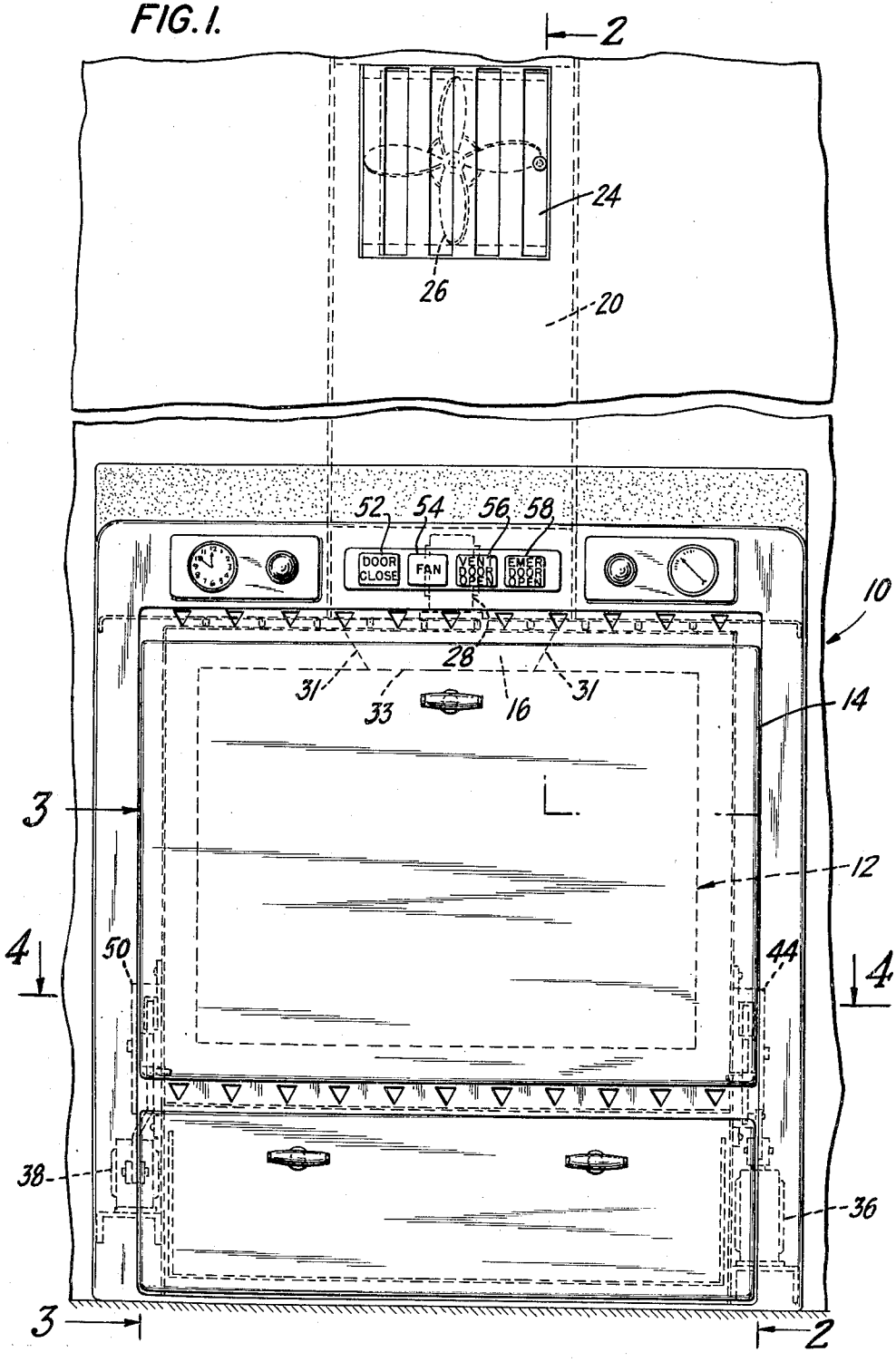
Oct. 31, 1961 H. W. NIEMANN 3,006,333

OVEN VENTILATION

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FIG. 1.

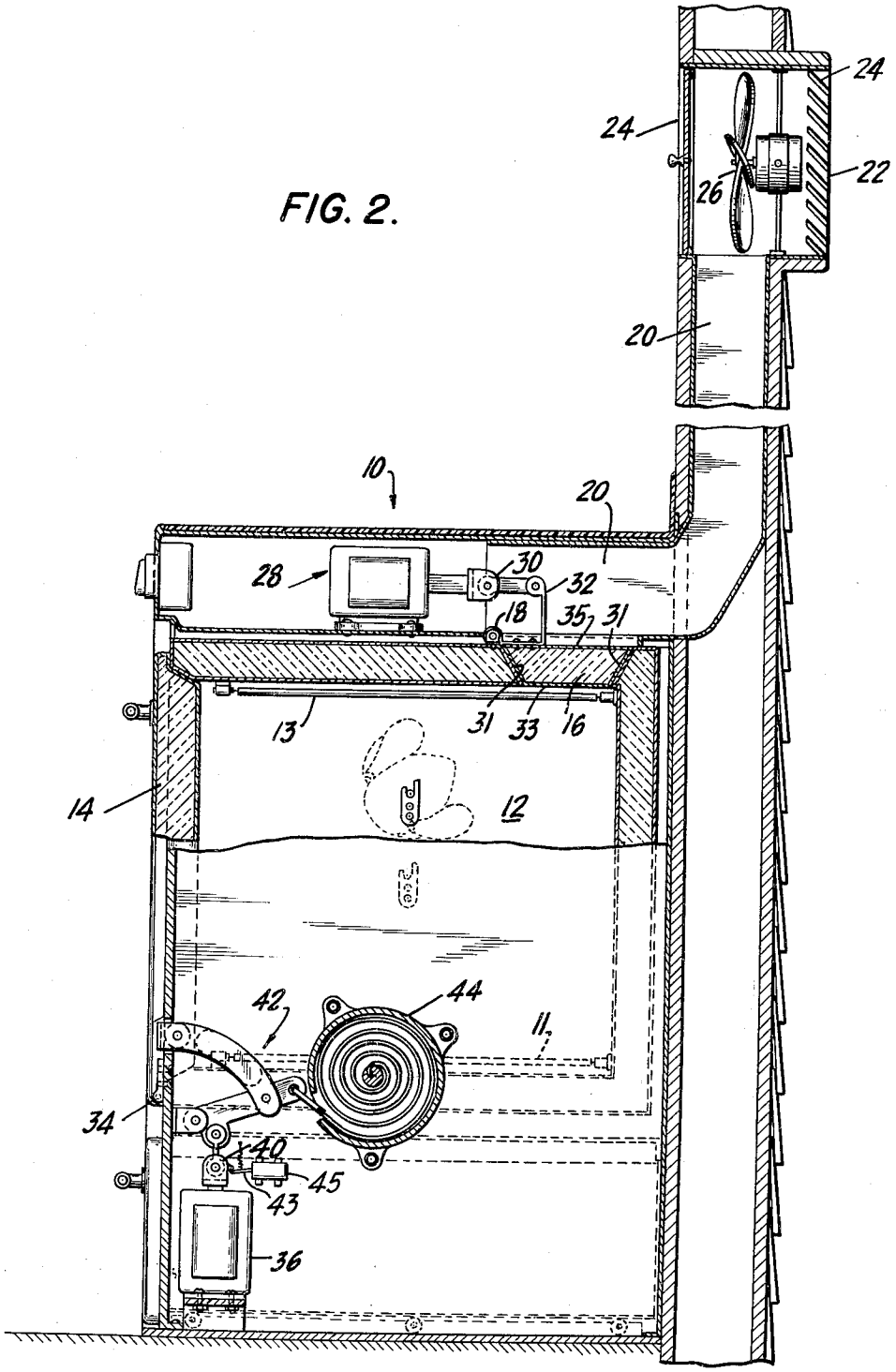


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FIG. 2.



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FIG. 4.

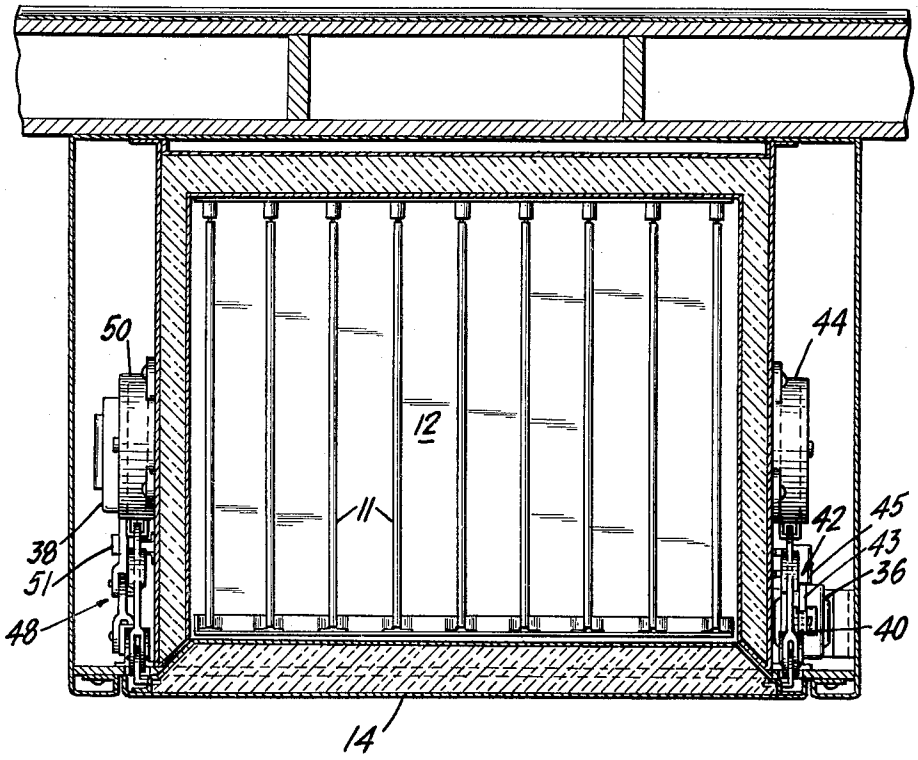
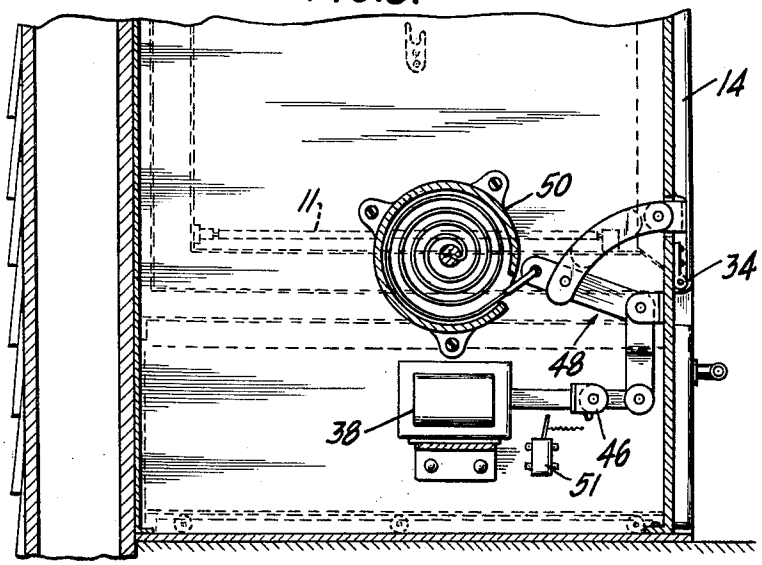


FIG. 3.



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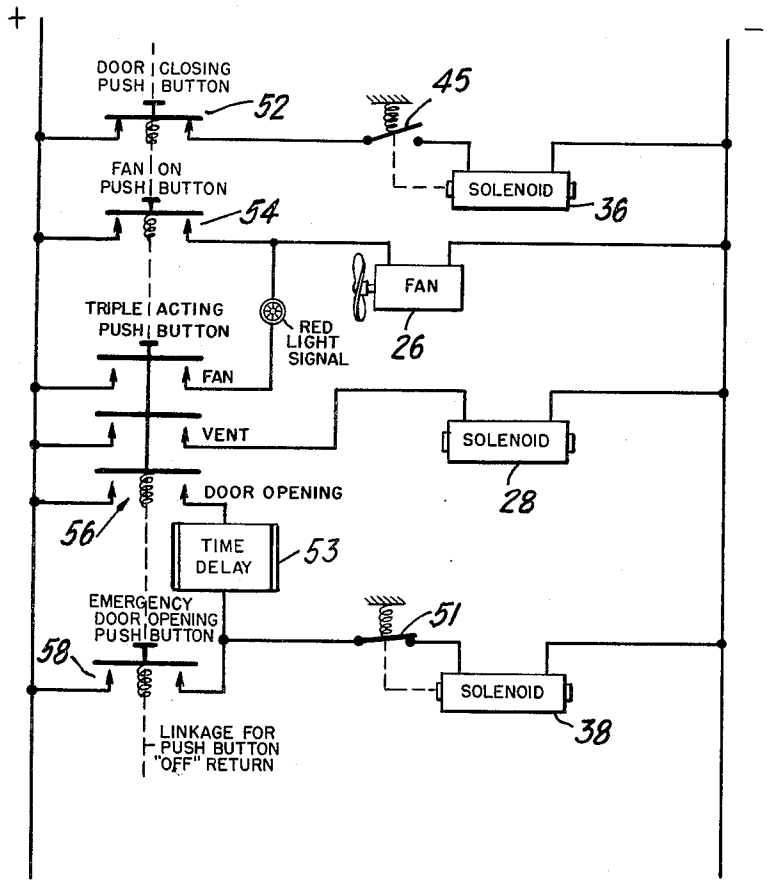


FIG. 5.

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3,006,333

OVEN VENTILATION

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Filed July 22, 1959, Ser. No. 828,744
9 Claims. (Cl. 126—19)

The invention relates to ovens and more particularly to the means for ventilating ovens.

In the use of ovens, fumes from the baking material and the gaseous products of combustion are largely confined in the oven during the baking process and escape into the face of the operator and into the room when the oven door is opened.

It is the object of this invention to provide means for exhausting the fumes and gaseous products of combustion from the oven just prior to the opening of the oven door and to continue exhausting the oven as long as the door is opened.

In carrying out the invention a duct is provided leading from an opening in the rear of a front opening oven to an outlet flue or opening. An exhaust fan is provided at the flue end of the duct. The rear opening in the oven communicating with the duct has a closure that is opened when the exhaust fan is operated. The oven is provided with a front door which is adapted to be opened automatically a short time after the fan is activated. When the oven door is closed the fan is deenergized and the rear oven closure is adapted to close. Pushbuttons are provided to control the operation of the components, either in sequential or independent operation.

A fuller understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings in which:

FIGURE 1 shows a front view of an electric stove having an oven and in which the invention is installed.

FIGURE 2 is a cross-section of FIG. 1 along line 2—2.

FIGURE 3 is a cross-section of FIG. 1 along line 3—3.

FIGURE 4 is a cross-section of FIG. 1 along line 4—4; and

FIGURE 5 is a schematic wiring diagram of the electrical connections.

Referring to FIGS. 1 and 2 the invention is illustrated as incorporated in an electric stove 10 having an oven 12 with heating elements 11 and 13. The oven is provided with a door 14, opening outward and downward, an opening in the top rear of the oven is closed by a hinged rear closure 16 which is adapted to rotate about hinge 18 to open upward. A duct 20 leads from the opening into a flue and into the room. An exhaust fan 26 is mounted in the duct 20 intermediate the openings into room and flue.

Permanently opened louvers 22 are across the duct opening into the flue. Adjustable ventilator closers 24 are across the opening into the room permitting the fan to be used to ventilate the room when opened.

A solenoid 28 is mounted on top of the oven 12 with its operating plunger 30 connected by mechanical linkage 32 to the closure 16, said solenoid, when energized, adapted to swing the closure upward and open about hinge 18. The closure 16 is adapted to swing downward around hinge 18 and close by its own weight and the force of gravity when the solenoid 28 is deenergized. The sides 31 of the closure 16 slope upward and outward from the lower surface 33 to the upper surface 35 and are adapted to snugly close the rear opening in the top of the oven. The sloping sides 31 of the closure 16 in cooperation with the correspondingly shaped sides in the rear opening of the oven prevent the closure 16 from swinging beyond the horizontal closing position.

The oven door 14 opens downward about its bottom hinge 34. Referring also to FIGS. 3 and 4, the two solenoids 36 and 38 are mounted respectively on the right and

left sides of the oven below the door 14. The operating arm 40 and solenoid 36 are connected with mechanical linkages 42 to the lower right side of the door 14 and adapted to close the door when activated. The linkage 42 is also connected to a counterweight spring 44 (see FIG. 4), fastened to the outside of the oven to the rear and above solenoid 36. A limit switch 45 is mounted adjacent the operating arm 40 of solenoid 36. A switching lever 43 having an on and off position on limit switch 45 is in the line of travel of operating arm 40. The lever 43 is adapted to being carried to its "off" position at the end of a power stroke of the operating arm 40, and to being returned to its "on" position by the movement of the operating arm 40 which is connected by linkage 42 to the door when the oven door is opened. The solenoid 36 is thus deenergized at the end of its power stroke and cannot again be reenergized until the door has been opened. The operating arm 46 of solenoid 38 is connected by mechanical linkage 48 to the lower left side of door 14 and adapted to open the door when activated. The linkage 48 is also connected to a counterweight spring 50 similar to spring 44 and fastened to the outside of the oven just above the solenoid 38. A limit switch 51 similar to switch 45 is mounted adjacent to the operating arm 46 of solenoid 38. The limit switch 51 is adapted to cooperate with the operating arm 46 of solenoid 38 in a similar manner as limit switch 45 cooperates with the operating arm 40 of solenoid 36, the solenoid at the end of its power stroke being deenergized and cannot be reenergized until the door is closed.

FIGURE 5 is a diagram of the electrical circuits of the invention in the condition of oven door closed. The diagram indicates the electrical supply is D.C. but it is understood that the indicated circuits can operate equally well with A.C.

Pushbutton switches 52, 54 and 58 are single pole switches. Pushbutton 56 is a three pole switch. The energizing coil of solenoid 36, the contacts of limit switch 45 and the pushbutton switch 52 are connected in series across the line. The fan-motor of fan 26 is connected in series with pushbutton switch 54 and through a red signal light to one pole of the pushbutton switch 56, the switches 54 and 56 being connected and parallel with each other. The energizing coil of solenoid 28 is connected in series with the second pole of switch 56. The energizing coil of solenoid 38 is connected in series with the contacts of time limit switch 51, a time delay mechanism 53 and a third pole of switch 56, and also in series with switch 58, the third pole of switch 56 and the time delay being connected and parallel with the switch 58.

The operation of the oven is controlled by the pushbuttons which can only be depressed one at a time, the depression of a button to close a switch raising any other depressed button to open the associated switch. When switch 52 is closed, assuming the oven door is open, the contacts of time limit switch 45 are closed and the solenoids 36 are energized to close the door. If the door had been closed the contacts of limit switch 45 would have been open as shown in FIG. 5 and the solenoid 36 would not have been energized. The time limit switch 45 is mechanically operated by the operating arm of solenoid 36, the limit switch being switched to its open contact position at the end of the power stroke of the solenoid 36. When the door is opened by any means the operating arm closes switch 45. When switch 54 is closed the fan motor is energized and the fan is turned on. The parallel connection to one pole of the triple pole switch 56 remains open because when the switch 54 is operated it opens all the other switches. When switch 56 is closed one pole energizes the red light and the fan motor to start the fan and light the light. The second pole energizes the solenoid 28 to open the rear closure of the oven. The third

pole energizes the door opening solenoid coil **38** through the time delay mechanism **53** and the contacts of the limit switch **51**. The limit switch **51** is mechanically connected to the operating arm of solenoid **38**, said arm opening the contacts when the door is opened and closing them when the oven door is closed. The parallel connection to the switch **58** is open because this switch is opened by the closing of switch **56**. When switch **58** is depressed the solenoid energizing coil **38** is energized through the time limit switch contacts **51**. The time limit switch **51** acts in the same way as described for the closing of switch **56**. The parallel connection to one pole of switch **56** is opened by closing the switch **58** and is therefore of no effect.

Although the invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What I claim is:

1. An oven having a door, electrical means for opening said oven door, electrical means for closing said opened door, electrical means for ventilating the oven including a vent with a closure approximately opposite said door, electrical control means for starting in sequence the operation of said ventilation means followed by said door opening means, and electrical control means for operating the door closing means and simultaneously stopping the operation of said ventilation means.

2. In an oven as described in claim 1, characterized in that means for closing said door comprises a solenoid having an operating arm connected to said door by mechanical linkage, said arm adapted to close said door when said solenoid is energized.

3. In an oven as described in claim 1, characterized in that the door opening means comprises a solenoid having an operating arm connected to said door by mechanical linkage and adapted to open said door when said solenoid is energized.

4. In an oven as described in claim 1, characterized in that the means for ventilating the oven comprises in combination a vent defined in a part of said oven approximately opposite said door, a closure means hingedly mounted in said vent for opening and closing said vent, electrical means for operating said closure means to pivot about said hinged mounting, a duct connected to said vent and leading to an outside-opening flue, and a fan in said duct adjacent to said flue for exhausting fumes from said oven through said vent and duct when said closure means is operated to open said vent.

5. In an oven as described in claim 4, characterized in that electrical means for operating said closure means to pivot about said hinged mounting comprises a solenoid having an operating arm adapted to pivot said closure means to open said vent when said solenoid is energized and to let said closure means pivot by weight and gravity to close said vent when the solenoid is deenergized.

6. In an oven as described in claim 4, characterized in that control means for sequentially operating said ventilation means and said door opening means comprises a three pole switch, in the closing of which one pole energizes the fan, a second pole energizes the solenoid operating to open the closure means of said vent, and the third pole energized a time delay mechanism and said door opening means.

7. In an oven as described in claim 1, characterized in that the control means for operating the door closing means simultaneously with stopping the operation of the ventilation means comprises a single pole switch mechanically interlocked when closed to deenergize said control means for operating sequentially the ventilating means and door opening means, said single pole switch in the closing of which energizes said door closing means.

8. In an oven as described in claim 2, characterized in that a limit switch has its actuating lever mechanically adapted to be operated by the solenoid operating arm said switch being electrically connected in the energizing circuit of the solenoid is adapted to open said electrical connection at the end of the power stroke of said solenoid operating arm thereby deenergizing said solenoid and to close said electrical connection on the return stroke of said operating arm, thereby permitting said solenoid to be reenergized.

9. An improved electrically operated oven having a front door adapted to open and shut, and an outside source of electrical energy, said oven comprising in combination means for opening said oven door when closed including first electrical actuating means and first electrical manually-operated control means for energizing said first actuating means, means for closing said oven door when open including second electrical actuating means and second electrical manually-operated control means for energizing said second actuating means, means for ventilating said oven comprising a back vent defined in said oven, a closure means for closing said back vent, and a conduit means connected to said vent, a fan means mounted in said conduit means for drawing air out of said oven through said vent and conduit and discharging said air clear of said oven, means for starting and stopping said fan means including third electrical actuating means and third electrical manually-operated control means for energizing said third actuating means, means for opening and closing said vent closure means including fourth electrical actuating means and fourth electrical manually-operated control means for energizing said fourth actuating means collectively with said first actuating means and said third actuating means, all said control means being mechanically interlocked whereby only one said control means can be manually operated at a time, and all said actuating means being connected to said source of electrical energy through the respective associated control means whereby said oven door is openable with and without ventilating said oven and closable with said ventilating means disabled when said electrical control means are manually operative.

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