May 5, 1970 F. S. GENBAUFFE 3,510,058

DIVERTER VALVE MEANS AND METHOD

Filed Sept. 26, 1967 2 Sheets-Sheet 1

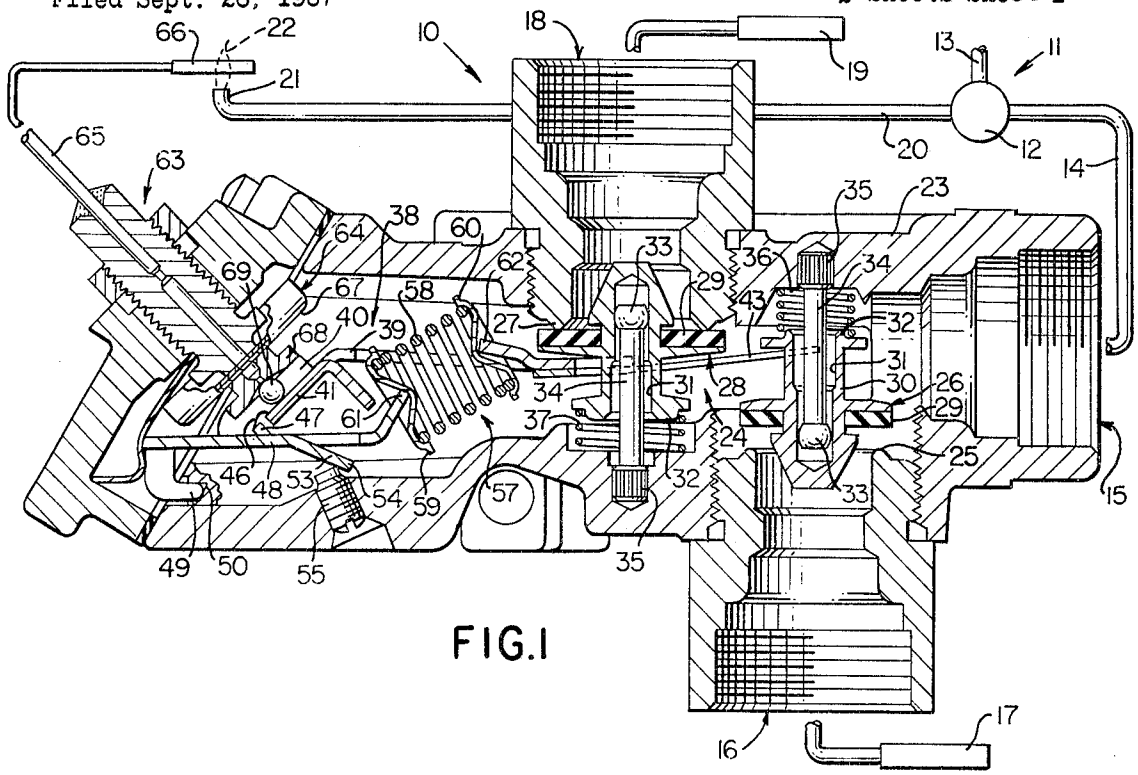
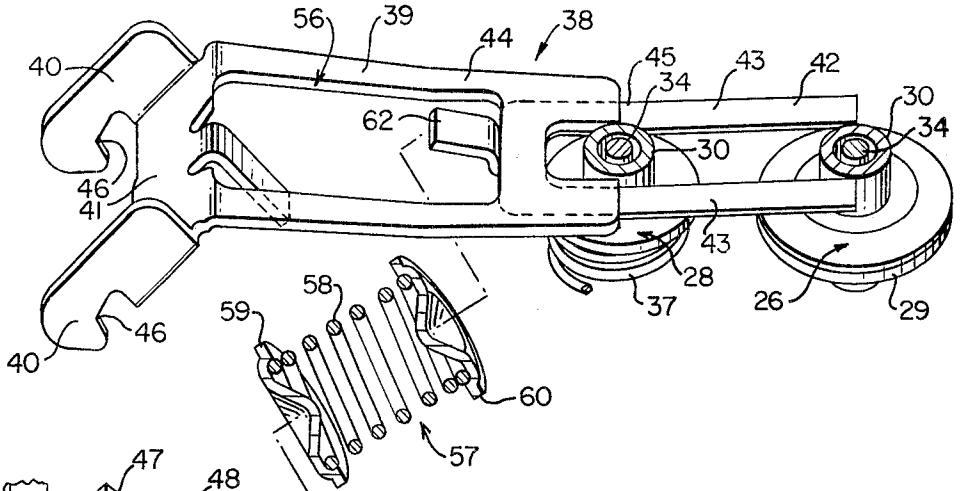


FIG.1



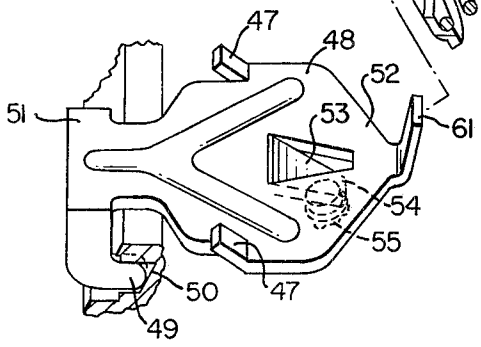


FIG.2

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DIVERTER VALVE MEANS AND METHOD

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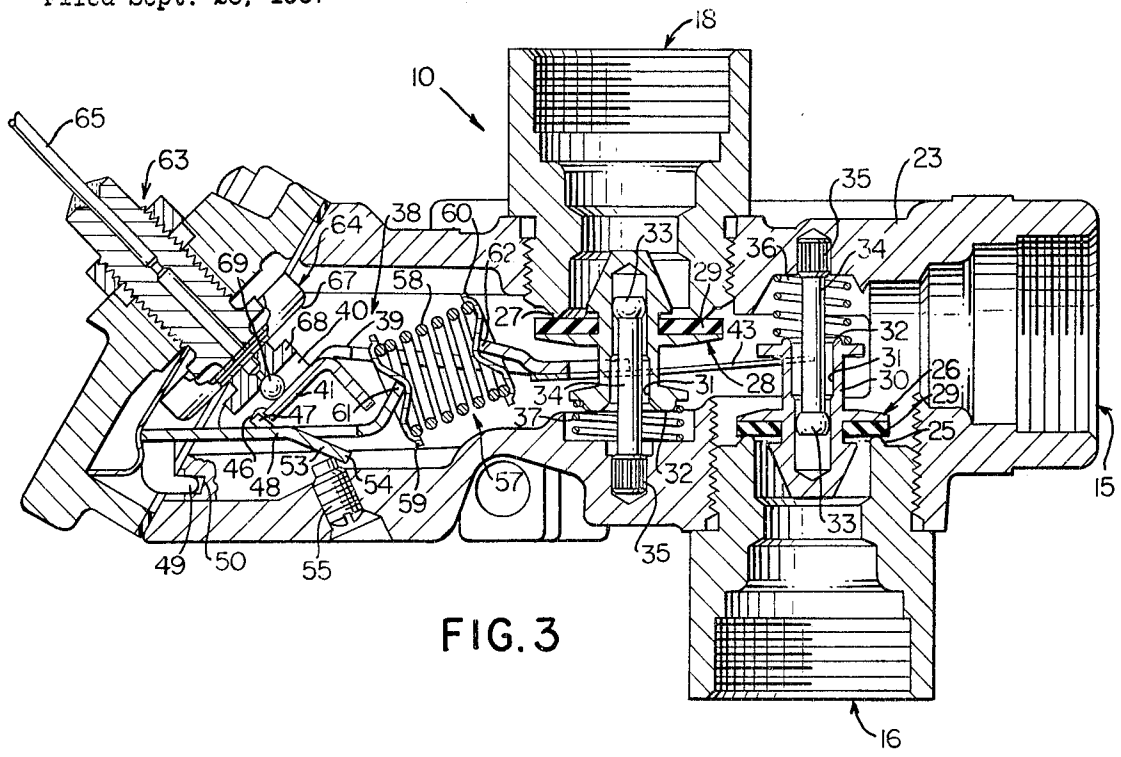


FIG. 3

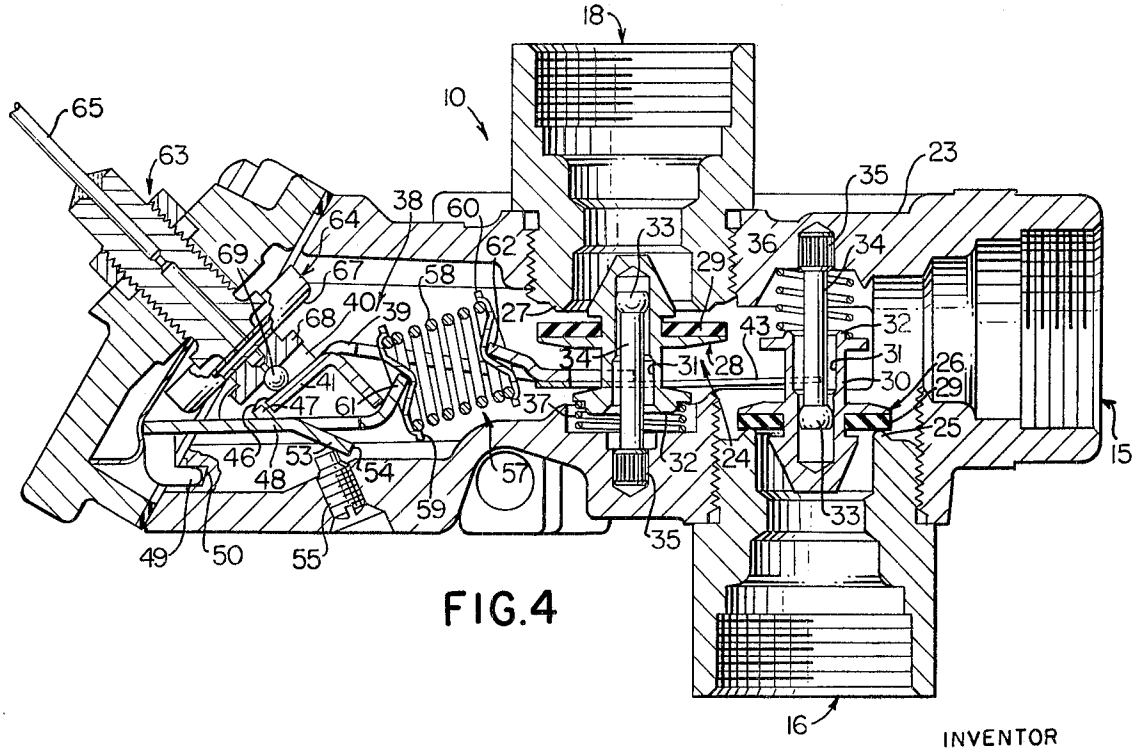


FIG. 4

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DIVERTER VALVE MEANS AND METHOD

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Int. Cl. F23n 1/00
U.S. Cl. 236—68 12 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a diverter valve means provided with an inlet and a pair of outlets respectively opened and closed by a pair of valve members moved between their opened and closed positions by an actuating means, the actuating means being so constructed and arranged that in one position of the actuator means, one of the valve members is disposed in its closed position and the other valve member is disposed in its opened position and when the actuating means is disposed in another operating position thereof, the first-named valve member is in its opened position and the second-named valve member is in its closed position. The actuating means is also so constructed and arranged that the same causes the particular opened valve member to fully move to its closed position before the actuating means begins to open the closed valve member as the actuating means moves between its operating positions.

This invention relates to a diverter valve means for effectively diverting the flow of fluid into the inlet means of a housing means of the diverter valve means to a selected one of a pair of outlet means for the housing, this invention also relating to a method of operating such a diverter valve means or the like.

While such a diverter valve means is particularly useful for diverting fuel flow from a control device to a bake burner interconnected to one of the outlets thereof or to a broil burner connected to the other outlet thereof, such as in a double burner oven arrangement, such diverter valve means and method can be utilized for other purposes as desired.

One feature of the diverter valve means of this invention is to actuate the respective valve members in such a manner that when the actuating means is in one of its operating positions, one of the valve members is closed and the other valve member is opened. Conversely, when the actuating means is in another operating position thereof the first-named valve member is in its opened position and the second-named valve member is in its closed position, the actuating means operating in such a manner that the actuating means causes the particular opened valve member to move to its closed position before the actuating means will move the closed valve member to its opened position as the actuating means moves between its operating positions.

Accordingly, it is an object of this invention to provide improved diverter valve means 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 method for operating such a diverter valve means 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 cross-sectional view illustrating the improved diverter valve means of this invention in one of its operating positions.

FIG. 2 is an exploded perspective view of various parts of the diverter valve means of FIG. 1.

FIG. 3 is a view similar to FIG. 1 and illustrates the diverter valve means in an intermediate operating position thereof.

FIG. 4 is a view similar to FIG. 1 and illustrates the diverter valve means in a different operating position than the operating position of the diverter valve means of FIG. 1.

While the various features of this invention are hereinafter described and illustrated as being particularly adaptable for controlling the flow of fuel for a double burner oven arrangement or the like, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide diverter means for other fluids of other 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 diverter valve means of this invention is generally indicated by the reference numeral **10** and is schematically illustrated as being utilized in a typical double burner oven system generally indicated by the reference numeral **11** and comprising a control device **12** for receiving fuel from a fuel source conduit **13** and selectively and/or thermostatically directing the same through an outlet conduit **14** to an inlet means **15** of the diverter valve means **10** which, in a manner hereinafter described, can direct the fuel entering the inlet means **15** thereof either through an outlet means **16** leading to a bake burner **17** for the system **11** or out through another outlet means **18** leading to a broil burner **19** for the system **11**. In addition, the control means **12** is so constructed and arranged that the same will direct a fuel flow through a conduit means **20** leading to a pilot burner means **21** to create a flame means **22** when the control device **12** is set in a position for operating the broil burner **19** as will be apparent hereinafter.

As illustrated in FIG. 1, the diverter valve means **10** includes a housing means **23** provided with the inlet means **15** and the outlet means **16** and **18** interconnected to the inlet means **15** by a chamber means **24** formed in the housing means **23**.

The inlet means **16** is interconnected to the chamber **24** of the housing means **23** by a valve seat **25** adapted to be opened and closed by a valve member **26**. Similarly, the outlet means **18** is interconnected to the chamber **24** of the housing **23** by a valve seat **27** adapted to be opened and closed by a valve member **28**.

The valve members **26** and **28** are similar in construction and each includes a resilient disc **29** for seating on the respective valve seat **25** or **27** to close the respective outlet means **16** and **18** from the inlet means **15**, the resilient disc member **29** being carried by a rigid member **30** having a bore means **31** interrupting a shoulder-like free end **32** thereof and telescopically receiving a ball-like free end **33** of a stem guide member **34** having the other end **35** thereof carried by the housing means **23**. In this manner, each valve member **26** or **28** is adapted to move substantially axially relative to its respective valve seat **25** or **27** and be guided by the guide means **34** while being rockable relative to the ball end **33** of the guide stem means **34** to permit the resilient part **29** to seek its own position in fully seating and sealing against the respective valve seat **25** or **27**.

The valve member **26** is normally urged toward its closed position by a compression spring **36** disposed between the housing means **23** and the shoulder end **32** of the valve member **26**. Similarly, a compression spring **37**

is disposed between the housing means **23** and the shoulder end **32** of the valve member **28** to normally tend to urge the valve member **28** to its closed position against the valve seat **27**.

In general, actuating means **38** are carried by the housing means **23** and are so constructed and arranged in a manner hereinafter set forth that when the actuating means **38** is disposed in the position illustrated in FIG. 1, the actuating means **38** causes the valve member **28** to be in its closed position and the valve member **26** to be in its opened position. Conversely, when the actuating means **38** is disposed in the operating position of FIG. 4, the actuating means **38** causes the valve member **26** to be in its closed position and the valve member **28** to be in its opened position.

However, as the actuating means **38** moves between its operating position of FIGS. 1 and 4, the actuating means **38** always causes the particular opened valve member to move toward its closed position and permits that valve member to fully close its respective valve seat before the actuating means causes the closed valve member to move to its opened position whereby at no time are both valve members **26** and **28** disposed in their opened positions to permit the inlet means **15** to be interconnected to both outlet means **16** and **18**.

The actuating means **38** includes a lever means **39** having a pair of ears **40** at one end **41** thereof and a bifurcated opposed end **42** defined by a pair of legs **43** adapted to straddle the parts **30** of the valve members **28** and **26** in the manner illustrated in FIGS. 1 and 2 to operatively interconnect the lever means **39** thereto with a lost motion action to provide the above function in a manner hereinafter described. While the lever means **39** is illustrated as being formed of two parts **44** and **45** suitably secured together to operate in unison, it is to be understood that the lever means **39** can comprise a one-piece member or a multi-piece member as desired.

The ears **40** of the lever means **39** are respectively provided with fulcrum notches **46** to receive and fulcrum against fulcrum members or edges **47** projecting from a plate-like member **48** having tang means **49** received in suitable slot means **50** of the housing means **23** to substantially secure the end **51** of the plate means **48** to the housing means **23**. However, the other end **52** of the plate means **48** has a downwardly bent tongue **53** carved therefrom and has the free end **54** thereof bearing against a threaded adjusting member **55** carried by the housing means **23** whereby adjustment of the member **55** relative to the housing means **23** will adjust the effective pivot point or fulcrum members **47** for the lever means **39**.

The lever means **39** has a central slot means **56** passing therethrough to partially receive a compression spring assembly means **57** comprising a compression spring **58** disposed between two cup-shaped retainers **59** and **60** respectively bearing against an outwardly directed tang **61** on the end **52** of the plate **48** and a tang **62** on the lever means **39** whereby the spring assembly **57** causes the lever means **39** to partially move between its operating position of FIGS. 1 and 4 with a snap action as hereinafter described.

A condition responsive means, generally indicated by the reference numeral **63** in the drawings, is carried by the housing means **23** and includes an expandible and contractible power element **64** having the interior thereof fluidly interconnected to a conduit means **65** disposed in fluid communication with a bulb portion **66** containing expansible and contractible fluid means or the like to sense the flame means **22** at the pilot burner means **21** in a manner hereinafter described.

The power element **64** includes a movable wall **67** carrying an extension **68** having a ball **69** secured on the outer end thereof and disposed against the end **41** of the lever means **39** to the right of the fulcrum notchets **46** and fulcrum tangs **47** as illustrated in FIG. 1.

In this manner, expansion of the power element **64** from the position illustrated in FIG. 1 to the position illustrated in FIG. 4 in an manner hereinafter described, causes the lever means **39** to pivot in a clockwise direction from the position illustrated in FIG. 1 to the position illustrated in FIG. 4. Conversely, as the power element **64** contracts from the position illustrated in FIG. 4 to the position illustrated in FIG. 1, the lever means **39** pivots in counterclockwise direction from the operating position of FIG. 4 to the operating position illustrated in FIG. 1.

The operation of the diverter valve means **10** when utilized in the control system **11** will now be described.

When the control device **12** is manually or automatically set in a position to operate the bake burner **17**, the control device **12** interconnects the fuel supply conduit **13** to the conduit **14** while preventing fluid communication between the supply conduit **13** and the pilot burner conduit **20** whereby no flame means **22** exists at the pilot burner means **21**. Since no flame means **22** is sensed by the flame detector **66** of the diverter valve **10**, the power element **64** is in the contracted or fully collapsed position of FIG. 1 whereby the compression spring **58** maintains the lever means **39** in the pivoted position of FIG. 1 so that the arms **43** of the lever means **39** bear against the underside of the shoulder end means **32** of the valve member **26** and hold the same in the opened position illustrated in FIG. 1 in opposition to the force of the compression spring **36**. In this manner, the fuel flow now entering the inlet means **15** of the housing **23** from the control device **12** passes through the opened valve seat **25** out of the outlet means **16** to the bake burner **17** to be ignited by suitable ignition means (not shown).

With the lever means **39** disposed in the position illustrated in FIG. 1, it can be seen that the compression spring **37** maintains the valve member **28** against the valve seat **27** to prevent fluid communication between the inlet means **15** and the outlet means **18** leading to the broil burner **19**, the lever **39** being prevented from pivoting further in a counterclockwise direction from the position illustrated in FIG. 1 under the force of the compression spring **58** because the end **42** of the lever means **39** is bearing against the valve member **28**.

Therefore, as long as the flame detector means **66** does not detect a flame means **22** at the pilot burner means **21**, the diverter valve means **10** will remain in the position illustrated in FIG. 1.

When the housewife or the like desires to utilize the system **11** for controlling the operation of the broil burner **19**, the control device **12** is adjusted manually or automatically to a broil position thereof wherein the control device **12** not only fluidly interconnects the fuel supply conduit **13** with the conduit **14** leading to the inlet means **15** of the diverter valve means **10**, but also interconnects the supply conduit **13** to the conduit **20** leading to the pilot burner means **21** whereby the fuel now issuing from the pilot burner means **21** is ignited by suitable ignition means (not shown) to continuously create the flame means **22** as long as the control device **12** is set in its broil position.

With the flame means **22** now existing at the pilot burner means **21**, the fluid in the flame detector bulb **66** is heated by such flame means **22** and expands in such a manner that the same causes the power element **64** to expand and cause the wall **67** thereof to move outwardly and carry the ball **69** therewith to pivot the lever means **39** in a clockwise direction from the position illustrated in FIG. 1 toward the position illustrated in FIG. 4.

However, as the lever means **39** begins to pivot in a clockwise direction from the position illustrated in FIG. 1, the valve member **28** remains in its closed position by the force of its associated compression spring **37** as illustrated in FIG. 3 and the clockwise moving arms **43** of the lever means **39** permit the compression spring **36** of the valve member **26** to cause the valve member **26** to

follow such clockwise movement of the lever **39** and approach the valve seat **25**.

Such movement of the valve member **26** toward the valve seat **25** continues as the power element **64** continues to expand and when the same has expanded to the position illustrated in FIG. 3, the valve member **26** fully seats against the valve seat **25** to prevent fluid communication between the inlet means **15** and the outlet means **16** to the bake burner **17**. However, in the position of the diverter valve means illustrated in FIG. 3, it can be seen that the arms **43** of the clockwise moving lever **39** still have not reached the shoulder end means **32** of the valve member **28** whereby the compression spring **37** still maintains the valve member **28** against its valve seat **27** at the same time the valve member **26** closes the valve seat **25**.

Therefore, both valve members **26** and **28** are disposed in their closed positions as illustrated in FIG. 3. However, the power element **64** continues to expand from the position illustrated in FIG. 3 to the position illustrated in FIG. 4 whereby the lever **39** continues to move in a clockwise direction and when the arms **43** engage the underside of the shoulder end means **32** of the valve member **28**, the clockwise moving arm means **43** of the pivoting lever **39** carry the valve member **28** therewith in operation to the force of the compression spring **37** to open the valve member **28** in the manner illustrated in FIG. 4.

Therefore, with the valve seat **27** now opened by the diverter valve **10**, fuel flowing into the inlet means **15** of the diverter valve **10** can now pass out of the outlet means **18** thereof to the broil burner **19** and be ignited by suitable ignition means (not shown). The diverter valve means **10** remains in this position of FIG. 4 as long as the flame detector means **66** is detecting the flame means **22** at the pilot burner means **21** because the power element **64** remains in its expanded condition as illustrated in FIG. 4 to maintain the diverter valve **10** in the operating position illustrated in FIG. 4.

However, should the control device **12** be turned to another position thereof so as to disconnect the fuel supply conduit **13** from the conduit **20** leading to the pilot burner means **21**, such as by turning the control device **12** to its off position or a bake position thereof, the flame means **22** will cease to exist at the pilot burner means **21** whereby the fluid in the bulb **66** will contract and cause the power element **64** to contract from the position illustrated in FIG. 4 back to the position illustrated in FIG. 1.

As the power element **64** is contracting from the position illustrated in FIG. 4, it can be seen that the force of compression spring **37** of the valve member **28** will not only cause the lever means **39** to pivot in a counterclockwise direction and follow the contracting movement of the wall **67** of the contracting power element **64** in addition to the force of the compression spring **58** of the assembly **57**, but also the force of the compression spring **37** will cause the valve member **28** to move toward its valve seat **27** until the same is fully seated in the manner illustrated in FIG. 3. When the valve member **28** fully seats against its valve seat **27** in the manner illustrated in FIG. 3, the counterclockwise movement of the lever **39** has not caused the arm **33** to engage against the shoulder end means **32** of the valve member **26** so that both valve members **26** and **28** are disposed in their closed position.

Further, contracting movement of the power element **64** from the position illustrated in FIG. 3 to the position illustrated in FIG. 1 causes the lever means **39** to further pivot in a counterclockwise direction under the force of the compression spring **58** of the assembly **57** and have the arms **43** thereof engage against the underside of the shoulder end means **32** of the valve member **26** to carry the same therewith in opposition to the force of the compression spring **36** to the fully opened position illustrated in FIG. 1 whereby the diverter valve **10** will remain in the position illustrated in FIG. 1 until a flame means **22** again exists at the pilot burner means **21** in the manner previously described.

Therefore, it can be seen that the diverter valve means **10** and actuating means **38** are so constructed and arranged that regardless of the operating position of the diverter valve **10**, only one valve member will be in an opened position and that opened valve member will be moved to its closed position before the other valve member will be moved to its opened positioned.

If desired, the compression spring assembly means **57** can be utilized to partially pivot the valve member **39** with a snap action after the lever means **39** has moved a particular valve member to its valve seat closing position with a throttling or modulating action to permit the other valve member to be substantially snapped from its closed position to its opened position so that sufficient fuel will immediately pass through the thus opened valve seat for full ignition thereof and not create a flashback problem.

For example, the line of compression force action of the compression spring **58** between the ends of the tang **61** on the plate means **48** and the end of the tang **62** on the lever means **39** progressively increases in its angular relationship with the horizontal as the lever **39** is moving in a counterclockwise direction from the position of FIG. 4 to the position of FIG. 1 so that when the counterclockwise moving lever means **39** reaches the position illustrated in FIG. 3, a greater force is being applied by the compression spring **58** in moving such lever means **39** in a counterclockwise direction so that through the flexibility of the lever means **39**, the valve member **26** is moved away from its valve seat **25** with substantially a snap action in opposition to the force of the compression spring **36**.

Conversely, when the lever means **39** is being moved in a clockwise direction by the expanding power element **64** from the position illustrated in FIG. 3 to the position illustrated in FIG. 4 to open the valve member **28**, the line of force of the compression spring **58** is progressively making a smaller angle with the horizontal and, thus, is progressively reducing the force resisting the clockwise movement of the lever means **39** by the expanding power element **64** so that the valve member **28**, in effect, moves away from the valve seat **27** with a snap action in opposition to the force of the compression spring **37**.

Therefore, it can be seen that this invention not only provides an improved diverter valve means for controlling the flow of fluid between an inlet means there of and a pair of outlet means therefore, but also this invention provides an improved method for operating such a diverter valve means or the like.

What is claimed is:

1. A diverter valve means comprising a housing means having an inlet means and a pair of separate outlet means, a pair of valve seats respectively separating said inlet means from said pair of outlet means, a pair of valve members for respectively opening and closing said pair of outlet means, actuating means carried by said housing means for moving said valve members between their opened and closed positions, said actuating means when in one operating position thereof causing one of said valve members to be in its opened position and the other valve member to be in its closed position, said actuating means when in another operating position thereof causing said other valve member to be in its opened position and said one valve member to be in its closed position, said actuating means when moving between its said operating positions always causing the opened valve member to move to its closed position before said actuating means causes the closed valve member to move to its opened position, a pair of spring means respectively for said pair of valve members to normally urge said valve members toward their closed positions, and a pair of guide means carried by said housing for respectively guiding the opening and closing movement of said valve members, each guide means comprising a stem means having one end carried

by said housing means and an opposed free end, each valve member having opening means telescopically receiving the free end of its respective guide stem means and being axially movable relative thereto.

2. A diverter valve means comprising a housing means having an inlet means and a pair of separate outlet means, a pair of valve seats respectively separating said inlet means from said pair of outlet means, a pair of valve members for respectively opening and closing said pair of outlet means, and actuating means carried by said housing means for moving said valve members between their opened and closed positions, said actuating means when in one operating position thereof causing one of said valve members to be in its opened position and the other valve member to be in its closed position, said actuating means when in another operating position thereof causing said other valve member to be in its opened position and said one valve member to be in its closed position, said actuating means when moving between its said operating positions always causing the opened valve member to move to its closed position before said actuating means causes the closed valve member to move to its opened position, said actuating means including a condition responsive means, said condition responsive means including a flame detector means that is adapted to maintain said actuating means in its said one operating position when said detector means does not sense a certain flame means and is adapted to maintain said actuator means in its said other operating position when said detector means senses said certain flame means.

3. A diverter valve means as set forth in claim 2 wherein said condition responsive means includes an expansible and contractible power element, said element being fully contracted when said detector means is not sensing said certain flame means.

4. A diverter valve means as set forth in claim 2 and including a pair of spring means respectively for said pair of valve members to normally urge said valve members toward their closed positions.

5. A diverter valve means as set forth in claim 4 and including a pair of guide means carried by said housing for respectively guiding the opening and closing movement of said valve members.

6. A diverter valve means as set forth in claim 5 wherein said actuating means includes lever means pivotally carried by said housing means, said lever means having end means cooperable wtih said valve members for causing said opening and closing movements thereof.

7. A diverter valve means as set forth in claim 6 wherein said end means of said lever means is bifurcated to straddle said guide means of said valve members.

8. A diverter valve means as set forth in claim 7 and including snap acting means operatively interconnected to said lever means to pivot said lever means with a snap action.

9. A diverter valve means as set forth in claim 2 wherein said outlet means extend in opposite directions from said housing means.

10. A diverter valve means as set forth in claim 9 wherein said outlet means are disposed in offset axial relation relative to each other.

11. A diverter valve means as set forth in claim 2 wherein said actuating means includes a movable lever means carried by said housing means and being operatively interconnected to said valve members to cause said movement thereof.

12. A method for controlling fluid flow between an inlet means of a housing means and a pair of outlet means of said housing means that are respectively opened and closed by a pair of valve members moved between their opened and closed positions by actuating means carried by said housing means, said method comprising the steps of moving said actuating means to one operating position thereof to cause one of said valve members to be in its opened position and the other valve member to be in its closed position, and moving said actuating means to another operating position thereof to cause said other valve member to be in its opened position and said one valve member to be in its closed position, said steps of moving said actuating means between its operating position always causing the opened valve member to move to its closed position before said actuating means causes the closed valve member to move to its opened position, the moving of said actuating means between its operating positions being caused by a condition responsive means that includes a flame detector means.

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137—65, 119, 627.5; 236—15