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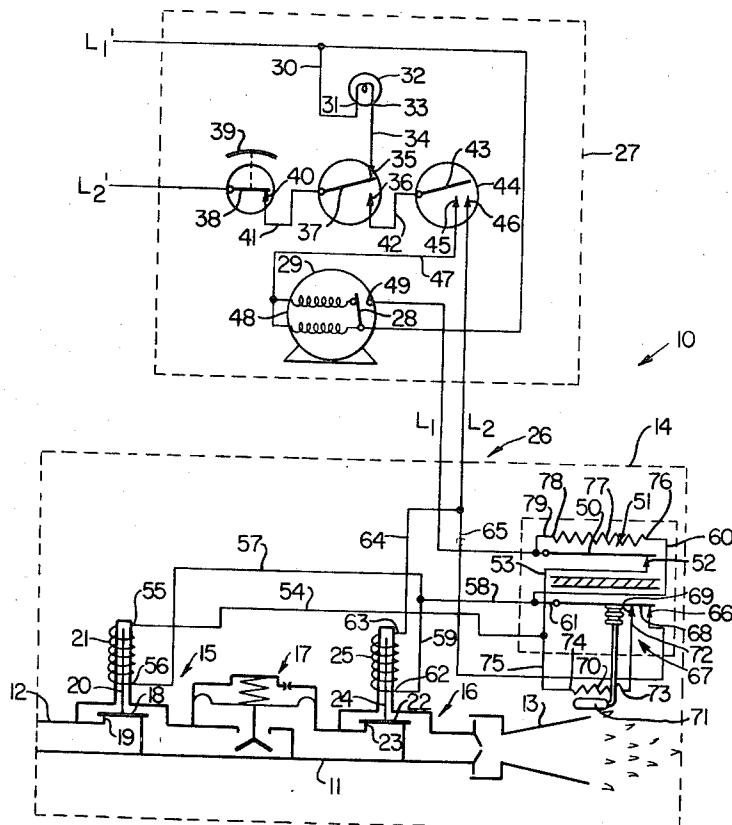
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[54] **FUEL CONTROL SYSTEM AND PARTS THEREFOR
 OR THE LIKE**
24 Claims, 5 Drawing Figs.

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431/66
 [51] Int. Cl. **F23q 9/08**
 [50] Field of Search **431/45, 66,**
67

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ABSTRACT: This disclosure relates to a fuel control system for a fuel-burning apparatus wherein an electrical switch is adapted to sense the nonignition condition and ignition condition of an electrically operated ignition means for a burner means in such a manner that when the system is initially energized, the switch means effects opening of a first valve means while energizing the ignition means and when the ignition means reaches an ignition condition, the switch means opens a second valve means to permit fuel to flow to the burner means while effectively disconnecting the electrical ignition means from the electrical power source. Such system includes a time delay means which will terminate the operation of the system if after a predetermined time period from the time the first valve means is initially opened, the second valve means does not open.



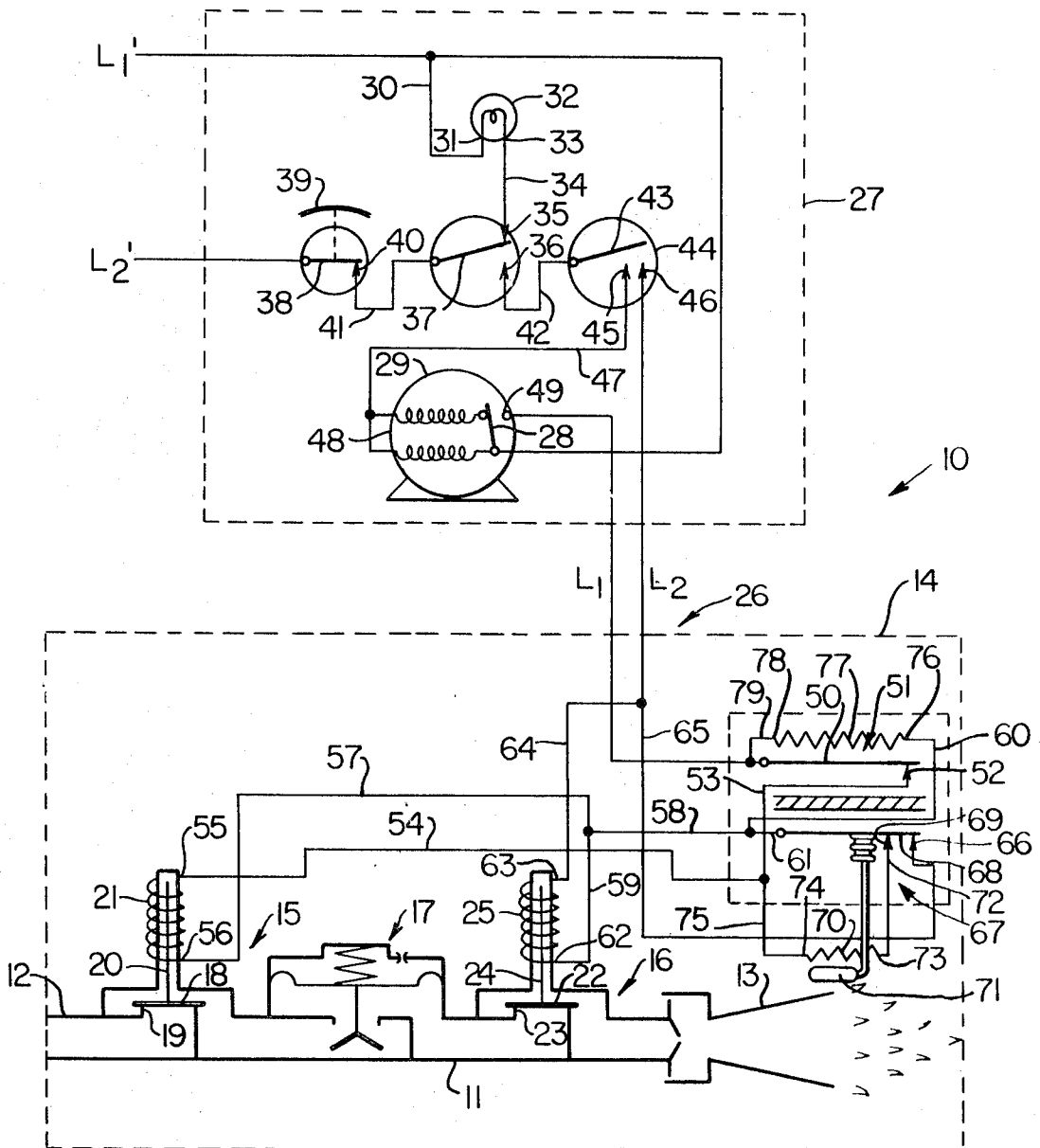


FIG. 1

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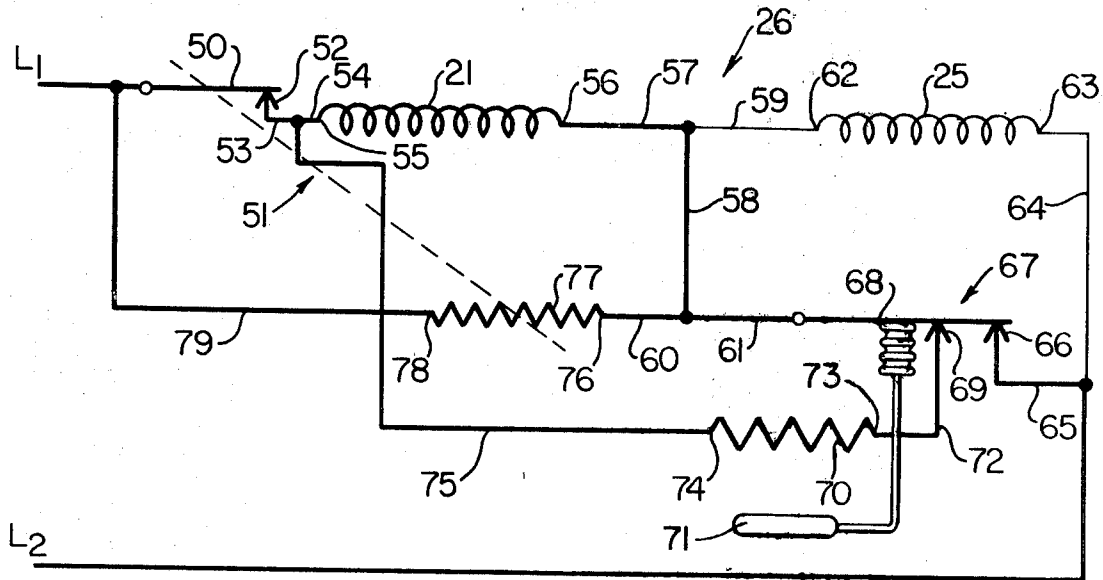


FIG. 2

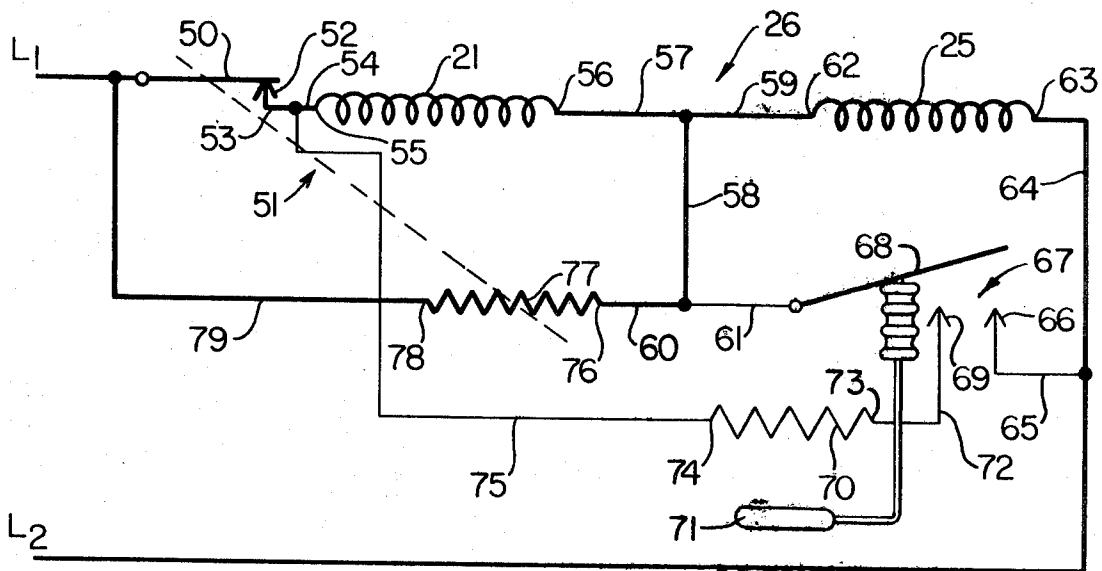


FIG. 3

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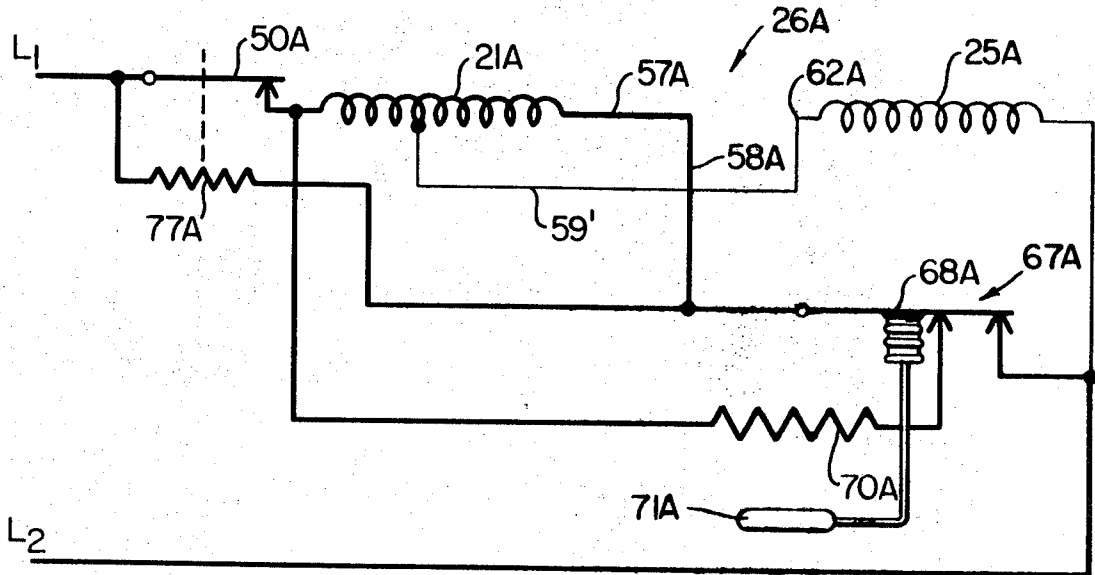


FIG. 4

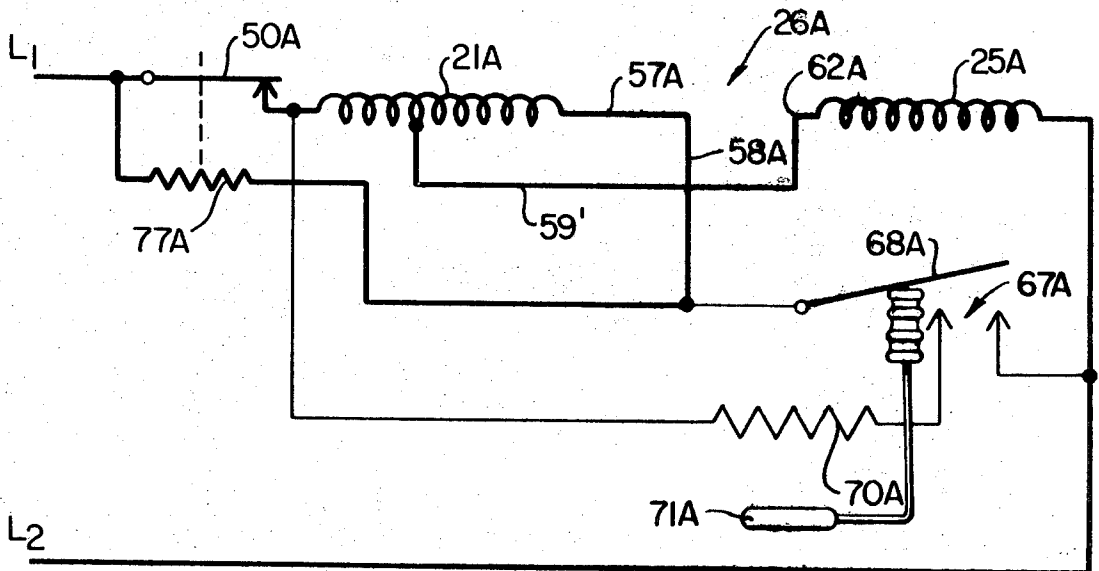


FIG. 5

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FUEL CONTROL SYSTEM AND PARTS THEREFOR OR THE LIKE

This invention relates to an improved fuel control system for a fuel-burning apparatus or the like as well as to an improved electrical control system for such an apparatus or the like.

It is well known that fuel-burning apparatus requires an ignition means for the main burner means thereof to effectively ignite fuel when the same first issues from the main burner means and such ignition means can be automatically operated when the apparatus is initially turned on.

Accordingly, it is a feature of this invention to provide an electrical ignition means for such a fuel-burning apparatus wherein the ignition means is automatically energized when the control means is first activated with the ignition means thereof thereafter and automatically causing the fuel to issue from the main burner means only after the ignition means has reached an ignition condition.

Another feature of this invention is to provide a time delay means in such a system so that after the ignition means is initially energized, full ignition of the burner means must take place within a predetermined time period or the time delay means will completely terminate the operation of the control system.

In particular, one embodiment of this invention provides a fuel control means wherein a source of fuel is interconnected to a burner means by a conduit means having first solenoid-operated valve means therein and a second solenoid-operated valve means therein disposed intermediate the first valve means and the main burner means. The electrical control system is so constructed and arranged that the same comprises a n electrical switch which when disposed in one position thereof and is sensing that the ignition means is at a nonignition condition, the switch means when initially interconnected to the electrical power source will only cause opening of the first valve means and the energizing of the ignition means so that the second valve means remains in its closed position to prevent the flow of fuel to the main burner means. Thereafter, when the electrical switch means senses an ignition condition of the ignition means, the electrical switch not only maintains the first valve means while terminating the operation of the ignition means to that the subsequently issuing fuel from the main burner means will be ignited by the ignition means. However, a time delay means is provided in the system so that if after the initial opening of the first valve means a predetermined time period lapses before the ignition means reaches ignition condition, the time delay means opens an electrical switch to effectively disconnect the electrical control system from the electrical power source.

Accordingly, it is an object of this invention to provide an improved fuel control system for a fuel burning apparatus or the like the system of this invention having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved electrical control means for such a control system or the like.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is a schematic view illustrating the control system of this invention with the control system being disposed in its off position.

FIG. 2 is a schematic electrical system for the control system of FIG. 1 and illustrates in bold lines the effective current flow through the control system of FIG. 1 when the control system is initially operated.

FIG. 3 is a view similar to FIG. 2 and illustrates the electrical circuit after the ignition means has reached ignition condition, the effective circuit in FIG. 3 being illustrated in bold lines.

FIG. 4 is a view similar to FIG. 2 and illustrates another embodiment of the electrical control system of this invention, the circuit illustrating bold lines the effective circuit when the control system is initially energized.

FIG. 5 is a view similar to FIG. 4 and illustrates the control system of FIG. 4 after the ignition means has reached ignition condition, the effective parts of the circuit in FIG. 5 being illustrated by bold lines.

While the various features of this invention are hereinafter described and illustrated as being particularly adapted to provide a control means for a fuel burning apparatus, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide control means for other types of apparatus as desired.

Therefore, this invention is not to be limited to only the embodiments illustrated in the drawings because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIG. 1, the improved fuel control system of this invention is generally indicated by the reference numeral 10 and comprises a conduit means 11 adapted to interconnect a fuel source conduit means 12 to a main burner means 13 of a fuel-burning apparatus 14 in a manner hereinafter described, the conduit means 11 having a first valve means 15 therein and a second valve means 16 therein intermediate first valve means 15 and the burner means 13. In addition, a pressure regulator means 17 can be disposed in the conduit means 11 intermediate the first and second valve means 15 and 16 so as to maintain a substantially constant pressure to the fuel being directed to the main burner means 13.

The valve means 15 comprises a valve member 18 adapted to open and close a valve seat 19 and carrying an armature 20 adapted to be attracted by a solenoid coil 21 so that when the coil 21 is energized in a manner hereinafter described, the valve member 18 will be moved away from the valve seat 19 and when the coil 21 is deenergized in a manner hereinafter described, the valve member 18 will close against the valve seat 19.

Similarly, the second valve means 16 comprises a valve member 22 adapted to open and close a valve seat 23 and carrying an armature 24 adapted to be attracted by a solenoid coil 25 so that when the coil 25 is energized in the manner hereinafter described, the valve member 22 is moved away from the valve seat 23 and when the coil 25 is deenergized in a manner hereinafter described, the valve member 22 will close against the valve seat 23.

The electrical control system of this invention for operating the fuel control means 10 is generally indicated by the reference numeral 26 and comprises a pair of power source leads L' and L² adapted to be respectively electrically interconnected to the power source leads L¹ and L² after a conventional part of the electrical control means of the apparatus 14 is moved to its on position, the conventional part of the electrical control means of the apparatus 14 is moved to its on position, the conventional part of the electrical control means being contained within the rectangle dashed 27 in FIG. 1 and now to be described.

The power source lead L' is interconnected to a switch blade 28 of the dryer drum and motor 29 as well as to a lead 30 interconnected to one side 31 of a light 32 which is disposed inside the dryer 14 to cause illumination therein when the dryer door is in open position, the other side 33 of the light 32 being interconnected by a lead 34 to a fixed contact 35. The contact 35 is spaced from another fixed contact 36 and a door operated switch blade 27 is disposed against the contact 35 when the dryer door is opened and when the dryer door is closed, the switch blade 37 is moved against the contact 36.

The power source lead L² is electrically interconnected to a switch blade 38 that is controlled by a bimetal member 39 so that as long as the temperature within the dryer 14 does not exceed an unsafe high limit temperature thereof, the bimetal

member 39 maintains the switch blade 38 against an electrical contact 40 that is interconnected to the switch blade 37 by a lead 41.

The fixed contact 36 is interconnected by a lead 42 to a switch blade 43 of a manually actuated cycle timer 44 of the apparatus 14 so that when the timer 44 is set to an on position by the housewife or the like, the timer 44 holds the switch blade 43 against a pair of spaced electrical contacts 45 and 46 to cause the continuous operation of the apparatus 14 until the timer 44 reaches its end of cycle position and moves the switch blade 43 away from the contacts 45 and 46 to terminate the operation of the apparatus 14 in a conventional manner.

The contact 45 of the cycle timer 44 is interconnected by a lead 47 to one side 48 of the dryer drum and fan motor 29 while the contact 46 of the cycle timer 44 is directly interconnected to the power source lead L^2 of the electrical control system 26 of this invention. The switch blade 28 of the dryer motor 29 is adapted to be moved from the position illustrated in FIG. 1 to be disposed against a fixed contact 49 after the motor 29 has been initially energized in a manner conventional in the art to effectively interconnect the power source lead L^1 to the power source lead L^1 of the electrical control means 26 of this invention so that it can be seen that once the housewife or the like has manually set the cycle timer 44 and the dryer door is in its closed position to hold the switch blade 37 against the contact 36, the power source lead L^1 is electrically interconnected to the power source lead L^1 of the system 26 while the power source lead L^2 is interconnected to the power source lead L^2 of the electrical control system 26 of this invention.

The details of the electrical control system 26 of this invention for controlling the fuel control means 10 of this invention will now be described.

Referring now to FIGS. 1 and 2, the power source lead L^1 is directly interconnected to a switch blade 50 of a time delay means 51 of this invention, the switch blade 50 being bimetallic and normally being disposed against a fixed contact 52 that is interconnected by a lead 53 to a lead 54 that is interconnected to one side 55 of the solenoid coil 21 for the first valve means 15.

The side 56 of the first solenoid coil 21 is interconnected by a lead 57 to a pair of leads 58 and 59, the lead 58 in turn being interconnected to a pair of leads 60 and 61 and the lead 59 being interconnected to one side 62 of the second solenoid coil 25.

The other side 63 of the second solenoid coil 25 is interconnected by a lead 64 to the power source lead L^2 , the power source lead L^2 also being interconnected by a lead 65 to a fixed contact 66 of an ignition coil and/or flame operated switch means 67. In particular, the switch means 67 includes a switch blade 68 which is normally disposed in its closed position against the fixed contact 66 as well as against another fixed contact 69 as long as an electrically operated ignition coil 70 for the burner means 13 is not at ignition condition and/or the fuel is not burning at the main burner means 13, such switch blade 68 being operated by conventional sensing means indicated by the reference numeral 71 in FIGS. 1 and 2 and comprising a temperature sensing bulb and power element as desired.

In any event, if the ignition coil 70 is at ignition condition and/or flames exist at the main burner means 13, the sensing means 71 moves the switch blade 68 to the open position as illustrated in FIG. 3 for a purpose hereinafter described.

The contact 69 of the switch means 67 is interconnected by a lead 72 to one side 73 of the ignition coil 70 while the other side 74 of the ignition coil 70 is interconnected by a lead 75 to the juncture of the previously described leads 53 and 54.

The previously described lead 61 is interconnected to the switch blade 69 of the switch means 67 and the previously described lead 60 is interconnected to one side 76 of a resistance heater 77 of the time delay switch means 51, the other side 78 of the resistance heater 77 being interconnected

directly to the power source lead L^1 by a lead 79 in advance of the switch blade 50.

The resistance heater 77 is so constructed and arranged that the same is adapted to operate the bimetallic switch blade 50 so that if the heater means 77 reaches a predetermined temperature, the same will cause the switch blade 50 to move away from the fixed contact 52 to effectively disconnect the power source lead L^1 from the electrical control means 26 of this invention to terminate the operation of the fuel control means 10 as will be apparent hereinafter. However, as long as the resistance heater 77 produces a temperature effect below the previously described temperature effect, the bimetallic switch blade 50 remains closed against the contact 52.

The operation of the fuel control system of this invention utilizing the electrical control system 26 of this invention will now be described.

After the housewife or the like manually sets the cycle timer 44 to its on position so as to effectively cause the power source leads L^1 and L^2 to be respectively interconnected to the power source leads L^1 and L^2 of the electrical means 26 and since the ignition means 70 and heater means 77 are at ambient temperature and the valve members 18 and 22 of the first and second valve means 15 and 16 are disposed in their closed position, the initial energizing of the control system 26 of this invention is illustrated in bold lines in FIG. 2 whereby it can be seen that the closed switch blade 68 effectively places the first solenoid coil 21, resistance heater 77 and ignition coil 70 in parallel relation across the power source leads L^1 and L^2 while effectively shunting out the solenoid coil 25 of the second valve means 16 so that the energized solenoid coil 21 of the first valve means 15 opens the valve member 18 away from the valve seat 19 so that fuel can flow to the second valve means 16 but cannot pass therethrough to the main burner means 13. Also, since full line voltage is across the resistance heater 77, the energized heater 77 begins to heat up and because of a time delay in the heating thereof, the bimetallic switch blade 50 remains closed against the contact 52. Simultaneously, the ignition coil 70 is now energized and begins to heat up to ignition condition.

When the ignition coil 70 subsequently reaches ignition condition, the sensing means 71 opens the switch blade 68 in the manner illustrated in FIG. 3 whereby the opened switch blade 68 effectively disconnects the ignition coil 70 from the power source leads L^1 and L^2 and places the solenoid coil 21 and resistance heater 77 in parallel relation with that parallel circuit of the solenoid coil 21 and resistance heater 77 being placed in series with the solenoid coil 25 across the power source leads L^1 and L^2 to now energize the solenoid coil 25 so that the second valve member 22 can be moved away from the valve seat 23 to permit fuel to now issue from the main burner means 13 and be ignited by the ignition coil 70.

The solenoid coil 21 of the first valve means 15 is so constructed and arranged that the same will cause opening of the valve member 18 away from the valve seat 19 if the solenoid coil 21 is at or slightly below the line voltage and will only permit the valve member 18 to close against the valve seat 19 when the coil 21 is at or below one-half of the line voltage so that it can be seen that when the circuit means 26 is in the condition illustrated in FIG. 3, the first valve member 18 will remain in its open condition and the voltage across the resistance heater 77 has been reduced from the voltage provided across the resistance heater 77 when in the condition of FIG. 2 so that the resistance heater 77 cannot now open the blade 50. Also, the solenoid coil 25 of the second valve means 16 is so constructed and arranged that the same will cause opening of the valve member 22 away from the valve seat 23 when the solenoid coil 25 is at its designed voltage and will cause subsequent closing of the valve member 22 against the valve seat 23 when the coil 25 has no voltage across the same.

Thus, if the electrical control system 26 now is in a condition illustrated in FIG. 3, both valve members 18 and 22 are in their opened position so that the fuel issuing from the burner means 13 can be ignited by the ignition coil 70 and once fuel is

burning at the main burner means 13, the sensing means 71 maintains the switch blade 68 in its opened position as illustrated in FIG. 3 so that the burner means 13 continues to operate until the cycle timer 44 opens the switch blade 43 away from the contacts 45 and 46 to effectively disconnect the electrical power source from the system 26 whereby the valve members 18 and 22 will close against their respective valve seats 19 and 23 to terminate the flow of fuel to the main burner means 13.

However, if during the initial start up of the control system 26 in the manner previously described wherein the ignition coil 70 is not at ignition condition and the system is as illustrated in FIG. 2, the ignition coil 70 should not heat up to ignition condition in a predetermined time period, the heater means 77 will have heated up to such a condition that the same will cause opening of the switch blade 50 so as to disconnect the power source from the coil 21 whereby the valve member 18 will close against the valve seat 19, the opening of the switch blade 50 also disconnecting the ignition coil 70 from the power source leads whereby the heater 77 will maintain the valve member 50 in its open position until the timer cycle means 44 is turned off and no fuel can issue from the main burner means 13 during this failure in the ignition coil 70 from heating up to ignition condition during the predetermined time period.

If, after the control system 10 has been properly operated so that the fuel is now issuing from the main burner means and the electrical system 26 is in the condition as illustrated in FIG. 3, the housewife or the like should temporarily open the dryer door so as to temporarily move the switch blade 37 away from the contact 36 so as to disconnect the power source temporarily from the electrical control means 26 of this invention, both valve members 18 and 22 will seat against their valve seats 19 and 23 and when the housewife then closes the dryer door to again close switch blade 37 against the contact 36 and energize the power source leads L^1 and L^2 before the sensing means 71 closes the switch blade 69 against the contacts 68 and 69, only the valve member 22 of the second valve means 16 will be moved to its open condition because with the system as illustrated in FIG. 3, only a portion of the operating voltage is now being placed across the solenoid coil 21 of the first valve means 15 so that the same cannot open the valve member 18 away from the valve seat 19. However, a continued cooling being sensed by the sensing means 71 subsequently causes the switch blade 69 to move back to its closed position as illustrated in FIG. 2 which will restart the ignition cycle by shunting out the coil 25 of the first valve member 16 to permit the valve member 22 thereof to close against the valve seat 23 and will place the solenoid coil 21 of the first valve means 15 across full line voltage to open the valve member 18 from the valve seat 19 so that a normal ignition of the main burner means 13 can take place in the manner previously described.

Therefore, the control system will continue to function in the manner previously described until shut down by the cycle timer means 44 reaching its end of cycle position.

If during the normal operation of the control system 10, the switch blade 68 would fail to open from the position illustrated in FIG. 2 to the position illustrated in FIG. 3 when the ignition coil 70 reaches ignition condition, the resistance heater 77 of the time delay switch 51 of this invention will open the switch blade 50 so as to remove current from the solenoid coil 21 of the first valve means 15 to permit closing of the valve member 18 against the valve seat 19 in the manner previously described.

Therefore, it can be seen that the control system 10 of this invention means ignites only provides an improved burner control means, but the same also provides time delay electrically operated means for operating the control system 10.

Another embodiment of the electrical control means of this invention is generally indicated by the reference numeral 26A in FIG. 4 and parts thereof similar to the control means 26 for the system 10 are indicated by like reference numerals followed by the reference letter "A."

As illustrated in FIGS. 4 and 5, the electrical control means 26A is substantially identical to the previously described electrical control means 26 of FIGS. 2 and 3 except that the side 62A of the second solenoid coil 25A is tapped to the first solenoid coil 21A by a lead 59' instead of being interconnected to the juncture of leads 57A and 58A as in the control system 26.

In this manner, the solenoid coil 21A is provided with a holding voltage and eliminates the possibility of the second solenoid coil 25A pulling in to open its valve member due to surge of voltage or an accumulation of manufacturing tolerances.

As illustrated in FIG. 4, when the control system 26A is initially energized in the manner previously described, the switch means 67A effectively places the first solenoid coil 21A, the time delay heater 77A, and ignition coil 70A in parallel relation across the power source leads L^1 and L^2 to cause initial opening of the first valve means while effectively shunting out the second solenoid coil 25A for the purpose previously described. However, when the ignition coil 70A reaches ignition condition to cause opening of the switch blade 68A in the manner illustrated in FIG. 5, it can be seen that the resistance heater 77A and first coil means 21A are still disposed in series relation with the second solenoid coil 25A so that the voltage across the resistance heater 77 drops to prevent opening of the switch blade 50A while the solenoid coil 25A now pulls in to permit fuel to issue from the main burner means and be ignited by the ignition means 70A.

Accordingly, not only does this invention provide an improved fuel control system for a fuel burning apparatus or the like but also this invention provides improved electrical control means for such a system of the like.

I claim:

1. In a fuel control system having a source of fuel adapted to be interconnected by conduit means to a burner means, the improvement comprising a first valve means in said conduit means for controlling fuel flow therethrough, a second valve means in said conduit means for controlling fuel flow therethrough and being disposed intermediate said first valve means and said burner means, and electrically operated means operatively interconnected to said valve means so that when said electrically operated means is initially energized the same initially opens said first valve means while maintaining said second valve means in its closed position to prevent fuel flow to said burner means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition causes opening of said second valve means while holding said first valve means in its opened position and terminating the effective operation of said ignition means whereby said ignition means ignites fuel issuing from said burner means, said electrically operated means having a time delay means effectively responsive only to an ineffective operation of said ignition means which will terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated.

2. In a fuel control system as set forth in claim 1, said electrically operated means having a first solenoid coil for operating said first valve means and a second solenoid coil for operating said second valve means.

3. In a fuel control system as set forth in claim 2, said electrically operated means having an electrical power source and having switch means placing said first coil across said power source when said electrically operated means is initially energized to cause opening of said first valve means.

4. In a fuel control system as set forth in claim 3, said switch means effectively shunting out said second coil from said power source when said switch means initially places said first coil across said power source whereby said second valve means remains closed.

5. In a fuel control system having a source of fuel adapted to be interconnected by conduit means to a burner means, the improvement comprising a first valve means in said conduit means for controlling fuel flow therethrough, a second valve means in said conduit means for controlling fuel flow

therethrough and being disposed intermediate said first valve means and said burner means, and electrically operated means operatively interconnected to said valve means so that when said electrically operated means is initially energized the same initially opens said first valve means while maintaining said second valve means in its closed position to prevent fuel flow to said burner means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition causes opening of said second valve means while holding said first valve means in its opened position whereby said ignition means ignites fuel issuing from said burner means, said electrically operated means having a time delay means which will terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having a first solenoid coil for operating said first valve means and a second solenoid coil for operating said second valve means, said electrically operated means having an electrical power source and having switch means placing said first coil across said power source when said electrically operated means is initially energized to cause opening of said first valve means, said switch means effectively shunting out said second coil from said power source when said switch means initially places said first coil across said power source whereby said second valve means remains closed, said switch means being adapted to place said first and second coils in series across said power source when said ignition means is subsequently energized to ignition condition whereby said opened first and second valve means permit fuel to issue from said burner means and be ignited by said ignition means.

6. In a fuel control system having a source of fuel adapted to be interconnected by conduit means to a burner means, the improvement comprising a first valve means in said conduit means for controlling fuel flow therethrough, a second valve means in said conduit means for controlling fuel flow therethrough and being disposed intermediate said first valve means and said burner means, and electrically operated means operatively interconnected to said valve means so that when said electrically operated means is initially energized the same initially opens said first valve means while maintaining said second valve means in its closed position to prevent fuel flow to said burner means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition causes opening of said second valve means while holding said first valve means in its opened position whereby said ignition means ignites fuel issuing from said burner means, said electrically operated means having a time delay means which will terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having a first solenoid coil for operating said first valve means and a second solenoid coil for operating said second valve means, said electrically operated means having an electrical power source and having switch means placing said first coil across said power source when said electrically operated means is initially energized to cause opening of said first valve means, said switch means effectively shunting out said second coil from said power source when said switch means initially places said first coil across said power source whereby said second valve means remains closed, said switch means being adapted to place said first and second coils in series across said power source when said ignition means is subsequently energized to ignition condition whereby said opened first and second valve means permit fuel to issue from said burner means and be ignited by said ignition means, said switch means placing said ignition means in parallel with said first coil across said power source when said electrically operated means is initially energized and said ignition means is not at ignition condition.

7. In a fuel control system as set forth in claim 6, said switch means disconnecting said ignition means from said power source when said ignition means reaches ignition condition.

8. In a fuel control system as set forth in claim 1, said electrically operated means having an electrical power source and first and second solenoid coils for respectively operating said first and second valve means, said time delay means comprising an electrical switch for connecting and disconnecting said power source to and from said first coil, said electrically operated means placing said first coil across said power source when said electrically operated means is initially energized to cause opening of said first valve means and to start said predetermined time period for said time delay means.

9. In a fuel control system having a source of fuel adapted to be interconnected by conduit means to a burner means, the improvement comprising a first valve means in said conduit means for controlling fuel flow therethrough, a second valve means in said conduit means for controlling fuel flow therethrough and being disposed intermediate said first valve means and said burner means, and electrically operated means operatively interconnected to said valve means so that when said electrically operated means is initially energized the same initially opens said first valve means while maintaining said second valve means in its closed position to prevent fuel flow to said burner means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition causes opening of said second valve means while holding said first valve means in its opened position whereby said ignition means ignites fuel issuing from said burner means, said electrically operated means having a time delay means which will terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having an electrical power source and first and second solenoid coils for respectively operating said first and second valve means, said time delay means comprising an electrical switch for connecting and disconnecting said power source to and from said first coil, said electrically operated means placing said first coil across said power source when said electrically operated means is initially energized to cause opening of said first valve means and to start said predetermined time period for said time delay means, said time delay means having an electrical heater for opening said time delay switch when said heater reaches a predetermined temperature.

10. In a fuel control system as set forth in claim 9, said electrically operated means having a switch means that places said heater across said power source when said electrically operated means is initially energized and said ignition means is not at ignition condition.

11. In a fuel control system as set forth in claim 10, said switch means having means for sensing the condition of said ignition means whereby when said sensing means senses a nonignition condition of said ignition means said switch means is in one position thereof and when said switch means senses an ignition condition of said ignition means said switch means is in another position thereof.

12. In a fuel control system as set forth in claim 11, said switch means when in said one position thereof placing said ignition means and said first coil in parallel relation across said power source.

13. In a fuel control system as set forth in claim 11, said switch means when in said one position thereof placing said first coil and said heater in parallel relation across said power source.

14. In a fuel control system as set forth in claim 11, said switch means when in said other position thereof placing said first and second coils in series across said power source while disconnecting said ignition means from said power source.

15. In a fuel control system as set forth in claim 14, said switch means when in said other position placing said first coil and said heater in parallel relation with said parallel circuit being placed in series with said second coil across said power source.

16. An electrical control system for a fuel-burning apparatus or the like comprising a first solenoid coil for operating a first valve means, a second solenoid coil for operating a second valve means, and electrically operated means operatively interconnected to said coils so that when said electrically operated means is initially energized the same initially energizes said first coil for opening said first valve means while maintaining said second coil in a condition to prevent opening of said second valve means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition is adapted to cause energizing of said second coil to open said second valve means while holding said first valve means in its opened position, said electrically operated means having a time delay means which is adapted to terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having two electrical power source leads and having switch means adapted to place said first coil across said power source leads when said electrically operated means is initially energized to cause opening of said first valve means, said switch means effectively shunting out said second coil from said power source when said switch means initially places said first coil across said power source leads whereby said second valve means remains closed, said switch means being adapted to place said first and second coils in series across said power source leads when said ignition means is subsequently energized to ignition condition whereby said open first valve and second valve means will permit fuel to issue from a burner means of said apparatus and be ignited by said ignition means.

17. An electrical control system for a fuel-burning apparatus or the like comprising a first solenoid coil for operating a first valve means, a second solenoid coil for operating a second valve means, and electrically operated means operatively interconnected to said coils so that when said electrically operated means is initially energized the same initially energizes said first coil for opening said first valve means while maintaining said second coil in a condition to prevent opening of said second valve means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition is adapted to cause energizing of said second coil to open said second valve means while holding said first valve means in its opened position, said electrically operated means having a time delay means which is adapted to terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having two electrical power source leads and having switch means adapted to place said first coil across said power source leads when said electrically operated means is initially energized to cause opening of said first valve means, said switch means effectively shunting out said second coil from said power source when said switch means initially places said first coil across said power source leads whereby said second valve means remains closed, said switch means being adapted to place said first and second coils in series across said power source leads when said ignition means is subsequently energized to ignition condition whereby said open first valve and second valve means will permit fuel to issue from a burner means of said apparatus and be ignited by said ignition means, said switch means being adapted to place said ignition means in parallel with said first coil across said power source leads when said electrically operated means is initially energized and said ignition means is

not at ignition condition.

18. An electrical control system as set forth in claim 17, said switch means disconnecting said ignition means from said power source when said ignition means reaches ignition condition.

19. An electrical control system for a fuel-burning apparatus or the like comprising a first solenoid coil for operating a first valve means, a second solenoid coil for operating a second valve means, and electrically operated means operatively interconnected to said coils so that when said electrically operated means is initially energized the same initially energizes said first coil for opening said first valve means while maintaining said second coil in a condition to prevent opening of said second valve means, said electrically operated means having electrically operated ignition means which when subsequently energized to ignition condition is adapted to cause energizing of said second coil to open said second valve means while holding said first valve means in its opened position, said electrically operated means having a time delay means which is adapted to terminate the operation of said control system if said second valve means is not opened in a predetermined time period after said electrically operated means is initially operated, said electrically operated means having two electrical power source leads, said time delay means comprising an electrical switch for effectively connecting and disconnecting said power source leads to and from said first coil, said electrically operated means being adapted to place said first coil across said power source leads when said electrically operated means is initially energized to cause opening of said first valve means and to start said predetermined time period for said time delay means, said time delay means having an electrical heater for opening said time delay switch when said heater reaches a predetermined temperature, said electrically operated means having a switch means which places said heater across said power source leads when said electrically operated means is initially energized and when said ignition means is not at ignition condition, said switch means having means for sensing the condition of said ignition means whereby when said sensing means senses a nonignition condition of said ignition means said switch means is in one position thereof and when said switch means senses an ignition condition of said ignition means said switch means is in another position thereof.

20. An electrical control system as set forth in claim 19, said switch means when in said one position thereof placing said ignition means and said first coil in parallel relation across said power source leads.

21. An electrical control system as set forth in claim 19, said switch means when in said one position thereof placing said first coil and said heater in parallel relation across said power source leads.

22. An electrical control system as set forth in claim 21, said switch means when in said one position thereof also effectively shunting out said second coil from said power source leads.

23. An electrical control system as set forth in claim 19, said switch means when in said other position thereof placing said first and second coils in series across said power source leads while disconnecting said ignition means from said power source leads.

24. An electrical control system as set forth in claim 22, said switch means when in said other position thereof placing said first coil and said heater in parallel relation with said parallel circuit being placed in series with said second coil across said power source leads.