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IGNITION MEANS FOR BURNER MEANS AND THE LIKE

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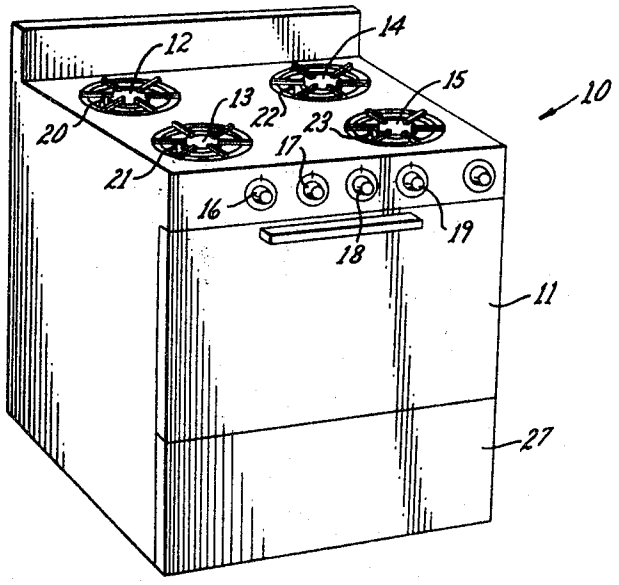


Fig. 1

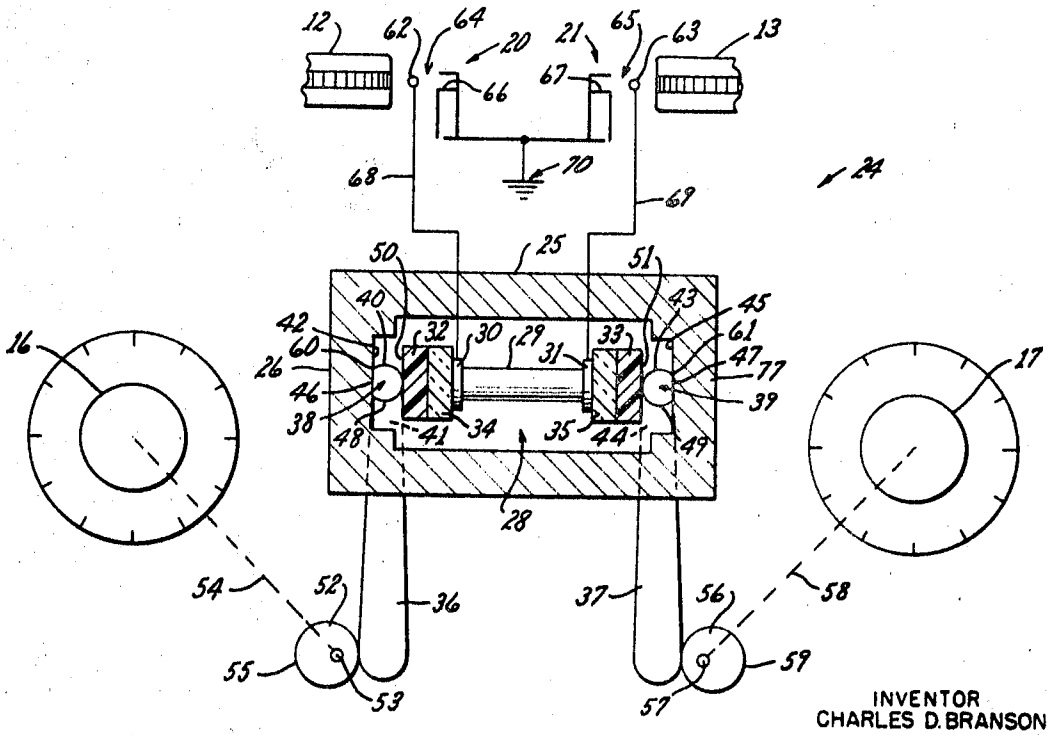


Fig. 2

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IGNITION MEANS FOR BURNER MEANS AND THE LIKE

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ABSTRACT OF THE DISCLOSURE

This disclosure relates to an ignition means for burner means of a cooking apparatus or the like wherein a piezoelectric crystal means is actuated each time a main selector means of the cooking apparatus is moved to an on position to direct fuel to its associated main burner means whereby the actuated ignition means will cause sparking not only at the pilot burner means associated with that particular main burner means, but also at other pilot burner means so as to tend to maintain full ignition of more than one pilot burner means of the cooking apparatus, the ignition means also being actuated when the selector means of another main burner means is turned to an on position.

This invention relates to improved ignition means for a cooking apparatus or the like as well as to an improved selector means for such a cooking apparatus or the like.

It is well known that many cooking apparatus of the fuel burning variety have individual pilot burner means for each main burner thereof whether the main burner is disposed in the oven or on top of the cooking apparatus, the pilot burners being continuously burning pilot burners and when adversely put out because of air currents or the like, the same must be reignited by the housewife or the like utilizing matches and the like.

However, according to the teachings of this invention, ignition means are provided for such pilot burner means wherein the housewife or the like will automatically initiate the actuation of the ignition means when the housewife or the like turns on the main selector means for operating one of the main burner means so that should the particular pilot burner means associated with that main burner means be unlit, the same will be automatically lit by the actuated ignition means to thereby ignite the selected main burner means.

In particular, the ignition means of this invention includes piezoelectric crystal means that, when actuated by the housewife turning a main selector means to its on position, will have the stresses therein altered in such a manner that the same will cause sparking not only at the particular pilot burner means associated with the main burner means for the actuated selector means, but also at another pilot burner means associated with another main burner means.

Accordingly, it is an object of this invention to provide an improved ignition means for a cooking apparatus or the like, the ignition means 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 piezoelectric igniter arrangement for such a cooking apparatus 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:

FIGURE 1 is a perspective view of a cooking apparatus utilizing the ignition means of this invention.

FIGURE 2 is a schematic view illustrating the selector and ignition system for the cooking apparatus of FIGURE 1.

While the various features of this invention are hereinafter described and illustrated as being particularly adaptable for providing ignition means for a cooking apparatus, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide ignition means for other apparatus as described.

Therefore, this invention is not to be limited to only the embodiment 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 FIGURE 1, a cooking apparatus is generally indicated by the reference numeral **10** and has the conventional oven opened and closed by a door means **11**, the apparatus **10** including a plurality of top burner means **12**, **13**, **14** and **15** for range top cooking purposes and the like.

Each main top burner means **12**, **13**, **14** and **15** is individually selectively controlled by respective rotatable selector knobs **16**, **17**, **18** and **19** so that when a particular selector knob is turned to an on position thereof, the same will direct fuel to its associated main burner means in a conventional manner to be ignited by a continuously burning pilot burner means associated therewith. For example, individual pilot burner means **20**, **21**, **22** and **23** are illustrated in FIGURE 1 as being respectively associated with the main top burner means **12**, **13**, **14** and **15**.

As previously stated, one of the features of this invention is to cause automatic ignition of a pilot burner means when fuel is being directed to its associated main burner means by the housewife or the like turning the respective selector means to its on position so that the main burner means will be ignited even though its associated pilot burner means was not burning at the time the housewife or the like was going to turn on the particular selector means for that main burner. Not only will this prevent the housewife or the like from thinking that a main burner means has been turned on and will be functioning properly when, in effect, the main burner means was not ignited because its associated pilot burner means had been extinguished for one reason or another, but also relieve the housewife or the like from checking the pilot burner means on the cooking apparatus **10** to make sure that the same are burning before turning on a particular selector means.

Also, it has been previously stated that another feature of this invention is not only to assure automatic ignition of the pilot burner means of its associated main burner of means when the respective selector means is turned to an on position thereof, but also to automatically tend to ignite another pilot burner means associated with another main burner means even though that other main burner means is not being turned on at that particular time.

Thus, such an ignition means for the pilot burner means **20** and **21** of the main burners **12** and **13** of the cooking apparatus **10** of FIGURE 1 is generally indicated by the reference numeral **24** in FIGURE 2 and will now be described. However, it is to be understood that the ignition means **24** hereinafter described for the main burner means **12** and **13** is identical to an ignition means of the apparatus **10** for the other two main top burner means **14** and **15** and could also be identical to an automatic ignition means for the pilot burner means of the bake and broil burners in the oven of the apparatus **10**, if desired.

The ignition means **24** illustrated in FIGURE 2 comprises a support or frame member **25** suitably mounted to the frame structure **27** of the cooking apparatus **10** so that the selector knobs **16** and **17** of the cooking apparatus **10** can actuate the ignition means **24** in a manner hereinafter described.

The support frame 25 has one or more piezoelectric crystal elements carried therein between the opposed ends 26 and 77 thereof with such crystal means being disposed in a recess or cutout 28 of the support frame 25. In the embodiment of the ignition means 24 illustrated in FIGURE 2, only one such piezoelectric crystal element is provided and is indicated by the reference numeral 29. However, it is to be understood that other crystal elements could be included in the ignition means 24 with each operating in the manner provided by the illustrated crystal element 29 as hereinafter described.

The piezoelectric crystal element 29 has a pair of electrical terminal means 30 and 31 at the opposed longitudinal ends thereof with such terminal means 30 and 31 being electrically insulated from the support frame 25 by respective insulators 32 and 33 whereby not only is the crystal element 29 electrically insulated from the support frame 25 of the ignition means 24, but also the crystal element 29 is completely electrically insulated from the frame means 27 of the cooking apparatus 10. If desired, suitable ceramic pressure pad means 34 and 35 can be respectively disposed between the insulators 32 and 33 and their respective terminal means 30 and 31 as illustrated.

Two rocker arms 36 and 37 are each pivotally or rotatably carried by the support frame 25 and each is adapted to rotate relative thereto about a transversely movable axis of rotation generally indicated by the reference numeral 38 for the rocker arm 36 and by the reference numeral 39 for the rocker arm 37. The rocker arm 36 carries a cam member 40 at the rotatably mounted end 41 thereof to be disposed between the insulator 32 and a flat surface 42 of the support frame 25 at the end 26 thereof to also rotate in unison with the rocker arm 36 about the movable axis 38. The rocker arm 37 also carries a like cam member 43 at the rotatably mounted end 44 thereof but is disposed between the insulator 33 and a flat surface 45 to the support frame 25 at the end 77 thereof to also rotate in unison with the rocker arm 37 about the movable axis 39.

The cam members 40 and 43 have respective flat surfaces 46 and 47 cooperating with the respective flat surfaces 42 and 45 of the support frame 25 and true partial circular surfaces 48 and 49 respectively cooperating with adjacent flat surfaces 50 and 51 of the respective insulators 32 and 33 whereby when the cam members 40 and 43 are disposed in the position illustrated in FIGURE 2, the elements 32, 34, 29, 35 and 33 are disposed in stacked relation between the opposed ends 26 and 77 of the support frame 25 and will not alter the stresses in the crystal element 29 to generate a potential difference at the respective terminal means 30 and 31 until the cam element 40 is rotated about the axis 38 or the cam element 43 is rotated about the axis 39 to either axially squeeze the crystal element 29 between the opposed ends thereof or relieve such squeezing action.

The selector knob 16 is operatively interconnected to the rocker arm 36 and the selector means 17 is operatively interconnected to the rocker arm 37 so that when the selector means 16 or 17 is rotated from its off position toward any on position thereof to direct fuel to the respective main burner means 12 or 13, such rotational movement of the selector means 16 or 17 will cause a rocking action of its respective rocker arm 36 or 37 to effect an altering of stresses in the crystal element 29 in a manner hereinafter set forth.

In particular, rotation of the selector knob 16 will cause rotation of a cam member 52 about its axis of rotation 53 through suitable interconnection means 54 whereby the cam surface 55 of the cam member 52 will act on the rocker arm 36. Similarly, rotation of the selector means 17 will cause rotation of a cam element 56 about its axis of rotation 57 through suitable interconnection means 58 whereby the cam surface 59 of the cam element 56 will act on the rocker arm 37.

For example, when the selector knob 16 is rotated from its off position as illustrated in FIGURE 2 toward an on position thereof, the cam member 52 will be rotated about axis 56 to initially cause the rocker arm 36 to rotate in a counterclockwise direction in FIGURE 2 whereby the cam element 40 will rotate about is axis 38 in a counterclockwise direction so that a corner 60, formed by the juncture of the flat surface 46 thereof and the circular surface 48 thereof, will bear against the flat surface 42 of the support frame 25 and cause the axis 38 to move upwardly and to the right in FIGURE 2 to increase the effective length of the cam member 40 between the surface 42 of the support frame 25 and the surface 50 of the insulator 32 to impose a substantially longitudinal compressive and squeezing action on the element 29 between the ends 26 and 77 of the support frame 25. Such longitudinal compression of the crystal element 29 will alter the stresses therein sufficiently to cause the same to create a potential difference at the terminal means 30 and 31 to be utilized in a manner hereinafter described to tend to ignite the pilot burners 20 and 21. When such compression or squeezing action on the crystal element 29 is subsequently relieved by the cam member 52 rotating back to the position illustrated in FIGURE 2, as the selector knob 16 is further rotated in a clockwise direction in FIGURE 2 to the desired on position thereof, the cam member 40 will rock back to the position illustrated in FIGURE 2 to effectively decrease the effective cam length of the cam member 40 between the surfaces 42 and 50 to thereby again alter the stresses in the crystal element 29 as the same will longitudinally expand from its previous squeezed condition to also generate a potential difference at the terminals 30 and 31.

During such rotation of the cam element 40, the stack of elements 32, 34, 29, 35, and 33 tends to rock as a unit in a clockwise direction as the cam element 40 is rotated in a counterclockwise direction and the stack tends to rotate as a unit in a counterclockwise direction as the cam element 40 is rotated in a clockwise direction back to the position illustrated in FIGURE 2 whereby such rocking movement of the crystal stack is facilitated by the arcuate surface 49 on the cam element 43 of the rocker arm 37.

Such squeezing and relieving of the crystal element 29 between the opposed ends thereof is also accomplished by the cam element 43 in the same manner as the cam element 40 when the selector knob 17 is rotated from its off position to a selected on position thereof, the cam member 43 being rocked on the corner 61 thereof.

While the interconnection means 54 and 58 between the selector means 16 and 17 and the rocker arms 36 and 37 provide a continuous squeezing and relieving action on the crystal means 29 both while the particular selector means 16 or 17 is being rotated in an on direction and in an off direction thereof, it is to be understood that the interconnection means between the particular selector means 16 or 17 and its respective rocker arm 36 or 37 can be such that the respective arm 36 or 37 will only be rocked once during the turning on of the respective selector means 16 and 17 and will not be rocked when the respective selector means is turned to the off position, if desired. However, by both rocking the respective rocker arm 36 or 37 a number of times while the respective selector means 16 or 17 is being moved in an on direction as well as when the particular selector means 16 and 17 is being moved in an off direction, such repetitive squeezing and relieving of the crystal means 29 will more than assure that the pilot burner means 20 and 21 will be fully lit in a manner now to be described.

A first pair of electrodes 62 and 63 are mounted to the frame means 27 of the apparatus 10 adjacent the respective pilot burners 20 and 21 and in spaced relation from the pilot burners 20 and 21 so as to define spark gaps 64 and 65 adjacent the fuel outlet means 66 and 67 of the pilot burners 20 and 21. The electrodes 62 and 65

are electrically insulated from the main means 27 of the apparatus 10 and are electrically interconnected to the terminals 30 and 31 by suitable leads 68 and 69.

The pilot burner means 20 and 21 are electrically conductive and are, in effect, connected to a ground potential by being electrically interconnected to the frame means 27 of the apparatus 10 and such ground potential of the pilot burners is generally indicated by the reference numeral 70 in FIGURE 2, the frame means 27 of the apparatus 10 being effectively grounded through interconnection thereof to the gas supply lines and the like and also by conventional grounding means. In this manner, it can be seen that the pilot burners 20 and 21 respectively provide ground electrodes cooperating with the electrodes 62 and 63 to define the spark gaps 64 and 65.

The operation of the igniting means 24 for the apparatus 10 will now be described.

When the housewife or the like desires to turn on the main burner means 12 of the cooking apparatus 10, she merely rotates the selector knob 16 from its off position to its on position to direct fuel to the main burner means 12. As such selector knob 16 is being rotated from its off position to its selected on position, the rotation of the cam member 52 effects rocking of the rocker arm 36 whereby the stresses in the crystal element 29 will be altered in the manner previously described so that one potential will be created at the electrode 62 and an equal and opposite potential will be created at the electrode 63. When the differences in potential between the electrodes 62 and 63 and their respective ground electrodes 20 and 21 reaches a particular magnitude, electrical arcing will be created across the spark gaps 64 and 65 in substantially a simultaneous manner whereby such electrical sparking will ignite fuel issuing from any unlit pilot burner means 20 or 21.

Of course, the counterclockwise movement of the rocker arm 36 by the rotating cam member 52 to effect a squeezing action on the element 29 will produce the above described sparking one or more times depending upon the amount of actual counterclockwise movement of the rocker arm 36. Also, subsequent clockwise movement of the rocker arm 36 also alters the stresses in the element 29 to effect sparking one or more times at the spark gaps 64 and 65 on the return of the rocker arm 36 to its full clockwise position as illustrated in FIGURE 2.

While it is believed that merely one complete rotation of the cam member 55 by the selector means 16 will effectively light any unlit pilot burner means 20 and 21, the repetitive rocking of the rocker arm 36 by the selector means 16 will more than assure that any unlit pilot burner means 20 or 21 will be effectively lit by the sparking created by the crystal means 29.

Of course, such sparking at the spark gaps 64 and 65 also takes place when the selector means 17 is rotated in the manner previously described for the selector means 16.

Therefore, it can be seen that by arranging the crystal means 29 in the manner previously described, the single crystal element 29 is adapted to effectively ignite two or more pilot burner means so that a relatively inexpensive ignition means can be provided for the apparatus 10, the actuation of the crystal means 29 being controlled by the operation of any one of the selector means associated with the main burner means of one of the pilot burner means forming part of the ignition system.

While the ignition means of this invention has been described as igniting pilot burner means for the cooking apparatus, it is to be understood that such ignition means can be utilized to directly ignite the main burner means of the cooking apparatus or the like without utilizing the intermediate pilot burners therefor.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. In a cooking apparatus having a plurality of burner means, a selector means for directing fuel to one of said burner means when said selector means is set in an on position thereof, ignition means for igniting fuel issuing from said one burner means as well as at another burner means by substantially simultaneously creating separate electrical sparkings respectively adjacent said one burner means and said other burner means when said ignition means is actuated, and means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner.

2. In a cooking apparatus having a plurality of burner means, a selector means for directing fuel to one of said burner means when said selector means is set in an on position thereof, ignition means for igniting fuel issuing from said one burner means as well as at another burner means, and means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, said ignition means including a piezoelectric crystal means that has its stresses altered by the setting of said selector means to a particular position to cause electric sparking at said one burner means and said other burner means in said substantially simultaneous manner.

3. In a cooking apparatus as set forth in claim 2, said crystal means comprising a single piezoelectric crystal element electrically insulated from said cooking apparatus.

4. In a cooking apparatus as set forth in claim 1, said one burner means comprising a main burner and a pilot burner associated therewith.

5. In a cooking apparatus as set forth in claim 4, said ignition means when actuated tending to ignite fuel issuing from said pilot burner so that said pilot burner can ignite fuel issuing from said main burner.

6. In a cooking apparatus as set forth in claim 1, another selector means for directing fuel to said other burner means when said other selector means is set in an on position thereof, and means operatively connecting said other selector means to said ignition means to actuate said ignition means when said other selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner.

7. In a cooking apparatus as set forth in claim 6, said one burner means comprising a main burner and a pilot burner associated therewith, said other burner means comprising another main burner and another pilot burner associated therewith.

8. In a cooking apparatus as set forth in claim 7, said ignition means when actuated tending to ignite fuel issuing from said pilot burners so that said pilot burners can tend to ignite fuel issuing from their respective main burner.

9. In a cooking apparatus having a plurality of burner means, a selector means for directing fuel to one of said burner means when said selector means is set in an on position thereof, ignition means for igniting fuel issuing from said one burner means as well as at another burner means, means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, another selector means for directing fuel to said other burner means when said other selector means

is set in an on position thereof, and means operatively connecting said other selector means to said ignition means to actuate said ignition means when said other selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, said one burner means comprising a main burner and a pilot burner associated therewith, said other burner means comprising another main burner and another pilot burner associated therewith, said ignition means when actuated tending to ignite fuel issuing from said pilot burners so that said pilot burners can tend to ignite fuel issuing from their respective main burner, said ignition means including a piezoelectric crystal means that has its stresses altered by the setting of either selector means to its particular position to cause electric sparking at said pilot burners in said substantially simultaneous manner.

10. In a cooking apparatus as set forth in claim **9**, said crystal means comprising a single crystal element, said means interconnecting said selector means to said ignition means each causing a longitudinal compressing action on said element at a respective end thereof when the respective selector means is set to its particular position.

11. In combination, a selector means adapted to direct fuel to one burner means when said selector means is set in an on position thereof, ignition means adapted to ignite fuel issuing from said one burner means as well as at another burner means by substantially simultaneously creating separate electrical sparkings respectively adjacent said one burner means and said other burner means when said ignition means is actuated, and means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner.

12. In combination, a selector means adapted to direct fuel to one burner means when said selector means is set in an on position thereof, ignition means adapted to ignite fuel issuing from said one burner means as well as at another burner means, and means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, said ignition means including a piezoelectric crystal means that has its stresses altered by the setting of said selector means to its particular position so as to be adapted to cause electric sparking at said one burner means and said other burner means in said substantially simultaneous manner.

13. A combination as set forth in claim **12** wherein

said crystal means comprises a single piezoelectric crystal element.

14. A combination as set forth in claim **11** and including another selector means adapted to direct fuel to said other burner means when said other selector means is set in an on position thereof, and means operatively interconnecting said other selector means to said ignition means to actuate said ignition means when said other selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner.

15. In combination, a selector means adapted to direct fuel to one burner means when said selector means is set in an on position thereof, ignition means adapted to ignite fuel issuing from said one burner means as well as at another burner means, means operatively interconnecting said selector means to said ignition means to actuate said ignition means when said selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, another selector means adapted to direct fuel to said other burner means when said other selector means is set in an on position thereof, and means operatively interconnecting said other selector means to said ignition means to actuate said ignition means when said other selector means is set to a particular position thereof whereby said ignition means will be actuated so as to tend to ignite said one burner means and said other burner means in substantially a simultaneous manner, said ignition means including a piezoelectric crystal means that has its stresses altered by the setting of either selector means to its respective particular position so as to be adapted to cause electric sparking at said burner means in said substantially simultaneous manner.

16. A combination as set forth in claim **15** wherein said crystal means comprises a single crystal element, said means interconnecting said selector means to said ignition means each causing a longitudinal compressing action on said element at a respective end thereof when the respective selector means is set to its particular position.

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