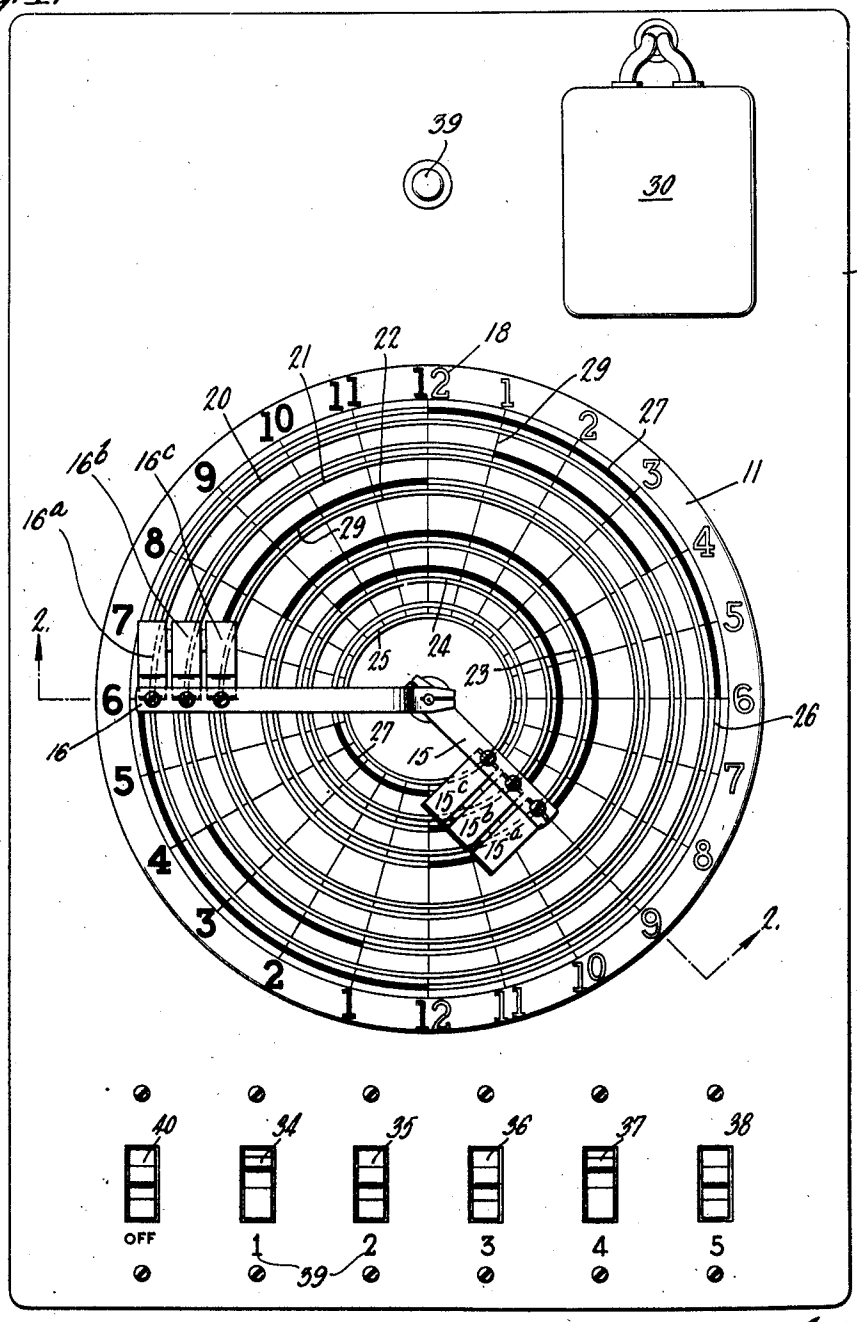
May 5, 1942. R. H. SNYDER 2,281,888

APPARATUS FOR CONTROLLING HEATING SYSTEMS AND THE LIKE

Filed Jan. 16, 1940 2 Sheets-Sheet 1

Fig. 1.



Inventor:-
Robert H. Snyder
by his Attorneys
Howson & Howson

May 5, 1942. R. H. SNYDER 2,281,888

APPARATUS FOR CONTROLLING HEATING SYSTEMS AND THE LIKE

Filed Jan. 16, 1940 2 Sheets-Sheet 2

Fig. 2.

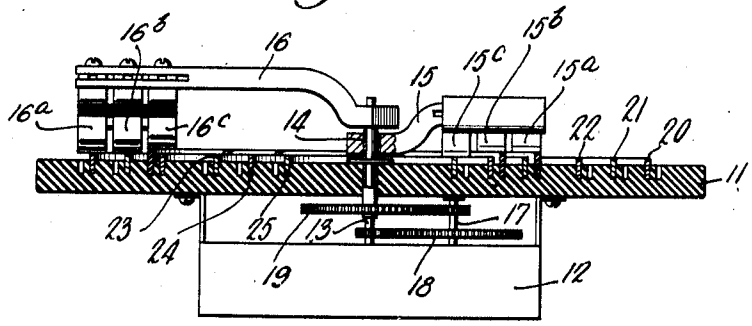


Fig. 3.

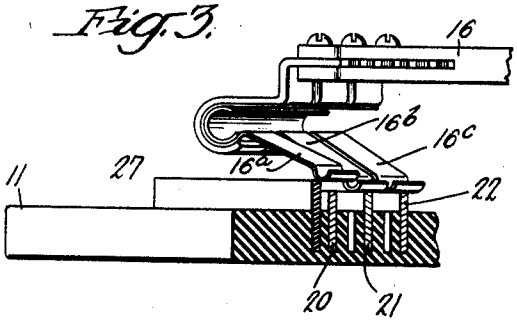


Fig. 4.

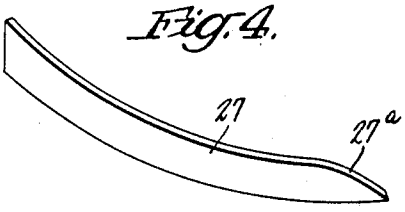
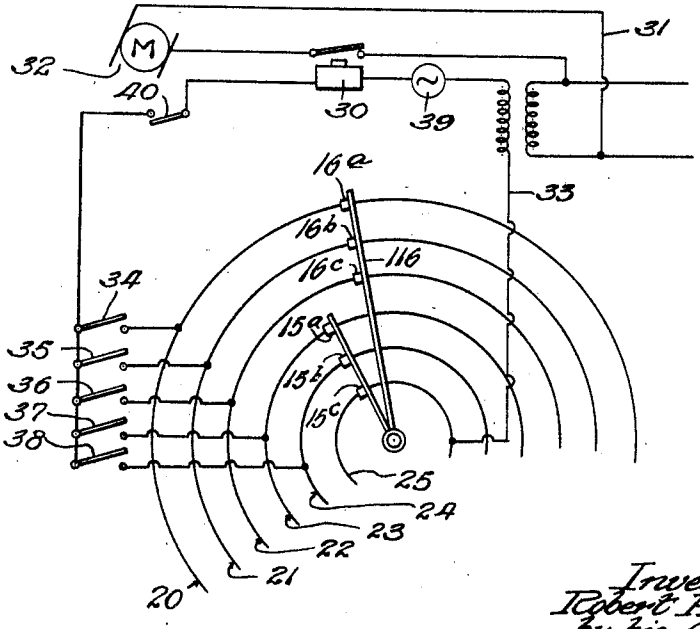


Fig. 5.



Inventor:-
Robert H. Snyder
by his Attorneys
Howson & Howson

Patented May 5, 1942 2,281,888

UNITED STATES PATENT OFFICE

2,281,888

APPARATUS FOR CONTROLLING HEATING SYSTEMS AND THE LIKE

Robert H. Snyder, Maple Shade, N. J., assignor of one-half to Stephen Haas, Philadelphia, Pa.

Application January 16, 1940, Serial No. 314,161

9 Claims. (Cl. 200—37)

This invention relates to an apparatus for controlling heating systems and, more particularly, for controlling the heating systems of large buildings such as apartment houses, hotels and the like whose heating systems usually require the continuous operating of the heating plant, which results in a considerable waste of fuel.

An important object of the present invention is to provide an apparatus for controlling such systems by means of which the system may be periodically operated at intervals selected by the engineer in charge, and by means of which these periods may be selectively varied to suit varying conditions throughout a comparatively large range.

Another object of the invention is to provide a construction through which operation may be completely suspended at certain periods of the day as, for example, between midnight and five o'clock in the morning, or at any other selected period of the day, and this without interfering with the set intermittent operation selected for use during the remainder of the day, and, conversely, may be made to operate continuously for a given period as, for example, in the early mornings when it is desired to restore the temperature of the building to that desired following a period of inoperation of the furnace.

Another object of the invention is the production of a device of this character which may be very readily and cheaply constructed, and in which the selection of periods of operation may be readily altered as regards any given set of periods for which the apparatus may have been originally intended.

These and other objects I attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a front elevation of the control panel used in my control system;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is an enlarged detail sectional view showing the construction of the brushes;

Fig. 4 is a perspective of a typical brush disengaging strip; and

Fig. 5 is a fragmentary wiring diagram showing a typical control system, the interrupter elements being omitted.

Referring now to Figs. 1 to 4, the control panel 10 mounts an insulating disc 11 which, in turn, is shown as supporting a clockwork mechanism 12 by means of which a pair of coaxial shafts 13 and 14 drive electrically connected brush arms 15 and 16. Clockwork mechanism 12 drives a shaft 17 by means of which, through geared connections at 18 the shaft 13 is caused to rotate once in twenty-four hours, and through geared connections at 19 shaft 14 is caused to rotate once for each hour. Each arm 15 and 16 bears a plurality of brushes, those of the arm 16 being indicated at 16*a*, 16*b*, and 16*c* respectively, and those of the arm 15 at 15*a*, 15*b*, and 15*c* respectively. Through rotation of the arms, these brushes move over endless contact bars or rings, there being a bar for each brush, and the bars 20, 21 and 22 coacting with the brushes 16*a*, 16*b*, and 16*c* respectively, while bars 23, 24 and 25 coact with the brushes 15*a*, 15*b*, and 15*c* respectively.

Adjacent each contact bar a groove 26 is formed, adapted to receive an insulating breaker strip 27, or a plurality of such strips, as is desired, such strips having one end of their upper faces sloped as at 27*a* to smoothly lift the associated brushes from their contact rings. It will be noted that the dial is graduated for twenty-four hours and that the numerals indicated at 28 are grouped in different colors to represent individual periods of twelve hours each. From each numeral a radial line 29 is inscribed on the disc so that the individual periods may be readily identified at any of the grooves 26. Since the brushes 16*a*, 16*b*, and 16*c* pass completely about the dial once each hour, their passage over the space between any two of the radial lines 29 at any of the contact rings 20, 21 and 22, will represent a period of two and one-half minutes; thus, the insulating strips 29 associated with bar 20 have a length such that it will require fifteen minutes for the associated brush to pass thereover. Those associated with the bar 21 would be operative through seven and one-half minutes, and that associated with the bar 22 through twelve and one-half minutes. Since arm 15 only makes one complete revolution in twenty-four hours, the space between adjacent lines 29 at the bars associated with this arm represents a period of one hour and the periods represented by the insulators may be very readily computed, as likewise may the hours at which these insulating strips become effective.

As shown in Fig. 3, the strip, when engaged with an associated brush, elevates this brush from the associated bar, the brush 16*a* being so illustrated in Fig. 3, while in Fig. 2 the brushes 16*c* and 15*a* and 15*b* are so illustrated.

Referring now to the diagram of Fig. 5 wherein I have shown a typical arrangement of the

apparatus, it will be noted that the bars **20** to **25** are connected in the circuit of a relay **30** which controls the circuit **31** of a motor **32**, such motor, for example, being the motor controlling the operation of an oil burner or the operation of a pump circulating fluid for heating purposes or the like. One of the bars associated with the arm **15** is connected in one side of the circuit **33** of the relay, the bar **25** being so shown, while the remaining bars **20** to **24** are connected to the opposite side of the circuit through switches **34** to **38** respectively, which are mounted on panel **10** and having identifying numerals **39** associated therewith to permit their ready identification. It will be noted that bar **25** is illustrated as having associated therewith an insulator strip **27** which will cause the brush **15***c* to become inoperative for a period from midnight until five o'clock and, accordingly, if any of rings **20** to **24** is activated by closing its associated switch the period of intermittent operation resulting from its activation will be interrupted during those hours through opening of the circuit at ring **25**. If, for example, switch **34** is closed, the system will be in operation as an intermittent system having a period of fifteen minutes on and fifteen minutes off between the hours of five a. m. and twelve p. m. the circuit at this time comprising bar **25**, brush **15***c*, arms **15** and **16**, brush **16***a*, bar **20**, switches **34** and **40**, and relay **30**. Following 12 p. m. this circuit will be thrown out of operation until five a. m. If switch **34** is left closed and the switch **37** closed, the system will be operated intermittently from eight o'clock in the morning until twelve midnight and will be interrupted from twelve midnight to five a. m., the circuit being the same as that just described. The system will operate continuously from five a. m. to eight a. m., the circuit at this time comprising bar **25**, brush **15***c*, arm **15**, brush **15***a*, bar **23**, switches **37** and **40**, and relay **30**. Where there is any substantial period of discontinuance, such as at present illustrated, these switches will ordinarily be simultaneously closed or, if desired, the rings associated with these switches may be permanently placed in parallel.

It will be noted that by employing various combinations of rings, a wide range of regulation may be had, and it is, of course, possible to readily alter this range by altering the lengths of the strips **27** employed with the various rings. To facilitate this, the rings are preferably formed of fibre or some other insulating material which may be readily cut, and are made to hold their positions in the groove simply through friction so that they may be removed and shifted or altered as desired. In the circuit of the relay **30**, I preferably arrange a telltale lamp **39** which may be mounted upon the panel, and include a cut-out switch **40** by means of which the apparatus may be made inoperative, as desired.

It will be obvious that the particular arrangement and construction herein illustrated are capable of considerable variation without in any manner departing from the spirit of my invention, and for this reason I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in a minor division of a day and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, removable elements of varied lengths associated with said bars and adjustably positionable along said paths, said elements constructed and arranged to disengage the associated brushes from their bars during passage of the brushes over the elements.

2. In a control of the type described, a pair of electrically connected rotating switch arms, means to rotate said arms continuously over concentric paths, one at a rate such that it completes a cycle of rotation in not more than an hour and the other at a rate such that it completes its rotation once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to the arms, a circular contact bar associated with each brush, removable elements of varied lengths associated with said bars and adjustably positionable along the bars, said elements constructed and arranged to electrically disengage the associated brushes from their bars during passage of the brushes over the elements.

3. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in an hour and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, a base supporting said bars, said base having grooves adjacent said bars and insulating strips in at least some of said grooves, said strips being each of a height to disengage the associated brush from its bar.

4. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in an hour and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, a base supporting said bars, said base having grooves adjacent said bars and insulating strips in at least some of said grooves, said strips being each of a height to disengage the associated brush from its bar, and being frictionally held in position in its groove whereby it may be adjusted longitudinally of the groove and readily removed therefrom.

5. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in a minor division of a day and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, removable elements of varied lengths associated with said bars and adjustably positionable along said paths, said elements constructed and arranged to disengage the associated brushes from their bars during passage of the brushes over the elements, means to connect the brush of the

slowly moving switch arm in a circuit for an element to be operated and means to selectively connect the remaining bars in the other side of the circuit.

6. In a control of the type described, a pair of electrically connected rotating switch arms, means to rotate said arms continuously over concentric paths, one at a rate such that it completes a cycle of rotation in not more than an hour and the other at a rate such that it completes its rotation once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to the arms, a circular contact bar associated with each brush, removable elements of varied lengths associated with said bars and adjustably positionable along the bars, said elements constructed and arranged to electrically disengage the associated brushes from their bars during passage of the brushes over the elements, means to connect the brush of the slowly moving switch arm in a circuit for an element to be operated and means to selectively connect the remaining bars in the other side of the circuit.

7. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in an hour and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, a base supporting said bars, said base having grooves adjacent said bars and insulating strips in at least some of said grooves, said strips being each of a height to disengage the associated brush from its bar, means to connect the brush of the slowly moving switch arm in a circuit for an element to be operated and means to selectively connect the remaining bars in the other side of the circuit.

8. In a control of the type described, a pair of switch arms, means to move said arms continuously over fixed paths, one at a rate such that it completes a cycle of travel in an hour and the other at a rate such that it completes its cycle once a day, a plurality of brushes carried by each arm, all of said brushes being electrically connected to one another, a contact bar associated with each brush and over which the brush moves throughout its travel, a base supporting said bars, said base having grooves adjacent said bars and insulating strips in at least some of said grooves, said strips being each of a height to disengage the associated brush from its bar, and being frictionally held in position in its groove whereby it may be adjusted longitudinally of the groove and readily removed therefrom, means to connect the brush of the slowly moving switch arm in a circuit for an element to be operated and means to selectively connect the remaining bars in the other side of the circuit.

9. In a control of the type described, a pair of groups of brushes all of which are electrically connected, an endless contact bar associated with each brush, means to relatively move said bars and brushes at rates such that one group of brushes traverses the associated bars once an hour and the other group of brushes traverses its associated bars once in a day, a groove paralleling each bar and insulating elements of selected length and of a height such as to disengage the associated brush from the bar frictionally held in said grooves.

ROBERT H. SNYDER.