an outside view; and Fig. 3, an inside view of the signal box or case, Fig. 4, a view of a mercurial ther-

mostat suited to the present invention; Fig. 5, a view of a metallic thermostat also suitable for the same purpose; Fig. 6, a diagrammatic view showing the usual or preferred wiring of the circuits; Fig. 7, an outside view; Fig. 8, an inside view; and Fig. 9, a vertical sectional view of the indicator or signal box equipped with incandescent electric lamps; Fig. 10, a diagram of the wiring as arranged when incandescent lamps are used; and Figs. 11 and 12, face and sectional elevations of the switch box as constructed for four apartments, each provided with four contact points for indicating a corresponding series of markings or readings of temperature.

In the heating of buildings from a central point, as by a steam heater, hot air furnace, water heater or the like, it is desirable to maintain a uniform or substantially uniform temperature throughout the building, or to maintain in different apartments a prescribed temperature; and various temperature regulating or controlling devices have been designed with this end in view. My purpose is to enable a person in charge of the heating apparatus, or other proper person, to readily ascertain from such central point the temperature in any given apartment under his control, and this I accomplish by the apparatus shown in the accompanying drawings, in which,—

A indicates a building containing apartments which are indicated by the numerals 1, 2, 3, 4 and 5. The room or apartment numbered 1 contains the heating apparatus B and the indicator or signaling apparatus C by which the temperature in the different apartments 2, 3, 4 and 5 is ascertained.

The signal apparatus is represented in Figs. 2 and 3 as provided with Geissler tubes, and in Figs. 7, 8 and 9 as furnished with incandescent electric lamps.

Referring now to Figs. 2 and 3, C represents the indicator or signaling apparatus as a whole, comprising advisably an inclosing box or case containing a series of Geissler tubes *a*, *b*, *c* and *d*, corresponding in number with the number of points of indication required for each apartment, or with the largest number required for any one apartment.

D indicates an induction coil also contained

within the case of the signal apparatus, and E a battery composed of a convenient or suitable number of cells of any approved type, the common Leclanché, the Burnley dry cell, or such other form as may be found suitable for open circuit work. Instead of the battery, however, connection may be made with a service main or with any other source of electric energy.

On the door or wall of the containing box or case is mounted a dial F containing as many sets of contacts as there are apartments connected with the apparatus, and each set comprising as many contact points as there are points of temperature to be indicated or ascertained in the respective apartments. Each of the apartments 2, 3, 4 and 5 contains a thermostat G, shown in position in Fig. 1, in diagram in Fig. 6, and in detail in Figs. 4 and 5. The form of construction of the thermostat is variable at will, two forms being represented in Figs. 4 and 5 respectively, that in Fig. 4 being a mercurial thermostat, and that in Fig. 5 a metallic, or one comprising a compound bar, or bars subject to deflection under variations of temperature.

Referring first to Fig. 4, it will be seen that the thermostat therein represented comprises simply an ordinary thermometer tube pierced at suitable intervals for the introduction of wires *e, f, g, h* at points corresponding to the different degrees of temperature to be indicated, represented in the drawings as 60, 65, 68 and 70. The tube is also pierced at a lower point for the introduction of a wire *i* by which the circuit of the wires *e, f, g, h* is completed, as presently explained. The tube is supplied with mercury or with other liquid capable of sufficient expansion and contraction under variations of temperature and of serving as a conductor or circuit closer. Under the construction just explained, it will be seen that so long as the mercury column remains below the 60 mark, no circuit will be completed because of a break between the wire *i* and the wire *h* next above it; but as the column rises to and makes contact with the wire *h*, a circuit will be completed at that point between the wires *h* and *i*, and so on successively with the wires *g, f* and *e*. When the latter wire is touched by the liquid column, the four circuits will be closed at this point.

Referring now to Fig. 5, the thermostat G will be seen to consist of a series of compound bars *j, k, l, m*, which may be of brass and steel, steel and zinc, brass and hard rubber or any equivalent and well known combination of substances having different rates of expansion and contraction. These several bars are set or adjusted so as to make contact each with a screw or stud *n* at a predetermined temperature, the several bars making contacts at different degrees, as for instance, 60, 65, 68 and 70, as in the case of the form shown in Fig. 4. These particular de-

grees are purely arbitrary in this instance and may be varied as desired, both as to the temperature indicated and the number of indications.

Referring now to Fig. 6, the wiring of the system will be explained.  $G^1, G^2, G^3, G^4$  indicate the four thermostats of the four apartments 2, 3, 4 and 5. From each thermostat the wires *e, f, g, h* are carried to the dial plate F and through the same, terminating in the contact points *o* on the face thereof. These four groups of four contact points are each advisably arranged in series concentric with the dial F.

H indicates a radial arm which will be more fully described in connection with Figs. 10 and 11, and which carries four contact fingers or springs *p* spaced to correspond with the spacing of the contact points *o* of the dial and of a length to bear upon the same as the arm is carried about the central axis of the dial. Carried by the arm H and connecting with the respective fingers *p* thereof, are four wires *q, r, s, t*, each connecting one of the fingers with one of the Geissler tubes *a, b, c, d* of Figs. 2, 3 and 6, or with one of the corresponding incandescent electric lights *a', b', c', d'* of Figs. 7, 8, 9 and 10.

*i* indicates the return wire from the thermostats  $G^1, G^2, G^3, G^4$ , which connects with the several Geissler tubes through the medium of the induction coil I, or with the incandescent electric lights directly, except for the intervention of the battery or other source of electrical energy.

As shown in Figs. 3, 7, and 9, a switch or push button J is arranged at a suitable point on the casing or box of the indicator by which the circuit may be completed or broken at any time at that point.

By referring to Figs. 7, 8, and 9, it will be seen that in all essential particulars the construction and arrangement of parts is the same as described in connection with Figs. 1, 2, 3 and 6, except that the induction coil is omitted as an unnecessary and undesirable element when using incandescent lights.

In Figs. 11 and 12 the construction of the dial and switch mechanism or contact maker is shown in detail. While susceptible of some variations, the preferred construction comprises a circular shell K of wood or other insulating material, hollowed out to receive the working parts, and provided within the recessed portion with an annular plate L of vulcanite or like material, through which are led the stems *o* which constitute the contact points of the dial, as above mentioned, and serve also as binding posts in which to clamp the ends of the wires *e, f, g, h*. Centrally located and swiveled in the body of the shell or casing K is a shouldered or flanged hub or spindle M, conveniently made of brass, provided with a handle N by which to turn it, and provided further with a collar O of vulcanite or other non-conducting material which

serves both to retain the hub or spindle in place and carry the contact springs or fingers *p*, as shown in Figs. 11 and 12. The hub or spindle *M* is hollow, and serves to carry the wires *q, r, s, t*, which are led in from the Geissler tubes or the incandescent lamps, as the case may be, as will be readily understood upon referring to the diagrams, Figs. 6 and 12. The wires *q, r, s, t* are insulated from each other where they pass through the body of the stem or spindle *M*, and at all points where they are liable to make contact with any conducting substance; or, as is preferred, they may be insulated throughout their length, and the same is true of the wires *e, f, g, h*, and *i*. The front of the shell or casing *K* is or may be covered with a glass plate as indicated in Fig. 12, and the groups of contact points *o* may be so separated that the fingers *p* shall entirely leave those of one group before making contact with those of another. This, however, is not essential, but there should be at least one point at which the fingers *p* may be placed entirely out of contact with any of the points *o*. The wires *q, r, s, t* should be left sufficiently free and slack to permit the spindle *M* to be turned one-half revolution without unduly twisting or straining the same; or else the connection should be so made as to permit the unlimited turning of the spindle without twisting the wires. In practice, however, it will be sufficient to limit the play of the handle *N* to a little less than one revolution, which may be done by means of a stop-pin *u* located at a suitable point in the path of the arm *H*.

The manner of connecting up the battery may be varied as required, and is a matter entirely within the province of the electrician, though ordinarily it will be found advisable to connect the cells for tension rather than quantity.

The apparatus being constructed as above described and connected in the manner set forth, it operates as follows:—Assuming that the handle *N* is so adjusted as to carry the fingers *p* out of contact with any and all of the contact point and that the switch or push button *J* is open so as to break the circuit at that point, the operator desiring to ascertain the temperature in a given room, first presses the button or closes the switch *J*, then turns the handle *N* until the contact springs or fingers *p* rest upon the contacts *o* of the dial corresponding to the room or apartment as to which information is desired. Whenever this is done, the contact fingers closing the circuit of each of the lines *e, f, g, h; i; q, r, s, t* at the dial, the Geissler tubes or incandescent lamps corresponding to each of the contacts *o* of the apartment in question, will become luminous, provided the temperature has reached the highest of the four points; or in other words, provided the thermostat or thermostats have completed the circuit of each of the wires *e, f, g, h* connected therewith. If, however, the

contacts be not all made at the thermostat, then only those tubes, lamps, or signals corresponding to the points of temperature reached or passed in the room and for which there are contact points, will become luminous. In this way the operator is enabled to ascertain at once the highest of the indicated points of temperature reached in the particular apartment in question, and by carrying the handle *N* so as to bring the fingers *p* successively into contact with the different groups of contacts, the same information may be obtained as to each of the apartments provided with the thermostats. To save battery power and somewhat facilitate the reading of the signal, a single compound bar, similar to those shown in Fig. 5, may be employed, carrying at its end a spring contact which, riding over a series of contact plates corresponding to the contact screws *n*, will make electrical connection therewith one at a time, so that only the circuit of the tube or lamp corresponding to the particular temperature indicated by the thermostat will become luminous.

It will of course be understood that I do not limit myself either to Geissler tubes or to electric lamps, as any form of signal, annunciator drops, semaphores, bells, or the like may be adopted, provided only that each shall cease to give indication as soon as the temperature falls below the point which it is designed to indicate. Without such provision it would be necessary to set the signals back, or to throw them out of action manually each time, before a reliable reading could be made, hence the Geissler tubes and incandescent lamps are peculiarly adapted to the purpose in view. So too, the capability of being read at night, or in the dark places in which heating apparatus is commonly located, without other light, is a marked advantage possessed by such signals over the ordinary annunciator drops, which remain displayed until manually set back, and require such other light. With such manually controlled signals, there would always be liability of error, through failure to first return all the drops to a position where they could not be seen, and the consequent observation of a signal or drop which at the moment would not correctly indicate the existing temperature. With lamps or Geissler tubes arranged as set forth, the one indicating the highest temperature at any given time, is necessarily correct. So too, any usual means of distinction may be employed, as for instance, that shown in the drawings, Figs. 2 and 3, which consists in placing the Geissler tubes one above another, their relative height corresponding to the elevations of temperature indicated; by coloring the tubes or lamp globes differently; by lettering or numbering the same to correspond with the different degrees of temperature, and also marking the groups of contacts on the dial to correspond with the respective rooms.

To avoid injury of the Geissler tubes and

of the electric lamps, I find it advisable to sustain or support the same by light spiral springs *v*, as indicated in Figs. 3, 4, 7, 8 and 9. The employment of the push button or switch J is not essential, but is advisable as a means of preventing undue waste of the battery through carelessness in leaving the circuit closed, through the contact *o* and fingers *p*, but if the handle N be so adjusted as to destroy this contact, no waste can occur.

The wires *e*, *f*, *g*, *h* may be twisted together and carried as a cable from the indicator to the points at which it is necessary to separate to enable them to pass to the respective apartments.

Having thus described my invention, what I claim is:—

1. An apparatus for indicating the temperature of an apartment or apartments, comprising the following elements in combination: a thermostat in the apartment, provided with contact points corresponding with the points of temperature to be indicated; an indicator located at the point where the information is to be received and comprising separate signals, one for each of the contact points of the thermostat each signal adapted to go automatically out of operation when the temperature falls below the point which it indicates; electric conductors connecting the contact points and the signals independently; a return wire connecting the several thermostats and the several signals; a source of electrical energy included in the return wire, and a circuit closer adapted to complete the circuit from each contact point of the thermostat to each signal and through the source of electric energy.

2. In combination with a series of apartments or spaces, thermostats, one in each of said apartments or spaces and each provided with a series of contact points corresponding to different degrees of temperature; an indicator provided with a series of signals corresponding to the respective contact points of said thermostats; conductors connecting the respective contact points of the thermostats with corresponding contacts of the indicator; a source of electrical energy, and a circuit closing device substantially such as described, serving to complete the electrical circuit between the indicator signals and the contacts of any of thermostats at will.

3. The combination of a thermostat G provided with a series of contact points corresponding to different degrees of temperature, and with a series of wires or conductors insulated one from another and connecting with the respective contact points; an indicator provided with signals corresponding in number with the contact points of the thermostat each signal adapted to go automatically out of operation when the temperature falls below the point which it indicates; conductors connecting the contact points of the thermostat independently with the respective signals

of the indicator; a return line or conductor connecting the several thermostats with the several signals; a source of electric energy included in the return conductor, and a switch or contact maker adapted and arranged to make or break connection between the respective contact points of the thermostat and the respective signals, as desired.

4. In combination with a series of thermostats  $G'$ ,  $G^2$ ,  $G^3$ ,  $G^4$  provided each with a series of contacts corresponding to different degrees of temperature; an indicator provided with a series of independent signals corresponding to the contact points of the thermostats; a dial provided with groups of contact points corresponding to the contact groups of the several thermostats; conductors extending from the contacts of the thermostats to those of the dial; a movable arm or lever provided with contact springs adapted to make contact simultaneously with the contact points of one dial group; conductors connecting said contact fingers independently with the several signals of the indicator; a return line connecting the several thermostats with the several signals, and a source of electricity included in the circuit, substantially as set forth, whereby the arm or lever may be moved to complete the circuits of all those contact points of a group which are included within the temperature reached in the space or apartment in which the thermostat of that group is located.

5. In an apparatus for indicating at a central point the temperature at a distant point, the combination with a series of signals or indicators at the central point each adapted to go automatically out of operation when the temperature falls below the point which it indicates, of a thermostat at the distant point having a series of contacts corresponding to the degrees of temperature to be indicated; electrical connections between the thermostat and the respective signals, and a source of electrical energy included in a conductor common to the several circuits; whereby closing of the contacts by the thermostat shall bring into action a corresponding signal at the central point.

6. In a temperature indicating device such as described a circuit closer comprising shell or body K, insulated contacts *o* arranged in groups, a rotary spindle M carrying a series of insulated fingers *p*, which correspond to one of the contacts of the group, and a lever or handle for moving the spindle and carrying the contact fingers into and out of touch with the contact points.

7. In an apparatus for indicating at a central point the temperature of an apartment at a distant point, the combination with a series of signals at the central point, adapted to be rendered luminous by an electric current, of a thermostat at the distant point having a series of contacts corresponding to the degrees of temperature to be indicated; elec-



trical connections between the thermostat and the respective signals, and a source of electrical energy included in a conductor common to the several circuits; whereby closing of  
5 any of the thermostat contacts shall bring into action a corresponding signal, and the opening of such contact shall cause the display of the signal to cease.

In witness whereof I hereunto set my hand in the presence of two witnesses.

JAMES BARTLETT.

Witnesses:

B. CHAMBERLAIN,

A. E. CUTHBERT,

*U. S. Consulate General, London, England.*