

[54] **AUTOMATIC RESETTING TIMER**
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[58] Field of Search **219/412, 413, 414,**
219/492, 493

[56] **References Cited**

UNITED STATES PATENTS

3,410,988 11/1968 Nagel219/492 X

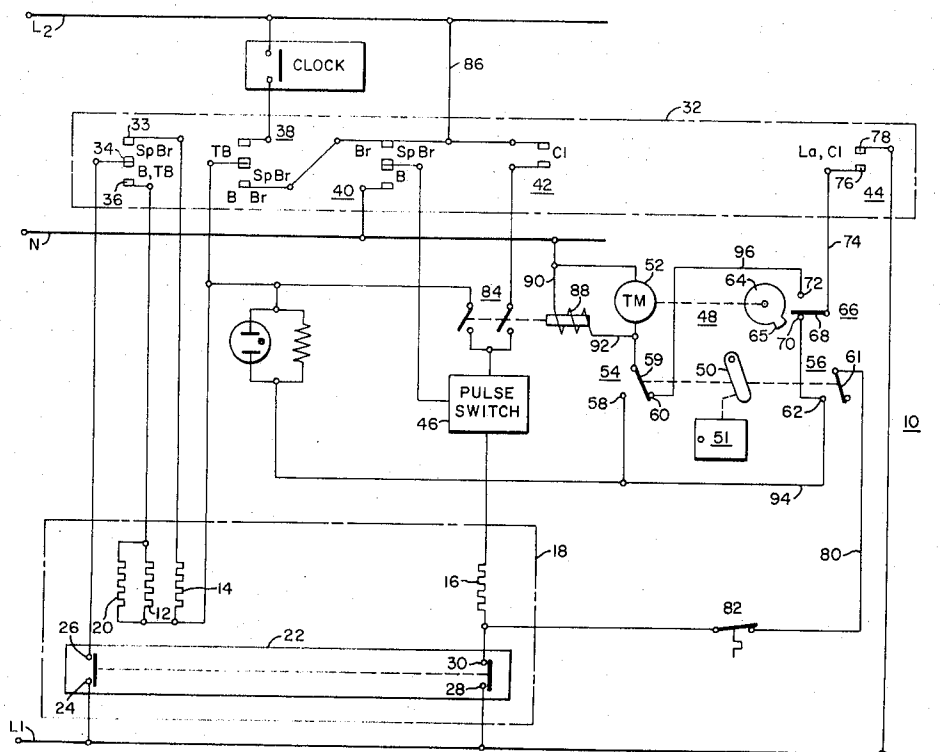
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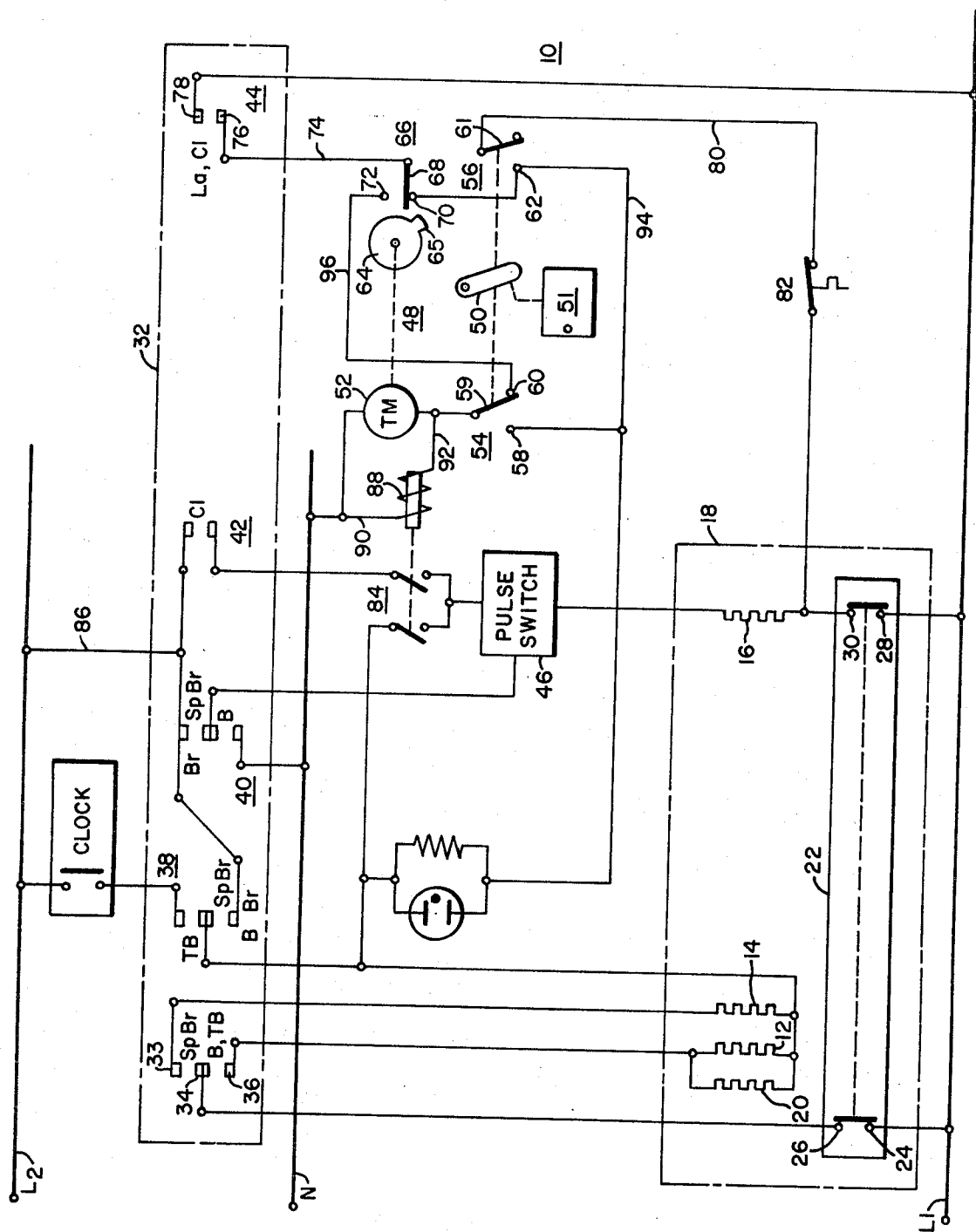
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[57] **ABSTRACT**

An apparatus for timing the clean cycle of a self-cleaning pyrolytic range, terminating the clean cycle and resetting itself is disclosed. The timing device is actuated by movement of a door latch handle to latch position and is reset after a predetermined time by moving the door latch handle to its unlatched position. No undesired mechanical linkage is required that extends between the front and rear of the self-cleaning range when utilization of the circuitry disclosed is had.

4 Claims, 1 Drawing Figure





AUTOMATIC RESETTING TIMER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to self-cleaning ovens and, more particularly, relates to a self-cleaning oven utilizing a latch actuated switching mechanism disposed in circuitry which provides for automatic timing of the clean cycle and resetting of the same by unlatching of the oven door.

2. Description of the Prior Art

Present clean timer arrangements for self-cleaning ranges generally, are actuated by movement of a door latch handle to a latched position. The movement to latched position of the latch handle is transferred to the rear of the oven by a mechanical linkage or the like and this motion is utilized for the setting and resetting of the timer motor which dictates the time period of the clean cycle. For example, in U.S. Pat. No. 3,410,988, owned by a common assignee, operation of the latch handle moves a worm drive shaft into contact with a timer gear. Disengagement of this mechanical contact occurs when the latch is moved to unlatched condition and a biasing means moves the timing gear back to a reset position ready for the next clean cycle.

However, as pointed out above, this arrangement requires that the timing mechanism and its actuation occur at the rear of the oven so that a mechanical linkage arrangement must be provided between the latch and the timing gear. Further, due to the expansion of the oven during any heating cycle, a means must be provided between the front and the rear of the oven to compensate for this expansion so as to insure a proper actuation of the timing gear and an initiation of and resetting for a heat cleaning cycle.

Accordingly, it would be advantageous to provide a clean cycle timing apparatus that was initiated by latching of a latch mechanism for the oven door but which did not require a mechanical linkage extending between the front and the rear of the oven and the consequent required use of a compensating means therefor to counter the effects of expansion due to the oven heating. Such an apparatus would preferably thereby provide a cleaning cycle timing arrangement of fewer parts and, therefore, much less expensive manufacture than those cleaning cycle arrangements that required the use of an actuating mechanism that extended between the front and rear of the range.

SUMMARY OF THE INVENTION

In accordance with the concepts of the invention, an oven of heat cleaning character is provided having means for latching an oven cavity door, a circuit means for controlling the heating of the cavity, the circuit means including a switch which is normally closed but is opened to terminate the heat cleaning cycle for the oven. An electrically powered timer motor is provided to rotate a cam arrangement that opens the aforementioned switch to cause the termination of the clean cycle. An interlock switch arrangement is also provided that is actuated by the latching means for the door to initiate the cleaning cycle, this interlock switch also insuring, when the oven door latch is moved back to open condition, that another circuit is established to the timer motor through another contact on the interlock switch so that the timer motor will run long enough to move the cam arrangement back out of engagement

with the interlock switch thereby reconditioning the circuit for the timer motor again so that it may drive the cam from its initial position so that another cleaning cycle may be subsequently initiated.

DRAWING DESCRIPTION

For a better understanding of the invention, reference may be had to the preferred embodiment, exemplary of the invention, shown in the accompanying drawing, in which:

The FIGURE represents a schematic illustration of the heat cleaning oven arrangement which incorporates automatic timer resetting for conditioning the oven circuit for another cleaning mode thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An oven circuit 10 is illustrated in the FIGURE that includes a bake heater 12, a speed broil heater 14, and a broil heater 16, with these elements taking the form of resistance heaters, and disposed within an oven enclosure 18 illustrated as a dash line rectangle in the FIGURE. Also enclosed within the dash line rectangle is an anticipator heater 20 that is physically situated adjacent a thermostat 22 so as to provide supplementary heating thereto and reduce the temperature range through which the thermostat 22 must operate to provide an upper temperature limiting means for operation of the aforementioned resistance heaters.

The thermostat 22 is a conventional hydraulic thermostat that includes normally closed contact 24, 26 and 28, 30 which open upon a temperature being reached which is preset on the thermostat 22. The opening of these contacts serves to interrupt the flow of electrical power to the aforementioned bake, speed broil and broil heaters so as to provide a safety feature and upper temperature limitation for the operation of the oven circuit 10. The thermostat 22 also has a lower preset temperature which, when reached, causes the contacts 24, 26 and 28, 30 to close so that bake, speed broil or broil mode of operation may continue.

The power supply for the oven circuit 10 is provided by a standard Edison three wire system, with the three wires denoted L₁, L₂ and N and with 240 nominal volts existing across the lines L₁ to L₂ and 120 nominal volts existing between neutral N and either of these two lines.

Power from the L₂ side of the power source is connected to a selector switch means 32 (illustrated also as a dash line rectangle), with the selector switch means 32 being mounted on the range (not shown) in a position easily accessible to the user. Selector switch means 32 includes within its enclosure a series of movable contacts which may be moved by a dial means (not shown) so as to initiate any of the heating or the cleaning cycle for the oven circuit 10.

More specifically, selector switch means 32 may be moved to place heating circuit 10 into a bake, time bake broil, speed broil, clean or latch position. As is illustrated graphically in the FIGURE, a first series of three contacts 33, 34 and 36 are disposed in the selector switch and utilized for the speed broil, bake and time bake modes of operation of the oven circuit 10. As is indicated by the abbreviations, the contacts 33 and 34 are in engaged position for the speed broil operation, while the contacts 34 and 36 are in engaged condition for the bake and time bake modes of operation

of oven circuitry 10. In a similar manner contact means 38, 40, 42, and 44 provide actuation of selector switch means 10 for the differing modes of operation of the oven circuitry 10 as indicated by the abbreviated indications in the FIGURE. Thus, the operator of the oven circuitry 10 may conveniently "dial in" that mode of operation which is desired for the oven circuitry 10 to undergo. The operation of selector switch means 32 is more precisely described in U.S. Pat. No. 3,549,862, owned by a common assignee. Reference may be had to this patent for a more thorough going understanding of the operation of the switch means 32.

A pulsing switch 46 is also provided in oven circuitry 10 so that the oven heating means provide a pulsing heat flow to the oven cavity 18. The details of a switch of this nature are more fully covered in U.S. Pat. No. 3,440,402, owned by a common assignee. Reference may be had to this patent if a fuller explanation of the operation of pulsing switch 46 is desired.

A latch actuated circuit means 48 is provided in the oven circuit 10 so as to initiate the clean mode of operation of the oven circuit 10 when a door latching means 50 of conventional character is moved to a latched position after a door 51 for oven cavity 18 has been closed. The latch operated circuit means 48 also includes a timing motor means 52 which terminates the heat cleaning mode and, when the door latching means 50 has been moved to its unlatched position, continues running so as to reset the latch actuated circuit means 48 so that the oven circuit 10 is again in condition so as to be capable of initiation for another clean mode of operation.

A pair of switches 54 and 56 are physically located so as to be actuated by a door latching means 50, the switches 54 and 56 being shown in the position when the latch means 50 is in unlatched condition. These switches may be mounted at the front of the oven to eliminate the aforementioned rearwardly extending linkage and compensating means, or, if desired, may be physically located in any other convenient area of the oven even at the rear if this is advantageous.

The switch means 54 is a single pole, double throw switch and includes a pair of contacts 58 and 60 and a switch blade 59 so that the switch blade can close on either of these contacts dependent upon the position of the latching means 50. The switch blade 59 closes on the contact 60 with the latching means 50 in unlatched condition and on the contact 58 when the latch means 50 is in latched condition. Similarly, the switch means 56 is a two-position switch with its switch blade 61 in open position when the latch means 50 is in unlatched condition and in closed position with a contact 62 when the latch means 50 is in latched condition. Thus, the blade of switch means 54 engages the contact 60, while the blade of switch 56 does not engage its contact 62 when the latching means 50 is in an unlatched condition; when the latch means 50 is moved into a latched condition, the blades of the switches 54 and 56 close against contacts 58 and 62, respectively, as motivated by the latching mechanism 50 and/or any conventional linkage arrangement connected between it and the switch means 54 and 56.

Timing motor 52 is a part of the latch actuated circuit means 48 and includes a cam means 64 which is drivingly rotated thereby and positioned so that it may contact a switch means 66 which includes a switch blade 68 and a pair of contacts 70 and 72 so that switch

means 66 is a single pole, double throw switch. The contact 70 is normally closed with switch blade 68 because of the resilient bias on this switch blade, while the contact 72 is normally open to thereby form a normally open and a normally closed contact for the switch.

The switch means 54, 56 and 66 are connected into the latch actuated circuit means 48 in the following manner. A lead 74 extends downwardly from a contact 76 of contact means 44 of selector switch 32, with this contact being electrically connectable with and, therefore, in electrical current carrying capacity with the L₁ side of the line by movement of the selector switch 32 so as to place a movable contact 78 of contact means 44 in engagement with contact 76. Lead 74, in turn, is in electrical connection with switch blade 68 of switch means 66. Thus, with a closed contact 70 and the oven circuit 10 in clean mode, an electrical circuit extends between the L₁ side of the line through the switch means 66 (normally closed contact 70) and switch means 56 (with the latching means 50 in latched position) and a lead 80 extending from the switch blade 61 to the aforementioned pulse switch 46 and through the broiler element 16 and a clean thermostat 82 which is set to open at an upper temperature limit of say 1,050°F so as to limit the top temperature at which the oven circuit 10 operates during the cleaning mode.

The current flow is completed to the L₂ side of the line through a then closed relay switch means 84 which, in turn, is connected to the closed contact means 42 of the selector switch that is connected to the L₂ side of the power supply through a lead 86. The contact means 42 is, of course, closed in the clean mode of operation due to the selector switch 32 having been manipulated to the clean mode by the user of the oven circuit 10.

In order to place the relay switch means 84 in closed condition, a relay coil 88 is provided which is connected to the neutral side N of the line through the lead 90. The relay coil 88 is also connected across the L₂ side of the line through the aegis of a lead 92 that extends therefrom to the switch means 54. With the door 51 latched, switch blade 59 is connected to contact 58. A lead 94 extends from the opposite side of contact 58 and is connected to the contact 62 of switch means 56 from thence and the contact 70 for the switch means 66. Flow of current may then follow a path formed between the neutral N side of the line through the relay coil 88, switch means 54, lead 94, and lead 74 and the closed contact means 44 to the L₂ side of the power supply. By this arrangement, then, the relay coil 88 is actuated when the door latching means 50 is moved to latched condition, placing the switch means 54 and 56 in closed position relative to the contacts 58 and 62, respectively.

During the time that power is being supplied through the broil element 16 for the clean mode of operation of oven circuit 10, the timer motor 52 is energized. This timer motor and its cam means 64 are sized and dimensioned so as to provide a sufficiently long clean mode of operation, such as 45 minutes duration, to insure that all the combustibles coating the interior of the oven enclosure 18, are destroyed by pyrolytic action. To terminate the clean mode of operation, the cam means 64 rotates a sufficient amount so that a camming surface 65 thereof engages the switch means 66. Switch blade 68 is in its normally closed position at this time and is moved by contact with cam surface 65 so that it engages contact 72. With switch blade 68 in this posi-

tion, current flow from the L₁ side of the power supply is terminated to broil element 16 since the lead 80 is no longer energized with contact 62 open. At the same time, the relay coil 88 is no longer placed across neutral to the L₁ side of the power supply because the lead 94 is not energized. Removal of power from the relay coil 88 opens the relay switch means 84, thus terminating a connection from the pulse switch 46 to the L₂ side of the power supply.

The latch actuated circuit means 48 includes means for resetting itself so as to place it in a condition again for another clean mode of operation of the oven circuit 10. More specifically, with the switch blade 68 closed against contact 72, as moved thereto by camming surface 65, the door latching means 50 is manually moved to an unlatched condition to permit ingress into the oven cavity 18. At this time, switch blade 61 opens while switch blade 59 moves into a closed condition with contact 60. This provides a flow of energizing current to the timer motor 52 since the timer motor is connected across neutral N to the L₂ side of the power supply line by the lead 74, the closed contact 72, a lead 96 extending from the contact 72 to the switch blade 59 and thence to the timer motor 52 and from it through the lead 90 extending to neutral N.

This circuit arrangement energizes the timer motor 52 so that it rotates to move the cam surface 65 of cam means 64 beyond interfering urging contact with the switch blade 68 so that the switch blade 68 again assumes a closed position with contact 70. Movement of the switch blade 68 away from contact 72, of course, terminates the closed circuit between neutral N and L₁ side of the power supply so that the operation of the timer motor 52 ceases and the timer motor 52 is again in a position so that a cleaning mode of operation may be again initiated for oven circuit 10.

It should be clear from the foregoing description that a conventional oven circuitry has been provided with an electrical circuit arrangement which, in conjunction, with a door latching means, initiates and terminates the clean mode of operation and then places the oven circuit in condition for another clean mode of operation by resetting itself after movement of the door latching means to unlatched position.

It should also be clear to one skilled in the art that an oven circuit arrangement has been described which provides all the advantages set out for it in the beginning portion of the description and that many modifications could be made to the exemplary circuitry without the exercise of the inventive skill which would still fall within the spirit and scope of the description offered.

I claim:

1. In an oven having separate cooking and heat cleaning modes of operation:

- a. a door latch operated switch means,
- b. a timer motor energized by moving said door latch operated switch means to a latched position.
- c. said timer motor drivingly rotating a cam means,
- d. said cam means engageable with another switch means having a switch blade contactable by said cam means and a pair of alternately engageable contacts, one of said contacts being normally engaged by said switch blade and the other of said contact being normally open relative to said switch blade,
- e. a heating means for said oven for operating said oven in heat cleaning mode,

f. said cam means when engaging said another switch means moving said switch blade against said normally open contact,

g. said door latch operated switch means also having an unlatched position,

h. when said latch operated switch means is moved to said unlatched position and said switch blade has been moved by said cam means to a closed position with said normally open contact, said timer motor is actuated to move said cam means out of engagement with said switch blade,

i. whereby said oven is again placed in condition for the initiation of another heat cleaning mode.

2. In an oven having a door adapted to be latched during a cleaning mode of operation;

a. circuit means including a latch operated switch means having a first position for initiating said cleaning mode of operation and a second position preventing said cleaning mode of operation,

b. timing means in said circuit means for terminating said cleaning mode by operation of timing means operated switch means from a first to a second position,

c. said timing means operated switch means in said second position completing a portion of said circuit means for subsequent energization of said timing means by operation of said latch operated switch means to a second position,

d. said latch operated switch means and said timing means operated switch means being connected in said circuit means in a two-way arrangement so that said timing means is connected for energization only when both said switch means are either in said first positions or in said second positions whereby operation of said latch operated switch means to said second position after a cleaning mode of operation results in energization of said timing means until said timing means operated switch means is operated back to said first position.

3. A control arrangement for a self-cleaning oven having an oven cavity with heating means therein, and an oven door, comprising:

timer means for controlling the period of a cleaning cycle;

a circuit for energizing said timer means;

timer operated switch means in said energizing circuit having a first and a second position for effecting a cleaning cycle and a timer resetting cycle, respectively;

latch operated switch means in said energizing circuit having a first and a second position corresponding to said door being latched and unlatched, respectively;

both said switch means being connected in a two-way arrangement in said energizing circuit so that said timer means is energizable only when both of said switch means are in either said first or said second positions so that upon operation of said timer operated switch means by said timer means to said second position at the end of a cleaning cycle, operation of said timer means is terminated until said latch operated switch means is operated to said second position whereupon said timer means is energized in a resetting cycle until operation of said timing means is again terminated by operation of said timer operated switch means back to said first position.

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4. A control arrangement according to claim 3 including:
a heating means control circuit for effecting energization of said heating means, said heating means control circuit including said timer operated switch 5

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means and said latch operating switch means, both of said switch means being required to be in said first positions for energization of said heating means to be effected.

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