Dec. 18, 1951 C. M. MAYER 2,578,718

OVEN BURNER IGNITION AND CONTROL MECHANISM

Filed Dec. 11, 1950 3 Sheets-Sheet 1

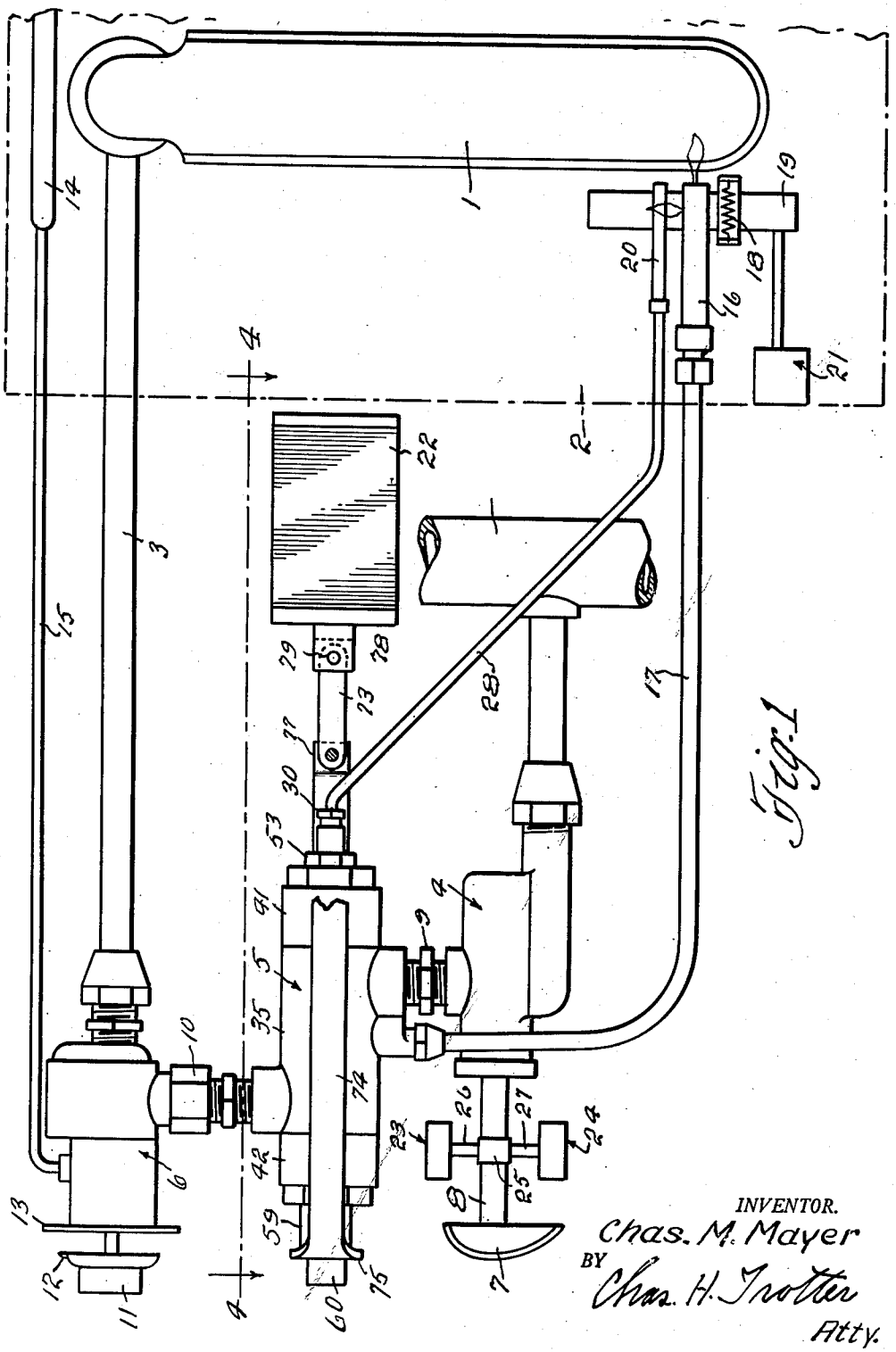


Fig. 1

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Filed Dec. 11, 1950 3 Sheets-Sheet 2

Fig. 2

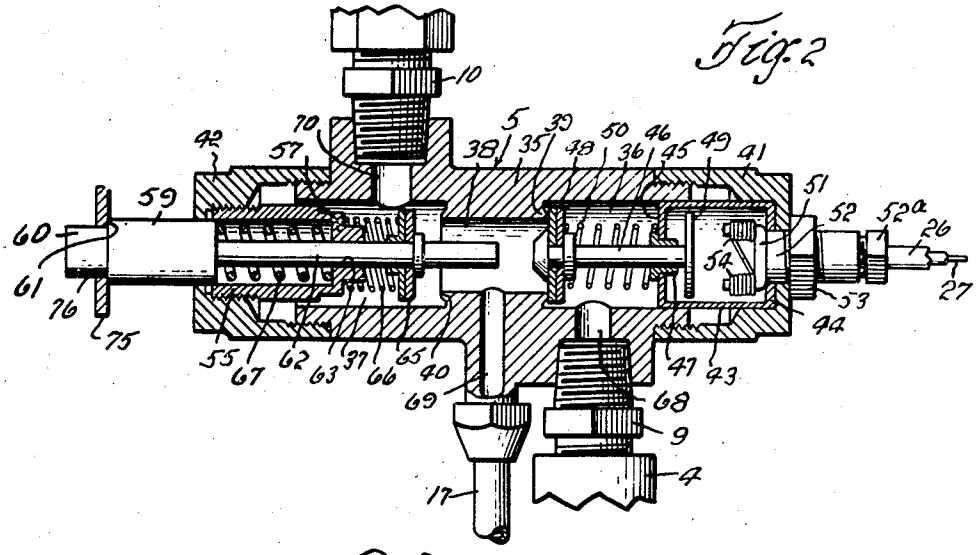
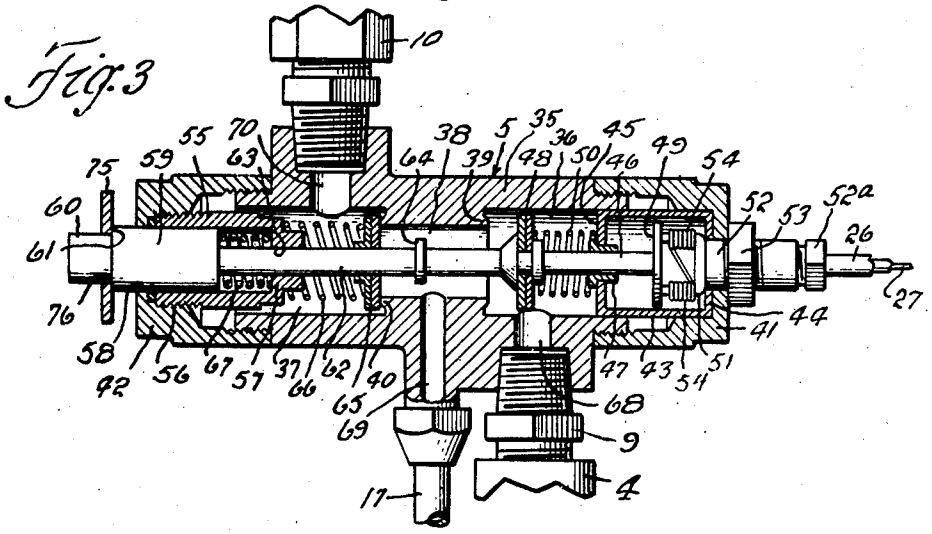



Fig. 3



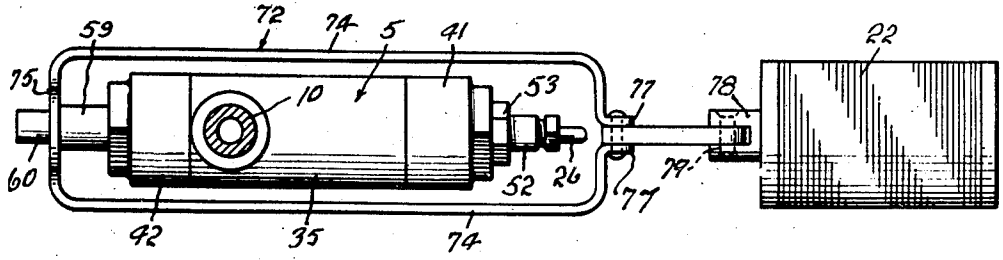



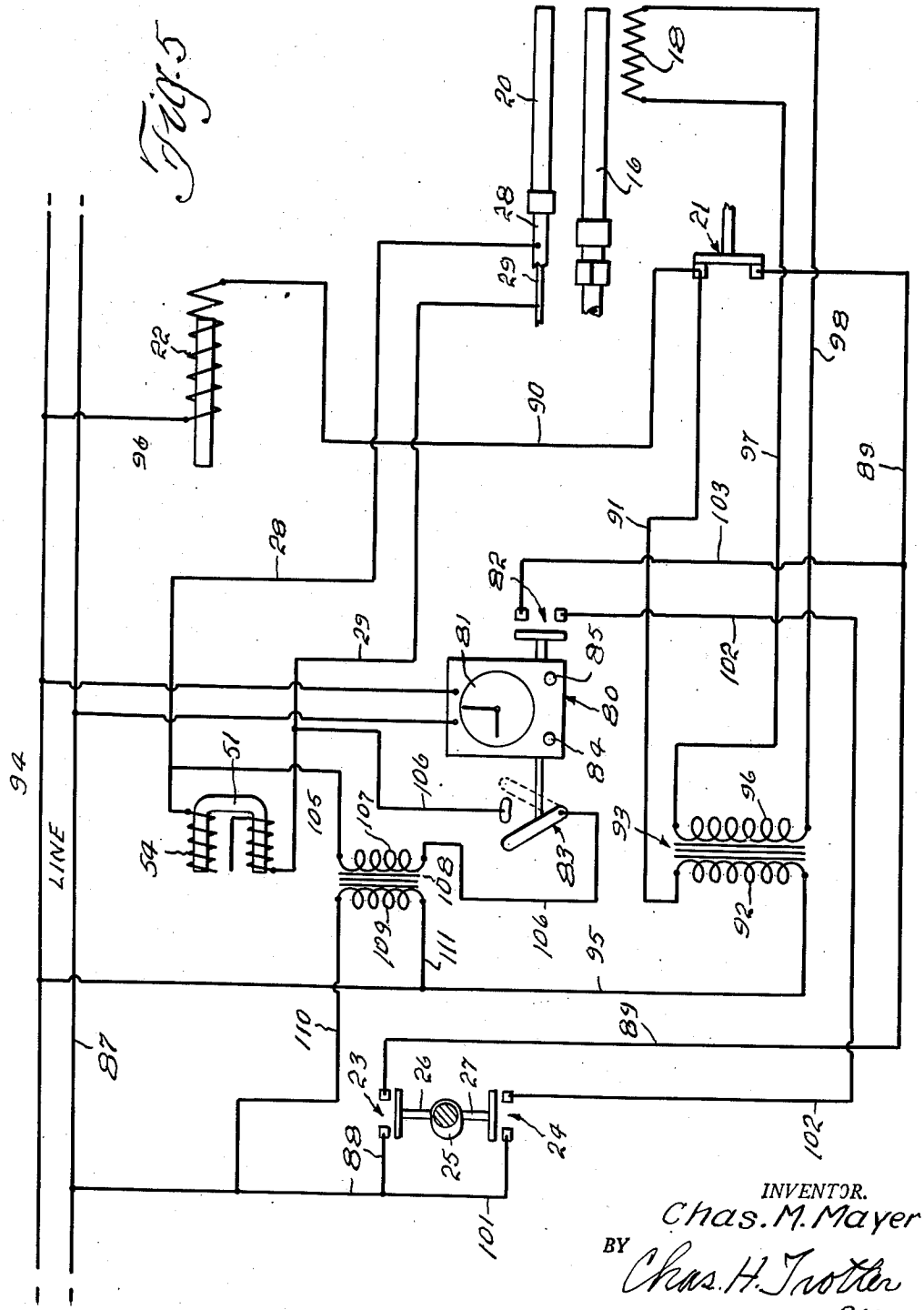

Fig. 4

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# UNITED STATES PATENT OFFICE

2,578,718

## OVEN BURNER IGNITION AND CONTROL MECHANISM

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Application December 11, 1950, Serial No. 200,204

6 Claims. (Cl. 161—9)

1

This invention relates to an automatic ignition and control mechanism for igniting and controlling the operation of cooking range ovens, and is a modification of the mechanisms disclosed in the copending applications of John M. Hoff and myself, Serial No. 153,664 and Serial No. 163,764, filed April 3, 1950 and May 23, 1950, respectively. It is especially designed for use with a clock actuated time control mechanism which automatically effects the turning on and off of the oven burner at predetermined set times, but is also arranged to be used independently of the time control mechanism in which case the oven burner is manually turned on and off as desired.

The mechanism is designed for use with a main gaseous fuel burner and includes a gaseous fuel pilot burner by which the main burner is ignited. The mechanism is so constructed and arranged that the main burner is under the control of the pilot burner at all times. The pilot burner must be ignited in order for gas to be supplied to the main burner. Should the pilot burner be extinguished for any reason during operation the supply of gas to the main burner will be promptly cut off, and it cannot again be supplied until the pilot burner has been re-ignited. This arrangement provides a safety feature which prevents the accumulation of unburned gas in an oven which may violently explode when an attempt is made to light either the main or pilot burner. It has been found by experience that both the main burner and the pilot burner in cooking range ovens are frequently extinguished during use for some reason or other without being turned off. This is sometimes due to a momentary gas failure or to the slamming of the oven door or to various other causes.

The mechanism includes in addition to the pilot burner a manually operable main control valve, a safety control valve mechanism, a thermostatically operated oven temperature control valve, a solenoid by which the safety control valve mechanism is initially set in condition to supply gas to the pilot burner, an electric ignition element by which the pilot burner is ignited, a pair of normally open manually operable switches, a normally closed switch which is adapted to be opened by a thermostatic element mounted in position to be heated by the pilot burner, a clock operated switch and an electric circuit which includes the aforesaid switches, the electric ignition element and the solenoid.

The main control valve is a standard cut-off valve having one closed or off position and two open or on positions. When this valve is turned

2

to one on position the mechanism is set for manual control of the cooking time, and when it is turned to the other on position the cooking time is automatically controlled by the time control mechanism. In operation gas flows from the supply manifold through the main control valve and into the safety control mechanism. From the safety control mechanism the gas flows through one conduit to the pilot burner and through another conduit to the oven temperature control valve and from there to the main burner.

The safety control mechanism comprises a casing having a gas inlet port, a pair of gas outlet ports, one to the pilot burner and one to the main burner, a pair of valves and an electromagnet which is energized by a thermocouple which is mounted in position to be heated by the pilot burner. One of the valves is normally closed and is operative in closed position to cut off the flow of gas to both the pilot burner and the main burner; and the other valve is normally open and is operative when in closed position to cut off the flow of gas to the main burner while permitting gas to flow to the pilot burner. The solenoid is operative when energized to simultaneously close the normally open valve and to open the normally closed valve; and the electromagnet is operative when energized to maintain the normally closed valve open after the solenoid has been de-energized. The two normally open switches are operatively associated with the main control valve and are arranged to be closed by the opening of the main control valve and to be opened by the closing of the valve. One of the switches is actuated when the control valve is turned to and from one of its open positions and the other switch is actuated when the control valve is turned to and from the other of its open positions.

To initiate operation of the main burner under manual control of the cooking time, the main control valve is turned to the proper open position which closes the associated normally open switch. The closing of this switch effects the energization of the electric ignition element and the solenoid. The solenoid then simultaneously closes the normally open valve in the safety control mechanism and opens the normally closed valve. Gas can then flow to the pilot burner but it cannot flow to the main burner. The pilot burner is then ignited by the electric ignition element and projects a flame against and heats both the thermocouple and the thermostatic element. The heating of the thermocouple gen-

erates a minute current of the order of .009 to .017 volt which energizes the electromagnet sufficiently for it to hold the normally closed valve in open position after the solenoid is de-energized, but not enough for the electromagnet to shift the normally closed valve from closed to open position. The heating of the thermostatic element will open the normally closed switch which will break the circuit to and de-energize the electric ignition element and the solenoid. The normally open valve of the safety control mechanism will then return to open position and the electromagnet will hold the normally closed valve open. Gas can then flow to the main burner where it is ignited by the pilot burner. The main burner will then operate under control of the oven temperature control valve as long as the main control valve is open and the pilot burner is ignited and heating the thermocouple and thermostatic element. If the pilot burner is extinguished for any reason during operation the thermocouple and the thermostatic element will immediately cool. The cooling of the thermocouple will de-energize the electromagnet which will release the normally closed valve which will then return to its closed position and cut off the flow of gas to both the pilot burner and the main burner. The cooling of the thermostatic element will close the normally closed switch will then effect re-energization of the solenoid and the electric ignition element. The solenoid will then open the normally closed valve and close the normally open valve, thus supplying gas to the pilot burner only. If the pilot burner is then re-ignited it will re-heat the thermostatic element and the thermocouple, thus re-initiating operation after which the mechanism will operate as described. To terminate operation the main control valve is manually closed.

For automatic operation I provide a clock actuated time control mechanism which may be set to initiate operation of the main burner at a predetermined set time and to terminate operation thereof at a predetermined set later time. The time control mechanism includes a normally open switch which is in series with the thermostatically operated normally closed switch and one of normally open switches associated with the main control valve. For automatic operation the time control is set to initiate operation at the desired time and to terminate operation at the desired later time and then the main control valve is turned to the proper open or on position which closes the normally open switch associated therewith. At the set time the time control mechanism will automatically close its normally open switch which will effect energization of the solenoid and the electric ignition element after which the mechanism will function exactly the same as with manual control until time to terminate operation. To terminate automatic operation I provide a quinching circuit which is hooked into the circuit between the thermocouple and the electromagnet. In the quinching circuit is a normally open switch which is adapted to be momentarily closed at a set time by the time control mechanism. When this switch is closed it establishes the quinching circuit which then damps out the current flowing from the thermocouple to the electromagnet and de-energizes the electromagnet. The electromagnet then releases the normally closed switch of the safety control mechanism which returns to its closed position and cuts off the flow of gas to both the pilot burner and the main burner, thus terminating operation.

The principal object of the invention is to provide an improved automatic ignition and control mechanism for igniting and controlling the operation of cooking range ovens.

Another object of the invention is to provide a control mechanism of the character described which may be used in conjunction with a clock actuated time control mechanism or independently thereof as desired.

Other and more limited objects of the invention will be apparent from the following specification and the accompanying drawings forming a part thereof wherein:

Fig. 1 is a diagrammatic layout illustrating my improved automatic ignition and control mechanism applied to a cooking range oven burner using gaseous fuel;

Fig. 2 is an enlarged central longitudinal vertical section through the safety control mechanism showing the various parts in the positions they assume when the oven burner is turned off;

Fig. 3 is a view similar to Fig. 2 showing the various parts in the positions they are automatically moved to when the main control valve is first turned on to initiate the operation of the main oven burner;

Fig. 4 is a horizontal section, taken on the line 4—4 of Fig. 1; and

Fig. 5 is a wiring diagram of the mechanism.

Referring now to the drawings by reference characters, the numeral 1 indicates a gaseous fuel burner which is mounted in or in heating relation to a cooking range oven 2. Gaseous fuel is supplied to the burner 1 from a manifold M through a conduit 3. Interposed in the conduit 3 are a main control valve 4, a safety control mechanism generally indicated by the numeral 5, and an oven temperature control valve 6. The main control valve 4 is a cut-off valve of standard construction having one closed or off position and two open or on positions. In either of the open positions it permits the flow of gas from the manifold M to the burner 1, and in the closed position it completely cuts off the flow of gas from the manifold M. In one open position of the main control valve 4 the mechanism is set for manual control and in the other open position the mechanism is set for automatic control. This valve is manually opened and closed by a handle 7 and a valve stem 8, and directly controls the operation of the entire apparatus in that it initiates the operation of the entire apparatus when it is turned to either of the on positions and terminates the operation when it is turned to the off position. From the main control valve 4 gas flows through a connector 9 to the safety control mechanism 5, to be described in detail hereinafter. From the safety control mechanism 5 the gas flows through a connector 10, the oven temperature control valve 6 and the conduit 3 to the burner 1. The oven temperature control valve 6 is operative to regulate the amount of gas flowing to the burner 1 in order to maintain the oven at any desired set temperature. The valve 6 is set to any desired temperature by a handle 11 having a pointer 12 which cooperates with a graduated dial 13 carried by the valve 6. The valve 6 is controlled according to the temperature setting by a thermostatic element 14 which is mounted in the oven 2 and is connected to the valve 6 as shown at 15.

The oven temperature control valve 6 is of standard well known construction. Consequently it is not shown in detail herein. There are many different constructions available, any one of which will work equaly well herein. Gas is also supplied to a pilot burner 16 through a branch conduit 17 which extends between the safety control mechanism and the pilot burner 16. The pilot burner 16 is disposed adjacent one end of the main burner 1 in position to ignite the burner 1 when gas is supplied thereto. An electrical ignition element 18 is operatively associated with the pilot burner 16 in position to ignite the pilot burner 16 when gas is supplied thereto. A thermostatic element 19 and a thermocouple 20 are mounted in position to be heated by a flame from the pilot burner. The thermostatic element 19 is operative to open and close a switch 21 which controls the energization of the electrical ignition element 18 and a solenoid 22 which when energized operates the safety control mechanism to supply gas to the pilot burner 16, as will be described in connection with the description of the safety control mechanism and the operation of the whole apparatus. The thermocouple 20 when heated is operative to hold the safety control mechanism in condition to maintain the supply of gas to both the pilot burner 16 and the main burner 1, as will also be described in connection with the description of the safety control mechanism and the operation of the apparatus.

A pair of normally open master switches 23 and 24 are operatively associated with the valve stem 8 of the main control valve 4 and are adapted to be closed and opened by the opening and closing of the valve 4. As the valve stem 8 is turned in a clockwise direction to set the valve in one open position the switch 23 is closed by a cam 25 on the valve stem 8 through a link 26; and when the valve stem 8 is rotated in a counterclockwise direction to set the valve 4 in its other open position, the switch 24 is closed by the cam 25 through a link 27. Conversely when the valve 4 is turned from either open position to the closed position the closed switch 23 or 24 will be opened.

The construction of the safety control valve mechanism 5 and its connection to the solenoid 22 will now be described, reference being had to Figs. 2, 3 and 4 of the drawing. This mechanism comprises a casing 35 having a chamber 36 in one end thereof and a chamber 37 in the other end thereof. The chambers 36 and 37 are connected by a bore 38 of reduced diameter. A valve seat 39 is located at one end of the bore 38 and a similar valve seat 40 is located at the other end of the bore 38. The chamber 36 is closed by a removable cap 41 and the chamber 37 is closed by a removable cap 42. A sleeve 43, having end walls 44 and 45, is carried by the cap 41 and extends into the chamber 36. A valve stem 46 which is slidably mounted in a bushing 47 carried by the end wall 45 of the sleeve 43, extends from the chamber 36 into the sleeve 43. A valve disc 48 of suitable material is secured to one end of the valve stem 46 within the chamber 36, and a metal disc 49 is secured to the other end of the stem 46 within the sleeve 43. A spring 50 disposed about the valve stem 46 between the valve disc 48 and the end wall 45 of the sleeve 43 normally holds the valve disc 48 against the valve seat 39. An electromagnet 51 is secured to one end of a hollow exteriorly threaded stud 52 which extends out through aligned apertures in the end wall 44 of the sleeve 43, and in the end of the cap 41. A nut 53 screwed onto the outer portion of the stud 52 securely holds the magnet 51 and the sleeve 43 in place. The legs of the electromagnet 51 have a winding 54 thereon, one end of which is connected to a copper tube 28 which extends between the thermocouple 20 and the safety control 5, and the other end of which is connected to an insulated wire 29 within the tube 28. The tube 28 and the wire 29 therein establish an electric circuit between the thermocouple 20 and the winding 54 of the electromagnet 51. The tube 28 is inserted into the hollow stud 52 and is held in place by a screw fitting 30. A sleeve 55 is screwed into a threaded recess in the end of the cap 42, as indicated at 56, and extends into the chamber 37 a slight distance. One end of the sleeve 55 is closed by an end wall 57, and the other end which is open registers with a circular aperture 58 in the end wall of the cap 42. A plug 59 is slidably mounted in the sleeve 55 and extends out through the aperture 58 in the cap 42. The outer end of the plug 59 has a reduced extension 60 formed integral therewith, providing an annular shoulder 61 around the extension 60 at the outer end of the plug 59. A stem 62 which is secured to the inner end of the plug 59 extends out through an aperture 63, in the end wall 57 of the sleeve 55, and through the chamber 37 and into the bore 38. The stem 62 has a collar 64 rigidly secured thereon between the end wall 57 and the outer end of the stem. A valve disc 65 of suitable material is slidably mounted upon the stem 62 between the end wall 57 of the sleeve 55 and the collar 64. The valve disc 65 is adapted to engage the valve seat 40 to cut off the flow of gas into the chamber 37 during the initiation of operation, as will be hereinafter described. A compression spring 66, disposed about the stem 62 between the end wall 57 and the valve disc 65, normally yieldingly holds the valve disc 65 against the collar 64. A compression spring 67 which is stronger than the spring 66 is disposed about the stem 62 within the sleeve 55 between the inner face of the end wall 57 and the inner end of the plug 59. The spring 67 is operative to return the plug 59, stem 62 and valve disc 65 from the position shown in Fig. 3 back to their normal position as shown in Fig. 2, against the resistance of the spring 66. A port 68 in the casing 35 provides communication between the chamber 36 and the connector 9 to allow gas to flow from the main control valve 4 through the connector 9 and into the chamber 36. During normal operation of the main burner 1 gas flows from the chamber 36 through the reduced intermediate bore 38 and into the chamber 37. A port 69 which establishes communication between the conduit 17 and the bore 38 is provided to supply gas to the pilot burner 16; and a port 70 establishes communication between the chamber 37 and the connector 10 to permit the flow of gas from the chamber 37 to the main burner 1 through the oven temperature control valve 6 and the conduit 3.

The safety control valve mechanism 5 is operatively connected to the solenoid 22 by a yoke 72 and a link 73. The yoke 72 which encompasses the safety control valve mechanism 5 as shown in Fig. 4 comprises a pair of spaced parallel arms 74 which are connected together at one end by a bridge 75. The bridge 75 has an aperture 76 therein through which the reduced end 60 of the plug 59 extends with the inner face

of the bridge engaging the shoulder 61 between the plug 59 and the reduced extension 60 thereof. The other ends of the arms 74 terminate in a pair of spaced parallel ears 77 to and between which one end of the link 73 is pivotally connected. The other end of the link 73 is pivotally connected to the movable core 78 of the solenoid 22 as indicated at 79.

In order to accommodate the mechanism for automatic control I provide a clock operated time control mechanism 80 of standard construction which comprises a clock 81 and a pair of normally open switches 82 and 83 which are adapted to be automatically closed and opened at predetermined times according to the setting of the clock 81, which may be set as desired by the buttons 84 and 85. The switch 82 is disposed in series with the switches 24 and 21 and is operative when closed to initiate and maintain operation of the main burner 1. The switch 83 is adapted to be momentarily closed simultaneously with the opening of the switch 82 and is operative when closed to terminate operation of the main burner 1.

The operation of the apparatus independently of the time control mechanism will now be described in connection with Fig. 5. To initiate the operation of the oven burner 1 it is only necessary to set the oven temperature control valve 6 to the desired temperature and to manually turn the main control valve 4 clockwise from the off position to one on position. After that the ignition and operation of the burner are automatically controlled until the operation of the burner is terminated by manually turning the main control valve 4 from the on position to the off position. As the main control valve 4 is turned from the off position to the on position the master switch 23 is closed by the cam 25 and link 26. After the main control valve has been opened gas can flow from the manifold M through the main control valve 4 and into the chamber 36 of the safety control valve mechanism 5, the various parts of which are in the position shown in Fig. 2. But the gas can go no farther since the valve disc 48 is being held against the valve seat 39 by the spring 50, thus closing the only exit from the chamber 36. As soon as the switch 23 is closed current flows from the positive side 87 of the line through the lead 88 to the switch 23. From the switch 23 the current flows through the lead 89 to the switch 21 and from the switch 21 through the lead 90 to the solenoid 22, and through the lead 91 to one side of the primary winding 92 of a transformer 93. The other side of the winding 92 is connected to the negative side 94 of the line by the lead 95. From the solenoid 22 the current flows through the lead 96 to the negative side 94 of the line. The electric ignition element 18 is connected to the secondary winding 96 of the transformer 93 by the leads 97 and 98. The electric ignition element 18 and the solenoid 22 are now both energized. The energizing of the ignition element 18 renders it operable to ignite the pilot burner 16 as soon as gas is supplied thereto, and the energization of the solenoid 22 causes it, through the line 73 and yoke 72, to shift the various parts of the safety control mechanism from the position shown in Fig. 2 to the position shown in Fig. 3. In this position the valve disc 48 is held away from the valve seat 39 and the metal disc 49 is held against the ends of the legs of the magnet 51 by the stem 62 acting against the resistance of the spring 50. This allows gas to flow from the chamber 36 into the bore 38 and thence through the port 69 and conduit 17 to the pilot burner 16 where it is ignited by the ignition element 18. But the gas cannot yet flow to the main burner 1 since the valve disc 65 is being held against the seat 40 by the spring 66 which cuts off communication between the bore 38 and the chamber 37. As soon as the pilot burner 16 is ignited it projects a flame against and heats both the thermocouple 20 and the thermostatic element 19. The heating of the thermocouple 20 generates a minute current of the order of .009 to .017 volt which energizes the electromagnet 51 sufficiently for it to hold the metal disc 49 and the stem 46 and valve disc 48 secured thereto in the position shown in Fig. 3 against the pressure of the spring 50 after the disc 49 has been moved into engagement with the magnet 51 by the solenoid 22. But the magnet 51 when energized by the thermocouple 20 is not strong enough to attract and withdraw the metal disc 49, and the stem 46 and valve disc 48 secured thereto, from the position shown in Fig. 2 to the position shown in Fig. 3. It can only hold these parts in this position after they have been moved thereto by the solenoid 22 through the medium of the link 73, yoke 72, plunger 59 and stem 62. The electric circuit between the thermocouple 20 and the winding 54 of the magnet 51 is through the copper tube 28 and the wire 29. This circuit will be maintained as long as the thermocouple is heated. After the thermostatic element 19 has been heated sufficiently, which is after the thermocouple has energized the magnet 51, it will open the normally closed switch 21, breaking the circuit to and de-energizing both the ignition element 18 and the solenoid 22. After the pilot burner has been ignited there is no further need to maintain the ignition element energized. As soon as the solenoid 22 is de-energized the spring 67 will return the plunger 59, stem 62 and valve disc 65 back from the position shown in Fig. 3 to the position shown in Fig. 2 against a pressure of the spring 66. The valve disc 48 will be held in the position shown in Fig. 3 by the magnet 51. Communication is then established between the chamber 36 and 37 through the bore 38. Gas will then flow from the chamber 36 into the chamber 37 through the bore 38. From the chamber 37 gas will flow through the oven temperature control valve 6 and conduit 3 to the main burner 1 where it will be ignited by the pilot burner 16. The apparatus is now operating normally, and in the absence of any abnormal conditions it will continue to do so provided the pilot burner remains ignited, until the supply of gas to both the pilot burner and the main burner is cut off by the manual closing of the main control valve 4.

In the event the pilot burner 16 is extinguished for any reason during operation, the thermocouple 20 will cool in a few seconds and de-energize the magnet 51. The de-energizing of the magnet 51 will allow the spring 50 to move the valve disc 48 back into engagement with the valve seat 39, as shown in Fig. 2, which will cut off the flow of gas from the chamber 36 into the bore 38 and chamber 37, and from them to the pilot light 16 and the main burner 1. The burner 1 will then be extinguished along with the pilot burner. As soon as the thermostatic element 19 cools it will close the switch 21 which will energize both the ignition element 18 and the solenoid 22, as previously described, since the main control valve 4 is still open and the switch 23 is closed. The pilot

burner 16 will then be re-ignited and the rest of the apparatus will again function as described, provided there is gas available. If no gas is available everything will remain in condition to ignite the pilot burner and re-initiate operation as soon as gas is again available. In the event of either a momentary or prolonged power failure during operation, the apparatus will continue to operate normally until terminated by the manual closing of the main control valve, provided of course that all other conditions are normal. In order to operate the apparatus during a prolonged power failure which occurred prior to operation, it is only necessary to hold a match to the pilot burner 16 and manually move the plunger 59 from the position shown in Fig. 2 to the position shown in Fig. 3 and hold it in this position a sufficient time for the thermocouple 20 to become heated, after which the plunger 59 may be released and allowed to be returned to its initial position by the spring 67. The apparatus will then continue to function normally as described, under the control of the pilot burner 16 and the oven temperature control valve 6.

When the apparatus is used in conjunction with the time control mechanism 80 the time control mechanism is set to initiate operation of the main burner 1 at a predetermined time and to terminate operation thereof at a predetermined later time. The setting of the time control mechanism 80 opens the switches 82 and 83, as shown in Fig. 5. Operating current is supplied to the time control mechanism from the line 87—94 by the leads 99 and 100. After the time control mechanism has been set the main control valve 4 is manually opened in a counterclockwise direction which close the master switch 24. Then at the predetermined set time the time control mechanism will close the switch 82. Current will then flow from positive side 87 of the line through the leads 88 and 101 to the switch 24. From the switch 24 the current will flow through the lead 102 to the switch 82 and from the switch 82 to the normally closed switch 21 through the leads 103 and 89. From the switch 21 the current will flow back to the negative side 94 of the line and energize the electric ignition element 19 and solenoid 22, as previously described. The main burner 1 will then operate under the control of the pilot burner 16 and oven temperature control valve 6, as previously described, until its operation is terminated by the simultaneous opening of the switch 82 and the momentary closing of the switch 83 by the clock 81.

The switch 83 is interposed in a quinching circuit which includes the leads 105 and 106 and the secondary winding 107 of a transformer 108, the primary winding 109 of which is connected to the line 87—94 by the leads 110 and 111. One end of the lead 105 is connected to the tube 28 in the thermocouple circuit and the other end thereof is connected to one side of the secondary winding 107; and one end of the lead 106 is connected to the wire 29 of the thermocouple circuit and the other end thereof is connected to the other side of the secondary winding 107. When the switch 83 is closed the current in the quinching circuit will damp out the thermocouple circuit and de-energize the electromagnet 51. The electromagnet 51 will then release the valve 46 and it will be closed by the spring 50, cutting off the flow of gas to both the main burner and the pilot burner and terminating operation. The thermostatic element will then cool and close the switch 21, setting the mechanism in condition for future use. After the main and pilot burners have been extinguished in this manner they cannot be automatically re-ignited, as in the case of the accidental extinguishment of the pilot burner, due to the fact that the switch 82 is being held open by the time control mechanism. After operation has been automatically terminated by the time control mechanism the main control valve may be manually turned off at any time.

From the foregoing it will be apparent to those skilled in this art that I have provided a very simple and efficient mechanism for accomplishing the objects of the invention.

It is to be understood that I am not limited to the specific construction shown and described as various modifications can be made thereto within the scope of the appended claims.

What is claimed is:

1. In an automatic ignition and control apparatus of the character described, the combination of a main burner, a pilot burner by which said main burner is ignited, a conduit through which gas is supplied to said main burner, a branch conduit through which gas is supplied to said pilot burner, a normally closed valve interposed in said conduit and operative when closed to cut off the flow of gas through said conduit and said branch conduit, a solenoid operative when energized to move said valve to open position, an electromagnet operative when energized to hold said valve in open position after said solenoid has been de-energized, a thermocouple mounted in position to be heated by said pilot burner, a thermocouple circuit between said thermocouple and said electromagnet, said thermocouple being operative when heated to energize said electromagnet through said thermocouple circuit, a quinching circuit hooked into said thermocouple circuit, a normally open switch in said quinching circuit, and a time control mechanism operative to close said switch at a predetermined set time, said quinching circuit being operative when said switch is closed to damp out said thermocouple circuit and de-energize said electromagnet.

2. In a burner control apparatus of the character described, the combination of a main burner, a pilot burner by which said main burner is ignited, a conduit through which gaseous fuel is supplied to said main burner, a safety control mechanism operative to control the supply of fuel to said main burner interposed in said conduit, a solenoid and operative connections between said solenoid and said safety control valve mechanism, a thermocouple disposed adjacent said pilot burner in position to be heated thereby, a thermocouple circuit between said thermocouple and said safety control mechanism, said solenoid being operative when energized to set said safety control valve mechanism in condition to supply fuel to said main burner and said thermocouple being operative through said thermocouple circuit when heated to maintain said safety control mechanism in said set condition, means operable to control the energization of said solenoid, a quinching circuit hooked into said thermocouple circuit, a normally open switch in said circuit, a time control mechanism, operative connections between said time control mechanism and said means by which said means is actuated at a predetermined time by said time control mechanism to energize said solenoid, operative connections between said switch and said time control mechanism by which said switch is closed at a predetermined time by said time control mechanism, said quinching circuit being opera-

tive when said switch is closed to damp out said thermocouple circuit and render said thermocouple ineffective to maintain said safety control mechanism in said set condition.

3. In a burner control apparatus of the character described, the combination of a main burner, a pilot burner by which said main burner is ignited, a conduit through which gaseous fuel is supplied to said main burner, a safety control mechanism operative to control the supply of fuel to said main burner interposed in said conduit, a solenoid and operative connections between said solenoid and said safety control mechanism, an electromagnet incorporated in said safety control valve mechanism, a thermocouple disposed adjacent said pilot burner in position to be heated thereby and an electric circuit between said thermocouple and said electromagnet, said solenoid being operative when energized to set said safety control valve mechanism in condition to supply fuel to said main burner, said electromagnet being operative when energized to maintain said safety control valve mechanism in said set condition and said thermocouple being operative to energize said electromagnet, means operable to control the energization of said solenoid, a quinching circuit hooked into said electric circuit, a normally open switch in said quinching circuit, a time control mechanism, operative connection between said time control mechanism and said means by which said means is actuated at a predetermined set time by said time control mechanism to energize said solenoid, operative connections between said switch and said time control mechanism by which said switch is closed at a predetermined set time by said time control mechanism, said quinching circuit being operative when said switch is closed to damp out said electric circuit and render said thermocouple ineffective to energize said electromagnet.

4. In a burner control apparatus of the character described, the combination of a main burner, a pilot burner by which said main burner is ignited, a conduit through which gaseous fuel is supplied to said main burner, a safety control mechanism operative to control the supply of fuel to said main burner interposed in said conduit, a solenoid and operative connections between said solenoid and said safety control mechanism, an electromagnet incorporated in said safety control mechanism, said solenoid being operative when energized to set said safety control mechanism in condition to supply fuel to said main burner and said electromagnet being operative when energized to maintain said safety control valve mechanism in said set condition, means operable to control the energization of said solenoid, an electric circuit operative to energize said electromagnet, a quinching circuit hooked into said electric circuit, a normally open switch in said quinching circuit, a time control mechanism, operative connections between said time control mechanism and said means by which said means is actuated at a predetermined set time by said time control mechanism to energize said solenoid, operative connections between said time control mechanism and said switch by which said switch is closed at a predetermined set time by said time control mechanism, said quinching circuit being operative when said switch is closed to damp out said electric circuit and de-energize said electromagnet.

5. The burner control apparatus as set forth in claim 4 in which said means includes a normally open switch and a normally closed switch disposed in series with each other.

6. The burner control apparatus as set forth in claim 5 in which said normally closed switch is operatively connected to a thermostatic element for actuation thereby, and said thermostatic element being disposed adjacent said pilot burner in position to be heated thereby.

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No references cited.