April 21, 1953 G. KLEIN 2,635,683

AUTOMATIC OVEN FOR GAS BURNING STOVES

Filed Sept. 29, 1948

Fig. 1.

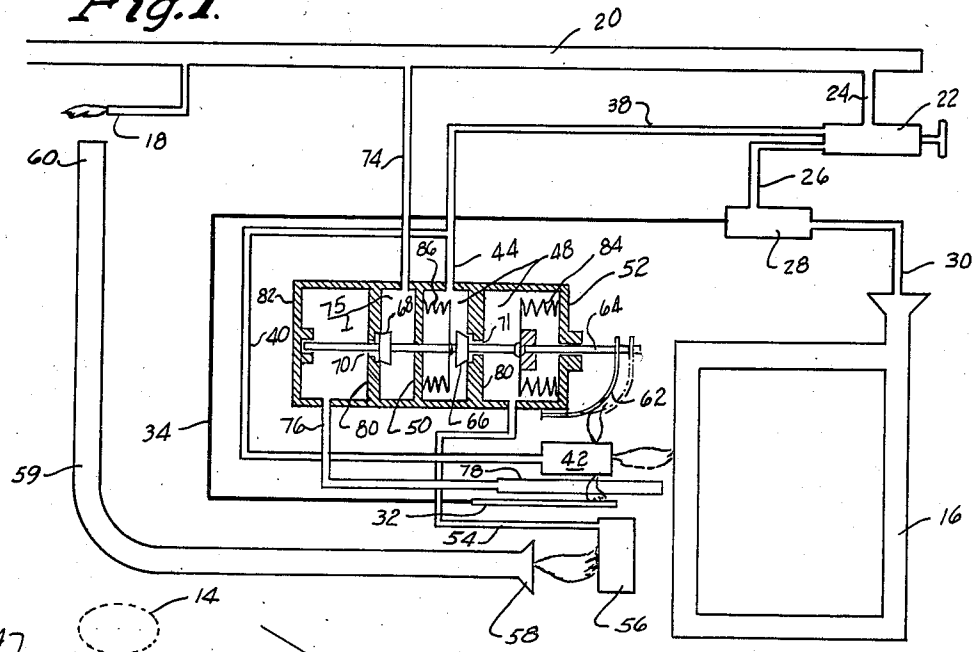
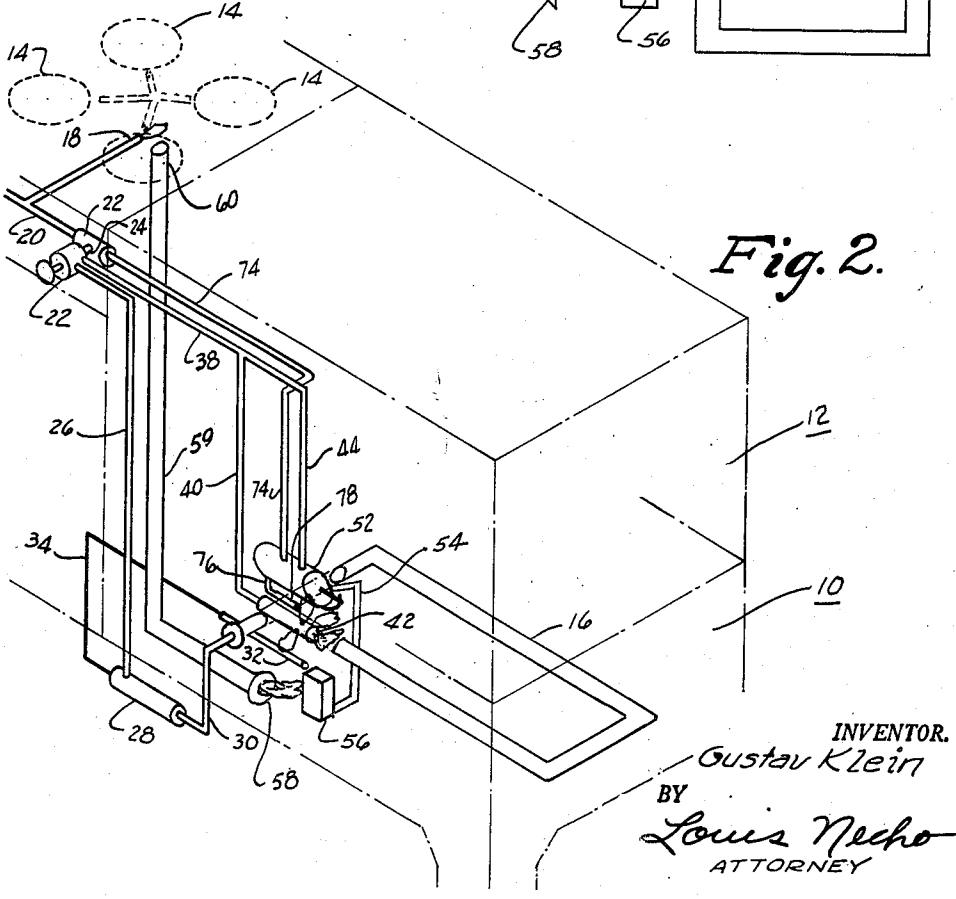


Fig. 2.



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Patented Apr. 21, 1953 2,635,683

UNITED STATES PATENT OFFICE

2,635,683

AUTOMATIC OVEN FOR GAS BURNING STOVES

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Application September 29, 1948, Serial No. 51,741

3 Claims. (Cl. 158—133)

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Gas burning cooking stoves usually have a plurality of top surface burners, an oven or broiler compartment, a burner for heating said compartment and a continuously burning pilot burner for automatically igniting said top burners by means of the usual flash tube. In a stove of this type, it is desirable that the oven or broiler burner, also, be ignited automatically when the gas is turned on. This can be done by providing a second flash tube leading from a point near the oven burner to a point near the conventional, continuously burning pilot burner which ignites the top surface burners of the stove. A conventional flash tube arrangement works satisfactorily in connection with the open, or unconfined top surface burners but it is not entirely satisfactory for use in connection with an oven or broiler burner. This is due to the fact that a relatively large volume of gas is discharged into the flash tube before the gas will reach the pilot burner on the top of the stove. This is true in all cases, but more so when relatively heavy gases or mixtures of gases are used.

This difficulty can be overcome by allowing the pilot burner in the vicinity of the oven burner to burn continuously but, due to the large gas consumption entailed, and due to the heat and odors generated, particularly when certain gases or mixtures of gases are used, this arrangement, too, is not entirely satisfactory. Also, if such a pilot burner should go out, there will be an accumulation of gas in a confined space with the attendant danger of explosion.

To overcome this difficulty, heat responsive devices can be used to turn off the flow of gas to the oven burner pilot burner after the oven burner is turned off, or after the burner has been ignited, or both, but even then there will still be danger of explosion if the gas is turned on and off rapidly or before the heat responsive devices have had time to reset themselves or to recycle.

According to my invention, I provide the usual pilot and flash tube for initially igniting the oven burner, a relatively small pilot burner in the vicinity of the oven burner, means for shutting the flow of gas to the flash tube when the oven burner is ignited and control devices for causing the small pilot burner to burn continuously as long as the oven burner is ignited and for a predetermined period of time after the oven burner has been turned off, said period of time being enough to allow the control devices to reset themselves or recycle.

The nature of the invention and its advantages will be understood from the following specification and the accompanying drawings in which

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Fig. 1 is a schematic view of one embodiment of the invention.

Fig. 2 is a schematic view showing the relation of the parts to a burner located in the broiler compartment of a conventional cooking stove.

In the drawings I have shown only that much of the structure of a cooking stove as is absolutely necessary for proper illustration of the invention. For this purpose, there is shown a broiler compartment 10, an oven compartment 12 thereabove, top surface burners 14, a burner 16 in the broiler compartment, a pilot burner 18 for automatically igniting the top burners 14, and a gas main 20 for supplying gas to the burners 14 and 16 and to the pilot burner 18.

The flow of gas from the gas main 20 to the burner 16 is controlled by a conventional combined valve and heat control device 22, which is connected by a pipe 24 to the gas main 20. The device 22 is capable of shutting off the flow of gas completely or of allowing gas to flow in controlled quantities.

According to my invention, the valve and heat control device 22 is connected by a pipe 26 to a valve 28, which, in turn, is connected by a pipe 30 to the burner 16. The valve 28 is so constructed that it normally assumes a closed position and is adapted to open and permit gas to flow to the burner 16 only under specified conditions. For the purposes of this invention, the valve 28 can be assumed to be controlled by a solenoid which acts to open the valve 28 when energized by electric current generated by a thermocouple 32 which is connected to the solenoid by a circuit 34. Alternately, the valve 28 can be operated by fluid pressure generated in response to the heating of a bulb (replacing the thermocouple) connected by a pipe (replacing the wire 34) to a diaphragm (replacing the solenoid). In any event, devices for performing the function of the valve 28, namely allowing gas to flow therethru to the burner 16 only when the temperature in the vicinity of the burner has reached a predetermined value, are available on the market and therefore need not be shown or described in detail.

The valve and heat control device 22 is also connected, by means of pipes 38 and 40 to a tipple ported pilot burner 42 and by means of a branch 44 to a compartment 48 which is formed in a casing 52. From the compartment 48 a pipe 54 leads to a pilot burner 56 located near one end 58 of a flash tube 59 the other end 60 of which is near the pilot burner 18 which is used for igniting the top burners 14.

Disposed near the upwardly pointing flame of

the pilot 42 is a bimetallic element 62 which is adapted to move a rod 64 which carries a valve closure 66 adapted to close or open a passage 71 to prevent or permit gas to flow from pipe 44, through compartment 48 to pipe 54 and pilot burner 56.

In order to provide a pilot burner, which is independent of the heat control device 22, I use a pipe 74 leading from the gas main 20 to another compartment 75 formed in another portion of the casing 52, and a pipe 76 leading from the compartment 75 to a pilot burner 78 disposed near the burner 16. The pilot burner 78 is relatively small and has a gas consumption which is considerably smaller than that of pilot 56 or pilot 42. The flow of gas from compartment 75 to pilot burner 78 is controlled by a valve closure 68 which is also carried by rod 64 or by an extension thereof and which closes or opens passage 70.

In the drawings, the passages 70 and 71 are shown as being formed in partitions 80 and the rod 64 is shown as having bearings in the end walls 82. These, however, are merely illustrations and the structure can be varied at will.

However, in order to prevent leakage and still avoid the use of packing, which can be troublesome and which interferes with the free movement of the rod 64, I provide bellows 84 and 86 which are secured in air-tight manner to adjacent walls or partitions of the casing 52 and to the rod 64 but which flex readily to permit movement of the rod 64. For example, the bellows 84 prevents gas from leaking at the point at which the rod 64 enters the end wall of the casing 52, and the bellows 86 prevents gas entering the compartment 48 from leaking into compartment 75 and vice versa.

By this arrangement, if the heat control 22 is opened while the bimetal 62 is in the solid line position of Fig. 1 gas will flow through pipes 38 and 40 to pilot burner 42 and through pipe 44, compartment 48, and pipe 54 to pilot burner 56. The gas reaching pilot burner 56 is ignited by flash tube 59 and it ignites the three way pilot burner 42.

The heat from pilot burner 56, when it happens to be ignited and from the downwardly pointing flame of the pilot burner 42 acts on the thermocouple (or pressure operated device) 32 to cause it to open the valve 28 and thus permit gas to flow to the burner 16 according to the adjustment of the valve and heat control device 22. When the gas reaches the burner 16, it is ignited by the laterally pointing flame of the tipple ported pilot burner 42. By the time this has taken place, the heat from the upwardly pointing flame of the tipple ported pilot burner 42, and from the burner 16, acts on the bimetallic element 62 and causes it to move to the right, or from the solid to the broken line position in Fig. 1. In other words, when the temperature of the bimetallic element is at, or below, a predetermined value, the bimetallic element will be in the position shown in solid lines in Fig. 1 in which the valve closure 68 obstructs the passage 70 and the valve closure 66 does not obstruct the passage 71. Under these conditions, the pilot burner 56 will remain ignited. Conversely, when the temperature of the bimetallic element 62 is at or above a predetermined value, it moves to the broken line position in Fig. 1, in which passage 71 is obstructed by valve closure 66 and passage 70 is left open so that the gas flows directly, from the gas main 20, through compartment 75, and pipe 76 to the relatively small pilot burner 78. Under these conditions pilot burner 56 is extinguished and pilot burner 78 continues to burn as long as the temperature of the bimetal element 62 continues to be above the predetermined value, or as long as the bimetal element is in the broken line position of Fig. 1. The pilot burner 42 continues to burn as long as the heat control device 22 is open.

When the gas is turned off by closing the valve and heat control 22, the burner 16 and the pilot 42 are extinguished but the pilot 78, which receives gas directly from the main 20, through pipe 74, passage 70, compartment 75, and pipe 76 will continue to burn as long as the valve closure 68 does not close the passage 70 which, in turn, is as long as the temperature of the bimetal element 62 is at or above the predetermined value. The temperature value to which the bimetal element is set is well below that at which the thermocouple 32, or its equivalent, opens the valve 28. Therefore, any gas reaching the burner 16 through valve 28 will be ignited by pilot burner 78 instead of accumulating in the oven compartment and presenting an explosion hazard.

When the temperature of the bimetallic element 62 falls below the predetermined value, it moves back to the position shown in solid lines in Fig. 1 in which only passage 70 is obstructed by valve closure 68. Under these conditions, the pilot burner 78 is extinguished and since the valve and heat control 22 is closed, the pilot burners 42 and 56 also are extinguished. The cooling of the thermocouple 32 also closes the valve 28 and therefore no gas can reach the burner 16 even if the combined valve and heat control 22 is opened, and the stove is ready for the start of another cycle of operation.

It will thus be seen that the burner 16 is automatically ignited by merely turning on of the gas; that, between cooking operations, there is no constantly burning pilot burner in the oven or broiler compartments, when these compartments are not in use, that the relatively large, initial pilot burner 56 is extinguished very shortly after the burner 16 is ignited, and that there is no danger of explosion due to the admission of gas into the burner compartment before the control devices have had time to recycle, because such gas will be ignited by pilot 78 which continues to burn until the thermocouple 32, which is independent of the ambient temperature of the oven, has cooled enough to permit valve 28 to close and shut off the flow of gas to the burner 16. It will also be seen that my invention is carried out by means of simple, compact and inexpensive parts and that the operation is wholly automatic.

By providing the pilot burner 42, the action of the bimetallic element 62 and the action of thermocouple 32 become entirely independent of the heat of the oven compartment which is generated by the burner 16. For example, the downward projecting flame of pilot burner 42 keeps thermocouple 32 at the desired temperature regardless of the adjustment of the burner 16. Thus, if the oven temperature is brought down to 70 degrees F., the current generated by the thermocouple, if any will not suffice to keep the valve 28 open. Conversely, the heat in the oven might, conceivably be sufficient to keep the valve 28 open. Since neither of these contingencies is desirable, I calibrate the thermocouple for operation under the direct flame of pilot 42 which keeps the temperature of the thermocouple at a value higher than the maximum temperature to which the

oven compartment can be raised by the burner 16. In other words because the thermocouple is arranged to operate at a high temperature, it will open valve 28 when pilot burner 42 is lit and will close valve 28 when the pilot burner 42 is extinguished without any reference to the burner 16. The same is true of the bimetal element 62 which also cycles, with the igniting and extinguishing of the pilot burner 42, at a temperature higher than the maximum temperature to which the oven compartment is raised and entirely independently of the burner 16.

What I claim is:

1. For use with a gas burning stove of the type which has a main surface burner, a first pilot burner for automatically igniting said surface burner, a main oven burner, a gas main for supplying gas to said top pilot burner and said main burners, and a manually operable control device interposed between said gas main and said oven burner for regulating the flow of gas to said oven burner, of means for automatically igniting said oven burner when said control device is opened while said first pilot burner is ignited, said means including a first normally closed valve interposed between said oven burner and said control device, a first heat responsive means located near said oven burner and operable when subjected to heat of a predetermined value to open said first valve, a second pilot burner also located near said oven burner, a flash tube leading from said second pilot burner to said first pilot burner for igniting said second pilot burner, a first conduit for delivering gas from said control device to said second pilot burner, a third pilot burner also located near said oven burner, in igniting relation to said second pilot and in heating relation to said first heat responsive means, a second conduit for delivering gas from said control device to said third pilot burner, a fourth pilot burner located near said oven burner, in igniting relation to said third pilot burner, a third conduit for delivering gas from said gas main to said fourth

pilot burner, a second valve operatively associated with said first and third conduits for selectively permitting or preventing flow of gas through either of said first or third conduits to either of the second or fourth pilot burner, respectively, and a second heat responsive means adapted to be heated by said third pilot burner and operable to move said second valve to a first position in which said third conduit is closed and said first conduit is open to permit gas to flow to said second pilot burner, as long as the temperature of said second heat-responsive means is below a predetermined value, and to move said second valve to a second position in which said first conduit is closed and said third conduit is open to permit gas to flow to said fourth pilot burner as long as the temperature of said second heat-responsive means is above said predetermined value.

2. The structure recited in claim 1 in which the first heat responsive means is heated by the flame of said third pilot burner and opens said first valve when said third pilot burner is ignited and closes said first valve when said third pilot burner is extinguished regardless of whether said oven burner is ignited or extinguished.

3. The structure recited in claim 1 in which said second heat responsive means is heated solely by the flame of said third pilot burner and moves said actuating means to said first position when said third pilot burner is extinguished, and to said second position when said third pilot burner is ignited, regardless of whether said oven burner is ignited or extinguished.

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