April 1, 1969 R. C. GEHRKE 3,436,165

SPARK IGNITION DEVICE WITH A GAS CONTROL VALVE AND A SWITCH

Filed April 25, 1967 Sheet 1 of 2

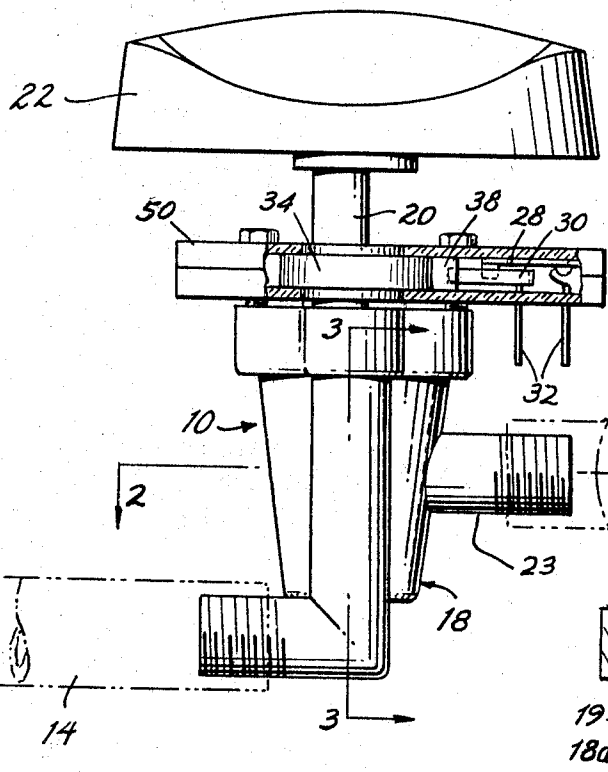


Fig. 1.

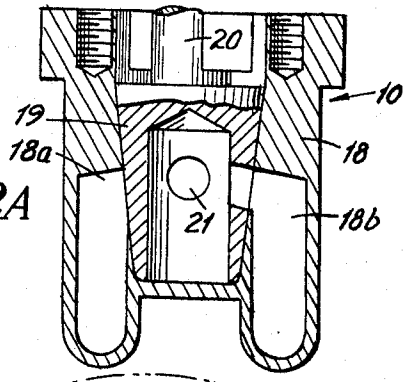


Fig. 2A

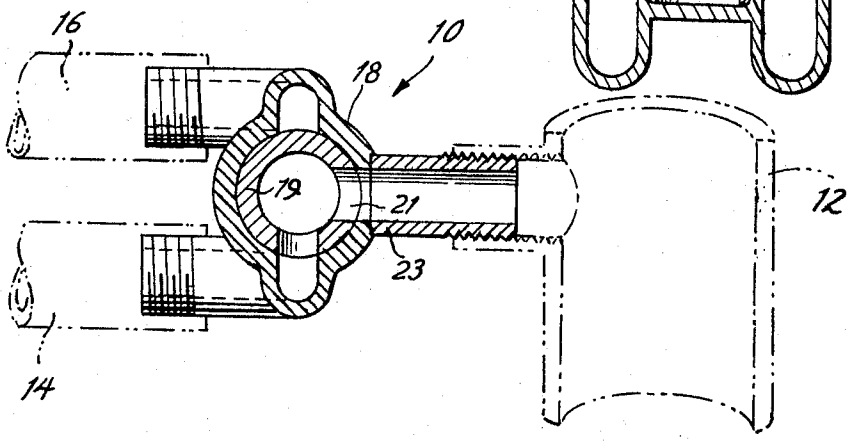


Fig. 2.

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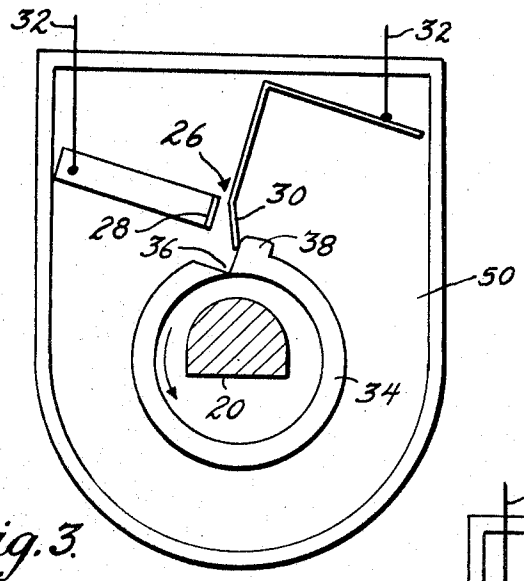


Fig. 3.

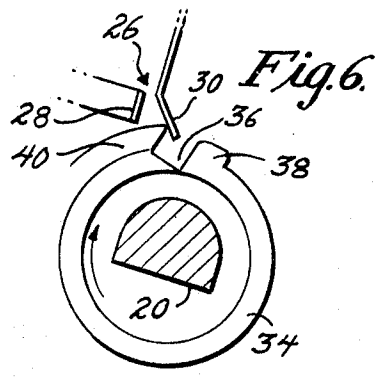


Fig. 6.

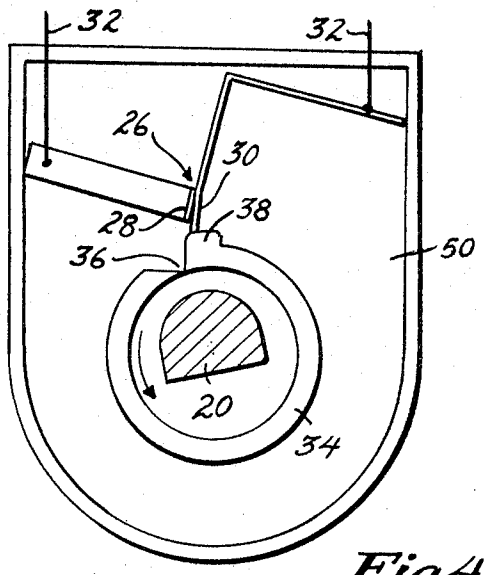


Fig. 4.

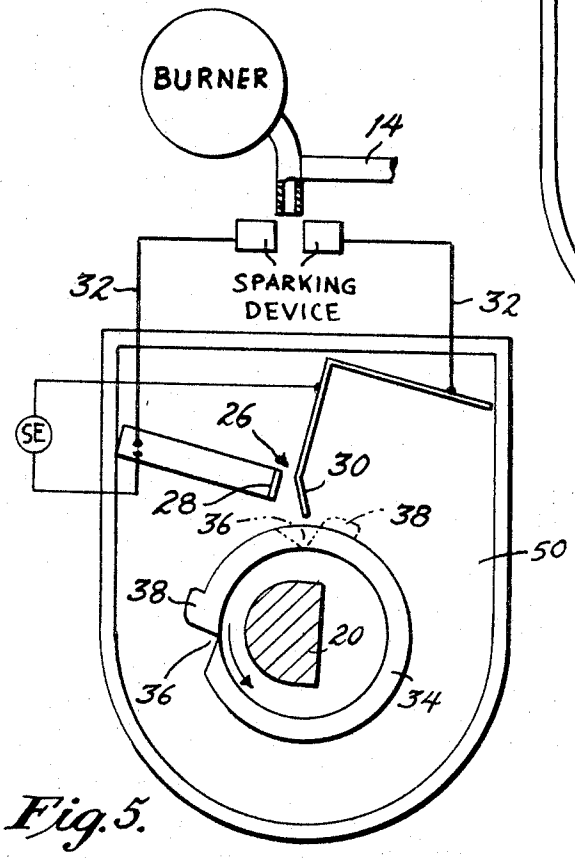


Fig. 5.

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SPARK IGNITION DEVICE WITH A GAS CONTROL VALVE AND A SWITCH

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5 Claims

ABSTRACT OF THE DISCLOSURE

A single shaft is rotatable in one direction to open a gas valve and simultaneously to close a switch momentarily to energize a spark-producing device to ignite the gas. Rotation of the shaft in the opposite direction closes the valve or cock and re-sets the switch.

The invention utilizes a capacitor or other arc or spark-producing device, a valve stem for opening and closing a gas cock, a switch for controlling the circuit of the spark-producing device and means for operatively connecting the switch with the valve stem whereby initial opening of the gas valve closes the switch to energize the spark-producing device substantially simultaneously with the arrival of the gas at the point of combustion.

In the drawings:

FIG. 1 is a side elevational view partly in section of a combined switch and a valve stem embodying my invention.

FIG. 2 is a sectional view looking in the direction of the arrows on line 2—2 of FIG. 1.

FIG. 2*a* is a sectional view taken on line 3—3 of FIG. 1 looking in the direction of the arrows.

FIG. 3 is an internal elevational view partly in section of the switch structure showing the switch in fully open position.

FIG. 4 is a view similar to FIG. 3 showing the positions of the switch parts as the valve stem is beginning to turn in valve-opening direction and as terminal **30** is being moved toward engagement with terminal **28** to close the switch.

FIG. 5 is a view similar to FIG. 4 showing, in solid lines, the position of the switch parts when the valve has been opened further and the switch has returned to its full open position. In broken lines, this view also shows the position of the switch parts when the gas valve has been fully closed and the switch has been reset.

FIG. 6 is an elevational view of the operating parts of the switch illustrating a modification thereof.

In FIG. 1, there is shown a conventional gas valve **10** which permits, or prevents, the flow of gas from a manifold **12** to pipes **14** and **16** which lead to points of combustion such as the front and rear top surface burners, or the oven or broiler, of a cooking stove or other appliance, or a pilot. A valve of this type comprises a casing **18** which houses a rotary valve plug **19**, which is carried by valve stem **20** and is rotated by knob **22**. Valve plug **19** has a transverse passage **21** which in one position of the plug, is out of registration with the nipple **23** and prevents all flow of gas from the manifold **12** to pipes **14** and **16**, and which in other positions of the valve plug, permits partial, or full, flow of gas through passageways **18***a* or **18***b* of the casing to said pipes.

Since the valve described is a purchased item and has been known for generations, and since its structure is not being claimed as such, and since any one, following the above description can construct it, or an operative substitute, additional details of the valve are not shown nor described. It is enough to note that the valve

plug is rotatable in either direction, and that rotation in counter-clockwise direction, as viewed in FIGS. 3 to 5, "opens" the valve, that is, permits the flow of gas from the manifold **12** to pipes **14** and **16**, and vice versa.

To carry out the invention, I provide a switch housing **50** containing a normally open switch **26** which housing is carried by casing **18**, the switch **26** being adapted to be closed by rotation of valve stem **20**. As can be seen from FIGS. 3 to 5, switch **26** includes a fixed, rigid, terminal **28** and a resilient and movable terminal **30**. These terminals are connected, by wires **32**, to a capacitor, or other spark or arc-producing device, not shown, which, when the switch is closed by engaging terminal **30** with terminal **28**, will produce an electric arc or spark. Since arc and spark-producing devices are old in welding and in other arts, and since they are available on the market, and since no claim is made to any special device, the structure and operation of no particular type of arcing device is shown nor described. It is sufficient to say that the closing of the switch produces an arc, or spark, at the point of combustion.

In order to provide an ignition spark substantially simultaneously with the arrival of gas at the point of combustion; to limit the length or endurance of the spark to the extent necessary to cause ignition; to enable the operator to produce repeated sparks; to prevent the formation of a spark during the further movement of the valve plug in gas flow permitting direction, or in gas flow restricting direction; and in order to cause the full closing of the valve to re-set the switch for another cycle of operation, movable terminal **30** is normally biased away from terminal **28** so that switch **26**, if unrestrained, will be normally open as shown in FIGS. 3 and 5. It will also be seen that the position of terminal **30** in FIG. 5 coincides with partial, or with full, opening of the valve.

In order to close switch **26** just as the gas valve is opened, I provide valve stem **20** with a disc **34** which has a notch **36** for receiving the bottom end of terminal **30**, and with a lug **38** for moving terminal **30** into momentary engagement with fixed terminal **28**.

The operation is as follows:

Beginning with the switch fully open, as shown in solid lines in FIG. 5, and with the valve fully closed, as shown in broken lines in FIG. 5, the operator turns knob **22** and valve stem **20** in counter-clockwise direction to engage the left side of lug **38** with the right side of terminal **30**, as shown in FIG. 3. Further movement of the valve stem begins to open the valve as it moves terminal **30** toward engagement with the fixed terminal **28** of the switch, as shown in FIG. 4. By this arrangement an arc, or spark, will be produced just as the gas reaches the point of combustion. Further rotation of the valve stem moves lug **38** out of engagement with, and to the left of, terminal **30**, as shown in solid lines in FIG. 5 to permit partial or full flow of gas. When the valve stem is turned in counter-clockwise direction to full closed position, lug **38** first engages the left side of terminal **30** and progressively clears the lower end of terminal **30** until it assumes the position shown in broken lines in FIG. 5. It will be noted that the movement of the valve in closing direction moves terminal **30** away from terminal **28**, or in switch-opening, not switch-closing, direction. Also, fully closing the valve brings lug **38** to the right of terminal **30** and resets the switch for another cycle.

In order to provide positive, fool-proof protection against unintended closing of switch **26**, disc **34** is provided with a ridge **40** which is shown in FIG. 6 and which, when the valve is in closed position, engages the left side of terminal **30** and provides a positive stop to prevent terminal **30** from unintended contact with terminal **28** until disc **34** is turned in counter-clockwise direction,

far enough for the right edge of ridge **40** to clear terminal **28**.

It will be noted that the movement of the valve stem and of terminal **30** are so coordinated, the igniting spark is produced just as the gas arrives at the point of combustion (the point of sparking), that is, before the accumulation of enough gas to cause any explosion.

It will also be noted that if, for any reason, no spark is produced at first try, the operator can immediately turn back to valve closing direction, again before any objectionable amount of gas has escaped. If the operator wishes, he can again turn the valve in counter-clockwise direction for a second try at ignition. This can be done safely because the amount of gas reaching the sparking device is so small that the operation of the valve a few times without achieving ignition, will not produce any seriously dangerous conditions.

What I claim is:

1. In combination:

a valve for controlling the flow of gas to a burner and igniting means for igniting said gas substantially simultaneously with its arrival at said burner,

said valve including a housing, a shaft rotatably mounted in said housing, and a plug on said shaft rotatable therewith within said housing between a closed position in which no gas flows to said burner and at least one open position in which gas flows to said burner,

said igniting means including a spark-producing device, a normally open switch electrically connected to said spark-producing device, and actuating means for closing said switch, said actuating means comprising a dielectric disc mounted upon said shaft, said switch including a pair of normally spaced apart contacts one of which is resilient and dimensioned to extend into a notch in an edge of said disc, said disc being rotatable with the shaft to move a side of said notch into engagement with the contact therein and urge said contact momentarily into engagement with the second contact when the shaft, plug and disc are moved in the valve-opening direction, thereby energizing said spark-producing device.

2. The combination set forth in claim **1** wherein a dielectric casing encloses and supports said switch and said disc and is fixed to said valve casing, and said shaft extends through the switch casing and supports the disc in proximity to said switch.

3. The combination set forth in claim **1** wherein said disc is provided with means for preventing accidental engagement of the flexible contact with the other contact upon movement of the shaft and disc in the valve-closing direction.

4. The combination set forth in claim **3** wherein said means comprises a projection on the disc at one end of said notch.

5. In combination, a rotary valve for controlling the flow of gas to a burner and igniting means for igniting said gas substantially simultaneously with its arrival at said burner,

said valve including a housing, a shaft mounted in said housing for rotation about its axis, and a plug on said shaft rotatable coaxially therewith between a closed position in which no gas flows to said burner and at least one open position in which gas flows to said burner,

said igniting means including a spark-producing device, a dielectric casing fixed to said valve housing, a normally open switch said casing and electrically connected to said spark-producing device, and actuating means in said casing for closing said switch, said actuating means comprising a dielectric disc mounted coaxially upon said shaft, said switch including a pair of normally spaced apart contacts one of which is resilient and dimensioned to extend into a notch in an edge of said disc, said disc being rotatable with the shaft to move a side of said notch into engagement with the contact therein and urge said contact momentarily into engagement with the second contact, thereby energizing said spark-producing device.

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U.S. Cl. X.R.

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