June 3, 1958 P. A. LUX ET AL 2,837,621

RANGE CONTROL MECHANISMS

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Fig. 1.

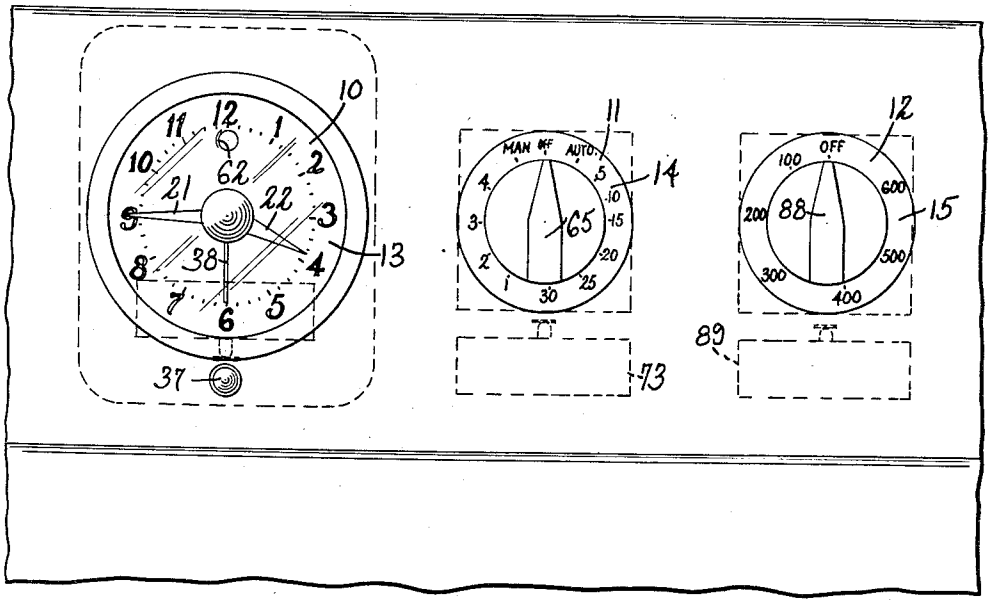
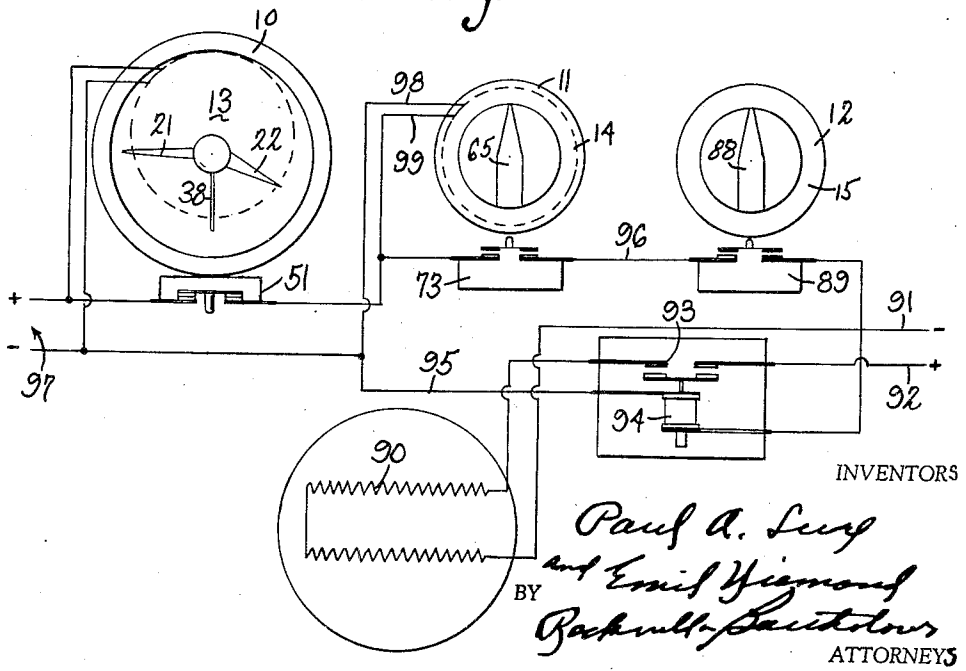


Fig. 2.



INVENTORS

Paul A. Lux

and Emil Yiamouyiannis

BY Rockwell & Davidson

ATTORNEYS

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RANGE CONTROL MECHANISMS

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Fig.3.

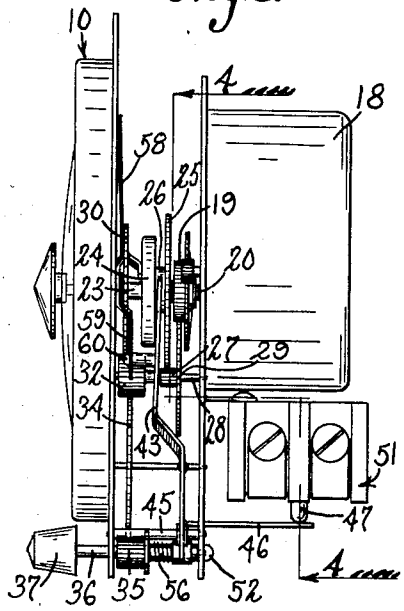


Fig.4.

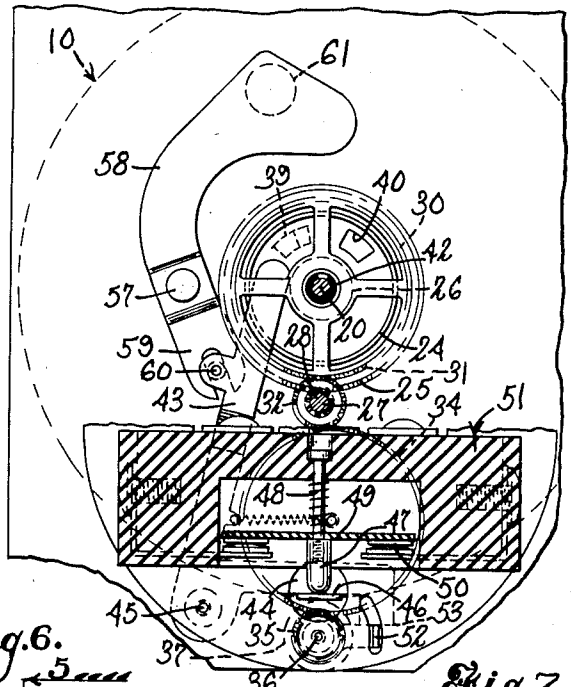


Fig.5.

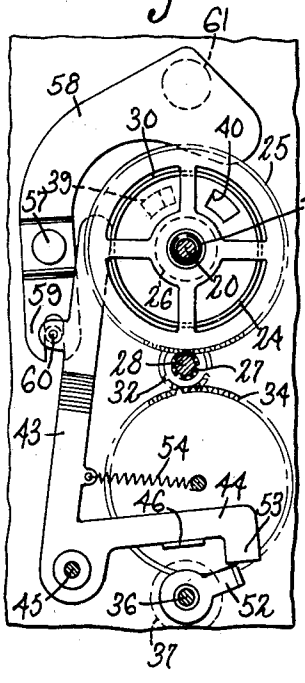


Fig.6.

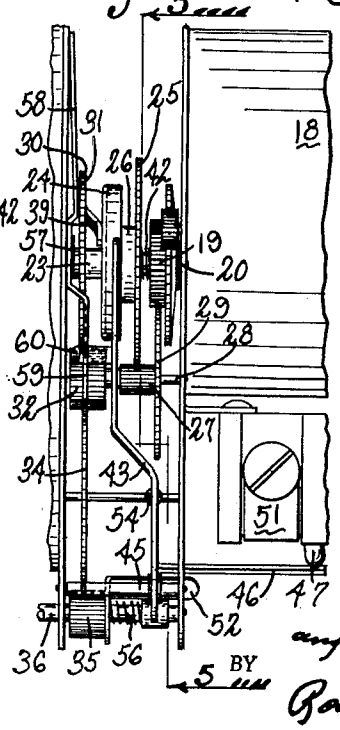
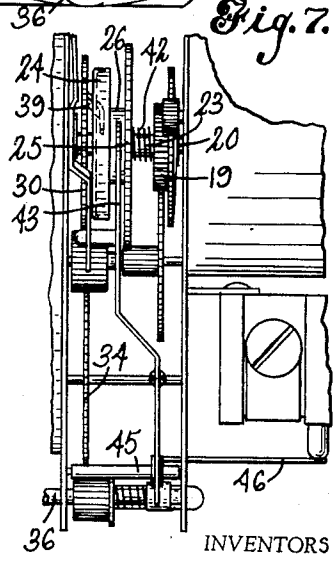


Fig.7.



INVENTORS

Paul A. Lux
and Ernest Yiemont

BY

Rockwell & Rockwell

ATTORNEYS

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Fig. 8.

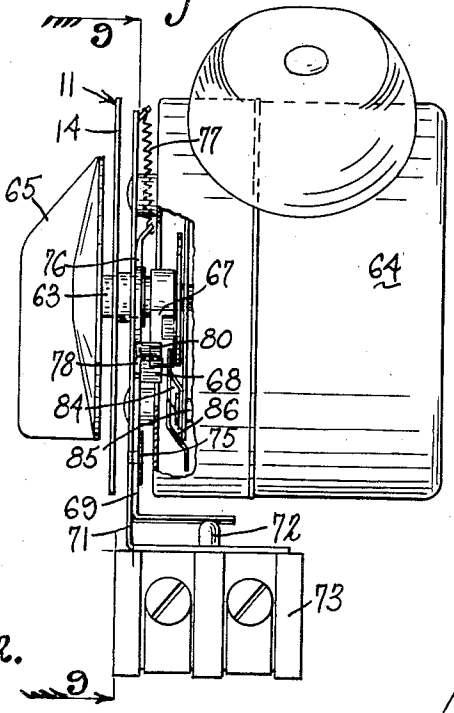


Fig. 11.

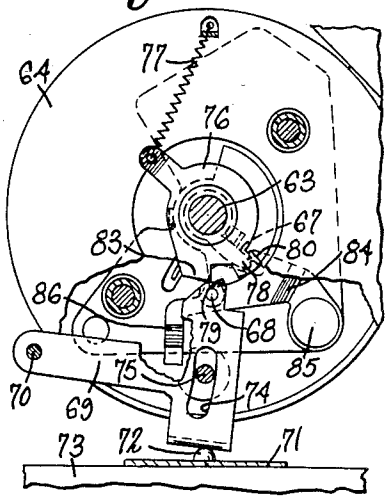


Fig. 12.

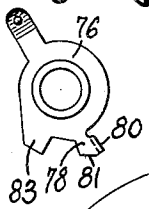


Fig. 10.

Fig. 9.

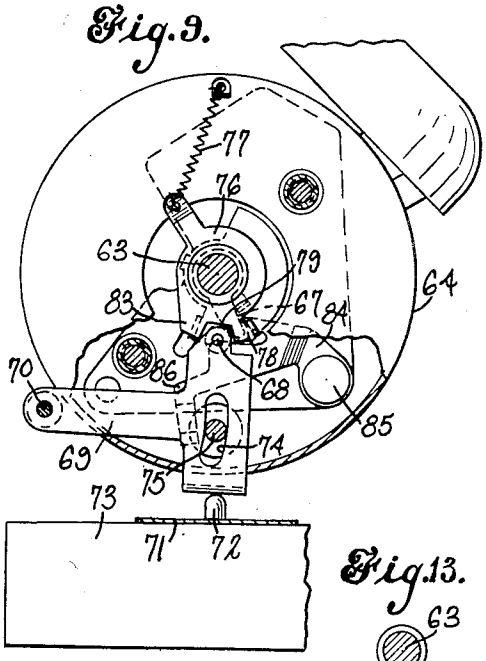


Fig. 13.



INVENTORS

Paul A. Lux
and Emil Hiemann

BY

Rockenbach & Rockenbach

ATTORNEYS

United States Patent Office

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RANGE CONTROL MECHANISMS

Paul A. Lux, Middlebury, and Emil Niemand, Waterbury, Conn., assignors to The Lux Clock Manufacturing Company, Inc., Waterbury, Conn., a corporation of Connecticut

Application May 3, 1954, Serial No. 427,100

8 Claims. (Cl. 219—20)

This invention relates to timers and more particularly to a range timer or range control mechanism to be employed with the timing of cooking operations. It will be understood, however, that it is not limited to this use but the structure employed may have broader application.

In the timing of cooking operations it is desirable to have a timing mechanism so constructed that it may be set in advance to begin the cooking operation at a predetermined time and to terminate it after a predetermined period. Also it is, of course, desirable that the mechanism be so constructed that it may be manually controlled so that cooking operations may be effected without employing the timing mechanism, the period of the operation being determined by the user of the range just as it would be if no timing mechanism were provided.

In some instances mechanism for achieving the results outlined above have been constructed wherein a clock work was provided and a timing mechanism employed in conjunction with the clock work so that the cooking operation could be set to begin at a certain time and to end after a predetermined period. Where all of this mechanism was combined with the clock structure, this required a somewhat complicated device which was expensive to manufacture and required considerable care in the setting of the various operations.

By the present invention it is contemplated to provide a structure of relatively simple construction which is adapted particularly for use in the operation of an electric range so as to control the supply of current to the electric heating units and the various burners or the oven of a range. For this purpose there are provided a unit for initiating the supply of current to the burner, a second unit for determining the period over which the current will be supplied thereto, and a third unit which constitutes a thermostat to determine the temperature at which the oven of the range, for example, shall operate. While these three units are separately constructed, they are electrically connected as will be hereinafter explained and may, of course, be provided in the same case or housing if desired. Each, however, has its own dial or indicating means to indicate the various settings.

The devices are so arranged that the device for initiating the supply of current to the burner to initiate the cooking operation will normally be in "on" position. That is to say, the switch which is controlled by this mechanism will normally be closed. When, however, this unit is "set," the switch will be open and will only be closed again when the clock hands of the unit have reached the hour for which the timing mechanism has been set.

The second unit which determines the period during which the heating unit is energized is normally in "off" position and the switch which is operated by this mechanism will only be closed when the device is set. It, however, has a manual position in which the switch is closed for manual operation of the heating mechanism without the use of automatic timing.

The third unit or thermostat likewise controls a switch and it may here be stated that the three switches mentioned so far are in series so that all must be closed in order to supply current to the heating unit, and this switch is normally open and closed when the thermostat indicator is set to a given temperature indication.

As the switch of the first or starting unit is normally closed, it is only necessary, if the cooking process is to begin at once, to set the thermostat for the proper temperature and to set the second or period control unit for the desired time during which the food is to be processed so that only these two controls need be set as is usual. However, in the event that the cooking is to start at a later time, only then must the starting or clock unit be set in addition to the other controls. This is done by simply turning the set knob of the first or clock unit to the time at which the cooking is to start. When this is done heat will be supplied to the heating unit beginning at the proper time and will be continued during the period for which the second unit is set at the temperature controlled by the thermostat unit.

One object of the present invention is to provide a new and improved range timer mechanism.

A further object of the invention is to provide a new and improved timing mechanism for an electric range so constructed that separate units are provided to initiate the current to a heating unit at any predetermined time, to continue the supply of current to the heating unit for a given period, and to maintain the heating unit or oven of the range at a proper temperature.

Still another object of the invention is to provide a range timer of the character described above in which each of the three control units above referred to controls a switch, which switches are in series so that all of these switches must be closed to supply current to the heating unit of the range.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a front elevational view of a range timer embodying our invention;

Fig. 2 is a diagrammatic view of the wiring connections of the timer;

Fig. 3 is a side elevational view of the clock and timing mechanism for initiating the supply of current to the heater;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a sectional view on line 5—5 of Fig. 6;

Fig. 6 is an enlarged view similar to Fig. 3 showing the parts in another position;

Fig. 7 is a view similar to Fig. 6 showing the parts in still another position;

Fig. 8 is a side elevational view of the timing mechanism to determine the period during which current is applied to the heating unit;

Fig. 9 is a view partly in section on line 9—9 of Fig. 8;

Fig. 10 is a view similar to Fig. 9 showing the parts in another position;

Fig. 11 is a similar view showing the parts in still another position; and

Figs. 12 and 13 are detail views of certain portions of the timer shown in Figs. 8 to 11.

To illustrate a preferred embodiment of the invention there is shown in Fig. 1 of the drawings a timing mechanism consisting of three units, namely a clock mechanism 10, a separate timing unit 11, and a temperature regulating device or thermostat 12. As stated, these may be located in separate housings or in the same housing without departing from the spirit of the invention. Each, however, will preferably be provided with its own indicating dial, the clock dial being shown at 13, the period-timing dial at 14, and the dial of the thermostat at 15.

The clock mechanism and timer 10 may be referred to

as the starting timer as this mechanism determines the time at which a supply of current to a heating unit will be initiated. This structure, besides the dial 13, comprises a motor 18 which, a shown, is an electric motor and which through gearing 19 of the usual form operates the shaft 20 of the minute hand 21 of the clock (Figs. 3 to 6).

The hour hand 22 is secured to a sleeve 23 rotatably mounted upon the shaft 20, and slidably keyed to the sleeve 23 is a drum 24 carrying a gear 25 and having a reduced portion 26 between the gear and the drum 24 so as to provide a recess between these members. The gear 25 meshes with a pinion 27 rotatably mounted upon a shaft 28, and secured to the pinion 27 is a gear 29 which meshes with the gearing 19 previously referred to. It will be obvious, therefore, that the hour hand is driven from the gearing 19 through gears 25, 27 and 29 and the drum 24 which is slidably keyed to the sleeve 23. It may also be noted that the pinion 27 is provided with a wide face so that the drum 24 may move axially upon the sleeve 23 while the teeth of the gear 25 are still in mesh with those of the pinion 27.

A timing disk 30 is rotatably mounted upon the sleeve 23, this timing disk having gear teeth 31 upon its periphery which mesh with a pinion 32 rotatably mounted in the frame, and the teeth of this pinion in turn mesh with a gear 34, the teeth of which are in mesh with those of a pinion 35 mounted on a setting shaft 36 provided with a manually engageable button 37 by which it may be turned to set the timing disk 30.

Secured to the timing disk 30 is an indicating hand 38 (Fig. 1) which indicates the position of the timing disk and, therefore, indicates the time at which the supply of current to the heating element will be initiated. The timing disk is provided with a rearwardly projecting finger 39 adapted to be received in an opening 40 in the front face of the drum 24 when the finger 39 and this opening are in registration which will normally occur once during relative rotation of the timing disk 30 and drum 24.

Normally the finger 39 will bear upon the outer surface of the drum 24, as shown in Figs. 3 and 6, in which position the drum is spaced some distance to the right of the timing disk. However, when the opening 40 registers with the finger 39 and allows the latter to enter this opening, the drum 24 will be urged to the left, as shown in Figs. 3, 6 and 7, by the compression spring 42 so that the drum will occupy a position closely adjacent the timing disk 30.

A switch-controlling lever having arms 43 and 44 is pivoted to the case at 45. The arm 44 of this lever is substantially horizontally disposed and, as shown in Figs. 4 and 5, is provided with a lug 46 which stands below a plunger 47 urged downwardly by the spring 48. This plunger carries a movable switch member 49 having contacts 50 which cooperate with stationary contacts to form a switch member designated generally by the numeral 51 to close a circuit which controls the supply of current to the heating element.

As shown in Fig. 5, the setting shaft 36 is provided with an arm 52, a part of which stands below a finger 53 on the arm 44 on the switch-controlling lever so that when the shaft 36 is turned to set the timing disk 30, the switch-controlling lever will be rotated counterclockwise as shown in Fig. 5 to raise the movable switch member 49 and open the switch against the action of the spring 48. This switch-controlling lever is normally urged in a clockwise direction by a spring 54. The arm 52 is frictionally pressed against the gear 35 by a spring 56 so that, while this arm will normally turn with the shaft 36, relative rotation between these parts is permitted so that when the arm 44 has been moved upwardly to the extent permitted, rotation of the shaft 36 may still be continued to set the timing disk 30.

The upper end of the arm 43 of the switch-controlling lever normally lies upon the reduced portion 26 of the drum 24, that is, in the recess between the drum 24 and the gear 25, as shown in Figs. 3 and 7. However, when the shaft 36 is turned to raise the lever arm 44, the arm 43 will likewise be moved in a counterclockwise direction, as shown in Fig. 5, and, due to its resiliency, the upper end of this arm will move toward the left, as shown in Fig. 3, to rest upon the surface of the drum 24, as shown in Fig. 5, thus holding the arm 44 upwardly and the switch 51 in open position. As will be explained hereinafter, in the position shown in Fig. 3, the upper end of the arm 44 is bent slightly to the right of its normal position, this arm being resilient to permit this action.

Also pivoted upon the casing at 57 is a lever 58 provided with a bifurcated lower end 59 in which engages a pin 60 secured to the arm 43 of the switch-controlling lever so that as this lever moves about its pivot 45 the lever 58 is likewise moved about its pivot 57. This lever is provided with a colored disk 61 which, when the timing mechanism is set, is visible through an opening 62 (Fig. 1) of the clock dial.

The operation of this part of the structure is as follows. Normally the parts stand in the position shown in Fig. 3 in which the upper end of the lever 43 lies in the recess in the drum, and the arm 44 is in its lowermost position, thus permitting the switch 51 to be closed by the action of the spring 48. It will be seen that in this position of the parts the finger 39 is normally out of registration with the opening 40 in the front face of the drum 24 so that these parts stand in spaced relation and the upper end of finger 44 will be bent slightly rearwardly and will be urged forwardly or to the left, as shown in Fig. 3, by its own resilience. Once every twelve hours the opening 40 will register with the finger 39 and allow the drum 24 to be urged to the left by its spring 42, but this will have no effect on the timing mechanism as the upper end of lever 43 will still lie in the recess in the drum.

When it is desired to set the clock to initiate the supply of current to the heating unit at a given time, the shaft 36 is turned by the button 37 to turn the indicator 38 (Fig. 1) to the hour at which it is desired to begin the cooking operation. The turning of the shaft 36 performs two operations. It raises the arm 44 to open the switch 51 through the lug 46, thus opening the controlling circuit. This also moves the arm 43 of the switch-controlling lever counterclockwise, as shown in Fig. 5, so that this arm moves out of the recess opposite the reduced portion 26 of the drum and springs forwardly over the periphery of the drum 24, as shown in Fig. 6. In other words, this arm 43 of the lever moves from the position shown in Fig. 3 to that shown in Fig. 6. In this position the upper end of the arm 43 will ride on the periphery of the drum 24 during the rotation of the latter by the clock and will be held in the position to hold the controlling switch open.

Rotation of the shaft 36 also sets the timing disk 30 so that the finger 39 will be in the proper position to fall into the opening 40 when the clock hands reach the predetermined time for which the mechanism has been set.

The parts are now in the position shown in Figs. 5 and 6 and the switch 51 is open. So soon as the drum 24 which is turned synchronously with the hour hand of the clock mechanism arrives at the designated hour for initiating the supply of current, the finger 39 will drop into the opening 40 and the drum 24 will be moved toward the left by the spring 42 to the position shown in Fig. 7, and the arm 43 of the switch-controlling lever will drop into the recess opposite the reduced portion 26 of the drum. This movement of the controlling lever clockwise (as the parts are shown in Fig. 5) permits the spring 48 to close the switch and thus deliver current to the circuit. As the clock mechanism continues to run the drum 24 will be rotated and the opening 40 will pass out

of registration with the finger 39, thus moving the drum to the right from the position shown in Fig. 7 to that shown in Fig. 3 against the force of spring 42. This will bend the upper end of the arm 43 slightly as previously described but this arm will remain opposite the portion 26 of the drum so that the switch will remain closed.

Movement of the arm 43 also moves the lever 58 in a clockwise direction about its pivot so as to move the colored spot 61 from a position in registration with the opening 62 and thus indicate that the switch is closed.

The period timing mechanism or the mechanism determining the length of the cooking operation will now be described. As previously stated this mechanism 11 comprises a stationary dial 14 through which passes the shaft 63 driven by a motor 64 which in this case is an electric motor. Upon the shaft 63 is an indicator or pointer 65 which will cooperate with the dial 14. The indicator may be turned to the proper position to indicate the length of time during which it is desired to use the heating element and the motor 64 will then return this indicator to its original or "off" position shown in Figs. 1 and 8. Secured to the shaft 63 to rotate therewith is a cam arm 67 (Fig. 13) which, as shown in Figs. 9, 10 and 11, is turned by the indicator 65 in a clockwise direction and by the motor in a counterclockwise direction. This cam is adapted to have wiping engagement with a pin 68 on a switch-operating member 69 pivoted at 70 to the frame member 71. This switch-controlling lever when moved from the position shown in Fig. 9 to the position shown in Fig. 10 is designed to operate a switch plunger 72 to close a switch 73 (Fig. 2) which is in the current-controlling circuit in series with the switch 51. That is, when the plunger 72 moves downwardly, as shown in the drawings, the switch is closed. The switch-operating lever 69 is provided with a guide slot 74 through which passes a pin 75 secured to the frame member 71, the pin having an enlarged head to guide the lever 69 in its movements.

Mounted to oscillate on the frame member 71 about the shaft 63 is a dogging member 76 (Figs. 9, 10 and 12) adapted to hold the lever 69 in switch-closing position when moved thereto by the cam 67. The dog 76 is urged to the position shown in Fig. 10 by the spring 77 in which position a lug 78 is in contact with the upper edge 79 on the lever 69 to hold the lever downwardly. This lug 78 is provided with an ear 80 which lies in the path of the arm 67 so that when this arm is rotated to the proper position by the motor 64 of the timing mechanism, it will contact the ear 80 and move the dog 76 from the position shown in Fig. 10 to the position shown in Fig. 9 so as to permit the lever 69 to move upwardly and release the plunger 72. It is understood that the plunger 72 is spring pressed to stand in its upward position shown in Fig. 9 in which position the switch 73 is open.

The operation of the parts of this period timing mechanism so far described is as follows: When the indicator 65 is at zero or "off" position, shown in Figs. 1 and 8, the parts are in the position shown in Fig .9 and the spring 77 is extended and tends to urge the dogging member 76 in a clockwise direction. The arm 67 stands between the ear 80 upon the dog 76 and the pin 68 on the lever 69. When the indicator is rotated in a clockwise direction, as shown in Fig. 1, this rotates the arm 67 in a clockwise direction, as shown in Fig. 9, and this arm engaging the pin 68 cams the switch-operating lever 69 downwardly from the position shown in Fig. 9 to the position shown in Fig. 10, closing the switch 73. As soon as the upper end 79 of the lever 69 is moved downwardly to a sufficient extent to clear the lug 78 on the dog 76, the spring 77 quickly moves the dog 76 from the position shown in Fig. 9 to that shown in Fig. 10 in which the lug 78 stands above the end 79 of the lever 69 and holds it in depressed position to hold the switch in closed position. This closing of the switch and setting of the lever 69 and dog 76 occurs during the initial part of the rotation of the indicator 65 and thereafter the rotation of the indicator may be continued to set it for any desired period of time.

It has been previously stated that the clock mechanism, at a predetermined time, closes the switch 51, and by reference to Fig. 2 it will be seen from the wiring diagram which will be later described that this closes a circuit through the clock mechanism 64 of the timer 11 so that the indicator 65 of the timer mechanism will not begin its return rotation until after the clock timer 10 has closed the switch 51 which it does to initiate the supply of current.

Therefore, as soon as the switch 51 is closed, the indicator 65 of the period timer will begin its reverse rotation, and just prior to its arrival at the zero or "off" position, it will strike the ear 80 upon the lug 78 and rotate the dog slightly against the action of the spring 77 from the position shown in Fig. 10 to that shown in Fig. 9 which will permit the lever 69 to move upwardly and open the switch 72.

It will be noted that the lower end of the lug 78 is beveled, as shown at 81, and this beveled edge of the lug is designed to cam the lever 69 downwardly a slight distance beyond that to which it is moved by the arm 67 so that upon return of this arm by the clock mechanism it will clear the pin 68 and pass this pin in order to be engaged with the lug 80.

It may be desirable when automatic cooking is not desired to close the switch 73 without use of the period timing mechanism. For this purpose the dog 76 is provided with a second lug 83. If the indicator 65 is moved in a counterclockwise direction from its zero or "off" position to a manual position (which is the direction opposite to that necessary for setting the timing mechanism) the arm 67 will by engaging the ear 80 move the dog 76 from the position shown in Fig. 9 to that shown in Fig. 11. During the movement the lug 83 will strike the end 79 of the lever 69 and cam this lever downwardly so as to close the switch 73. This holds the switch in closed position as the motor 64 is not in operation since the arm 67 cannot be moved beyond this position.

In order to hold the dog 76 in the position shown in Fig. 11 against the action of spring 77, a holding detent 84 is pivoted to the frame at 85, this member being provided with a tail portion 86 which engages the frame in the position shown in Fig. 11 and, by acting against the arm 67, holds this arm from being returned to its "off" position by the spring 77.

The thermostat 12 having the dial 15 is provided with a manually operable indicator 88, and rotation of this indicator is adapted to close the switch 89 (Fig. 2). The indicator may be turned to any desired degree of heat which is necessary for the cooking operation. This structure may be any desired form of thermostat, the details of which form no part of the present invention.

An electric wiring diagram which may be employed in connection with the timing mechanism is shown in Fig. 2. The heating coil is indicated at 90, this heating coil being connected to a source of current through the lead lines 91 and 92, the latter being interrupted by a switch 93 actuated by a relay 94. This relay is disposed in an electric circuit 95, 96 which contains in series switches 51, 73 and 89, the lines 95 and 96 leading to a source of current indicated at 97. Also the lines 95, 96 are connected in parallel by lines 98 and 99 to the motor 64 of the period timer 11.

With the above construction and as previously described the switch 51 will be normally closed unless the timing mechanism 10 has been set, while the switches 73 and 89 will normally be open as will the relay switch 93. If it is desired to use the range without the timing mechanism, it is only necessary to turn the indicator 65 in a counterclockwise direction to the position marked "Man" which will move the period timing mechanism to the position shown in Fig. 11 so that the switch 73 will be closed.

Then upon turning the thermostat indicator 88 to some degree of heat the switch 89 will be closed and, as all three switches will then be closed, the circuit constituted by the lines 95 and 96 will be closed, thus actuating the relay 94 to close the circuit through the heating element 90.

However, if it is desired to automatically time the cooking operation the turn button 37 is rotated to turn the indicating hand 38 to the position which will indicate the time at which the cooking operation is to start. This will move the parts of this mechanism to the position shown in Fig. 5 and Fig. 6 whereas previously explained the switch 51 will remain open so that no current can flow to the relay even though switches 73 and 89 may be closed. It is, of course, understood that the mechanism 10 will only determine the time of beginning of the cooking operation. To determine the period through which the operation is to be continued the pointer 65 is moved in a clockwise direction, as shown in Fig. 1, to the position indicating the number of minutes or hours which is necessary. The turning of the indicator 65 will close the switch 73 as previously described and the thermostat indicator 88 is then turned to indicate the desired temperature, which operation will close the switch 89.

As the switches 73 and 89 are closed when the hour hand of the clock of the timer 10 reaches the hour at which the supply of current is to be initiated, the switch 51 will be closed as previously indicated. Now as all three switches are closed, the relay 94 will be energized and close the circuit through the heating element 90.

The closing of the switch 51 will also deliver current through lines 98 and 99 to the motor of the period timer 11 and start this motor in operation to return the indicator 65 to its initial position. As previously described just prior to its reaching its "off" position, it will serve to open the switch 73 which will cut off the current to the relay 94 and, therefore, open the switch 93 so that current will no longer be supplied to the heating element 90 and the operation will be discontinued. The parts will, of course, remain in this position until again set by the operator except that the clock minute and hour hands 21 and 22 will, of course, continue to be rotated by the clock motor 18. As the switch 73 will be open, however, there will be no current supplied to the heating element 90 until after the period timer 11 has been reset.

While we have shown and described a preferred embodiment of our invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

We claim:

1. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element including an electric circuit having a first and a second switch in series whereby both must be closed to close said circuit, a continuously running starting timing mechanism for controlling the first of said switches, a separate, intermittently running, period timing mechanism for controlling the second of said switches, a motor for driving said period timing mechanism, and means effective upon the closing of said first switch for initiating operation of said motor.

2. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element including an electric circuit having a first and a second switch in series whereby both must be closed to close said circuit, a continuously running starting timing mechanism for controlling the first of said switches, a separate, intermittently running, period timing mechanism for controlling the second of said switches, and means controlled by the closing of said first switch for immediately placing said period timing mechanism in operation.

3. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element including an electric circuit having a first and a second switch in series whereby both must be closed to close said circuit, a starting timing mechanism for controlling the first of said switches, a separate normally inoperative period timing mechanism for controlling the second of said switches, means for setting said period timing mechanism and closing said second switch, said first switch being normally closed, manually operable means for setting said starting timing mechanism and thereby opening said first switch, means actuated by said starting timing mechanism for closing said first switch after lapse of a predetermined time, and means actuated by the closing of said first switch to immediately initiate operation of the period timing mechanism.

4. A timing mechanism comprising a load circuit, means to supply electric current to said circuit including a source of current and a plurality of switches arranged in series to control the current supplied from said source whereby all of said switches must be closed to effect a supply of current, the first of said switches being normally closed, and a second one of said switches being normally open, a first continuously running clock means, manually operated means to set said clock means and open said first switch means, means actuated by said first clock means to close said first switch after lapse of a predetermined time, a second intermittently running clock means, manually operated means to set said second clock means for operation over varied periods of time and close said second switch, means actuated by said second clock means to open said second switch after lapse of a predetermined time and means operative to begin movement of said second clock means when said first switch is closed.

5. A timing mechanism comprising a load circuit, means to supply electric current to said circuit including a source of current and a plurality of switches arranged in series to control the current supplied from said source whereby all of said switches must be closed to effect a supply of current, the first of said switches being normally closed, and a second one of said switches being normally open, a first clock means, manually operated means to set said clock means and open said first switch means, means actuated by said first clock means to close said first switch after lapse of a predetermined time, a second clock means, manually operated means to set said second clock means and close said second switch, means actuated by said second clock means to open said second switch after lapse of a predetermined time, and said second clock means being set into operation immediately upon the closing of said first switch by said first clock means.

6. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element including an electric circuit having a first and a second switch in series whereby both must be closed to close said circuit, a starting timing mechanism, a separate normally inoperative period timing mechanism, said first switch being normally closed and opened by manual setting of the starting timing mechanism, said second switch being normally opened but being closed by manual setting of the period timing mechanism for operation over a predetermined period of time, and an additional circuit energized upon the closing of said first switch to immediately initiate movement of said period timing mechanism, and means actuated by the latter to open said second switch at the end of the predetermined period for which it is set.

7. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element comprising a circuit having a switch therein, a normally inoperative period timing mechanism having an indicator settable to various predetermined positions, and clock means to return said indicator to zero position, means to close said switch when said mechanism is set and to open said switch when said mechanism

returns to zero position, a starting time clock mechanism, and means controlled by said starting time clock mechanism to initiate operation of said period timing mechanism.

8. A timing mechanism for ranges or the like comprising a heating element, means for energizing said heating element comprising a circuit having a switch therein, a normally inoperative period timing mechanism having an indicator settable to various predetermined positions, and clock means to return said indicator to zero position, means to close said switch when said mechanism is set and to open said switch when said mechanism returns to zero position, a starting time clock mechanism, a second switch in said circuit in series with said first switch and closed by said starting time clock mechanism, and means effective immediately upon the closing of said second switch to initiate operation of said period timing mechanism.

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