

- [54] FUEL CONTROL DEVICE AND SYSTEM
UTILIZING THE SAME

- [75] Inventor: **Harvey J. Shopsy**, Latrobe, Pa.

- [73] Assignee: **Robertshaw Controls Company,**
Richmond, Va.

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- [51] **Int. Cl.**..... **F16k 35/00**

- [58] **Field of Search**..... 251/96, 148

- ## [56] References Cited

UNITED STATES PATENTS

- | | | | |
|-----------|--------|--------------|--------|
| 1,953,776 | 4/1934 | Roberts..... | 251/96 |
| 2,194,714 | 3/1940 | Mueller..... | 251/96 |

- 2,634,949 4/1953 Robinson..... 251/96

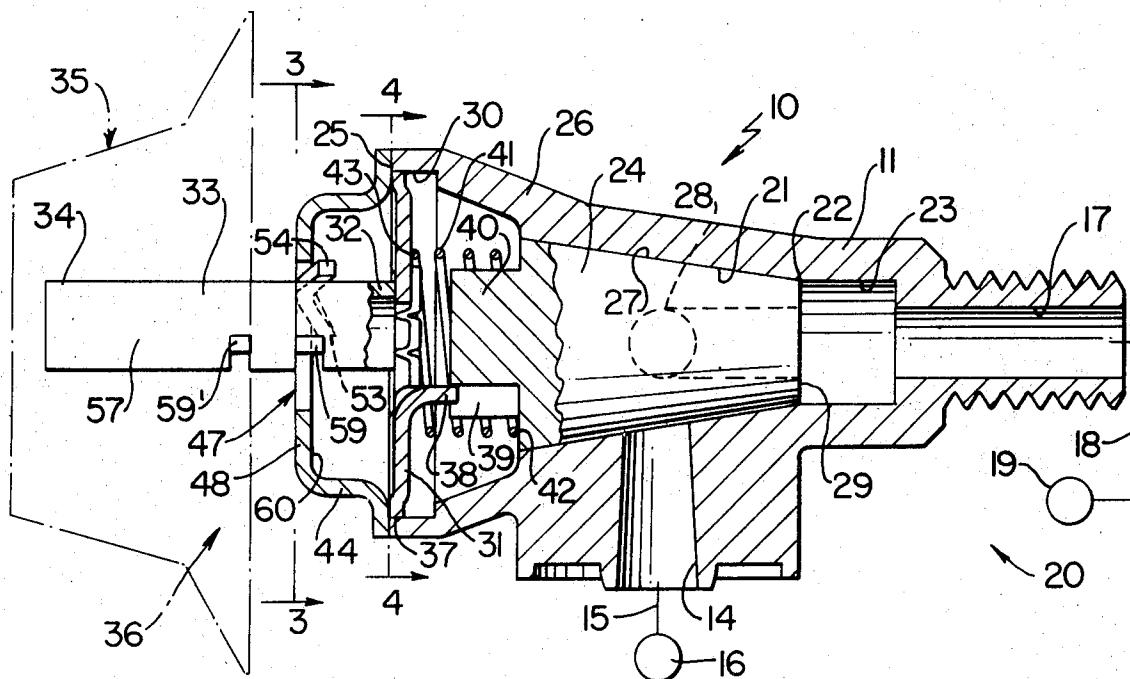
Primary Examiner—Henry T. Klinksiek

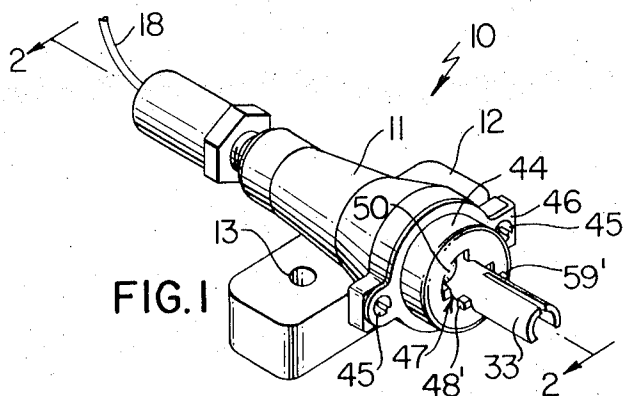
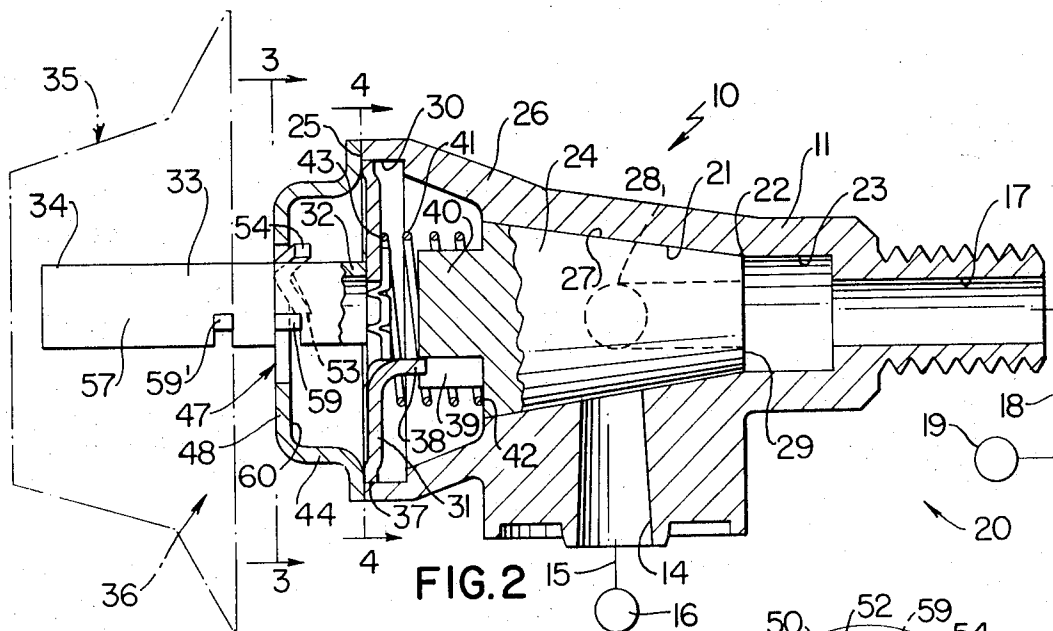
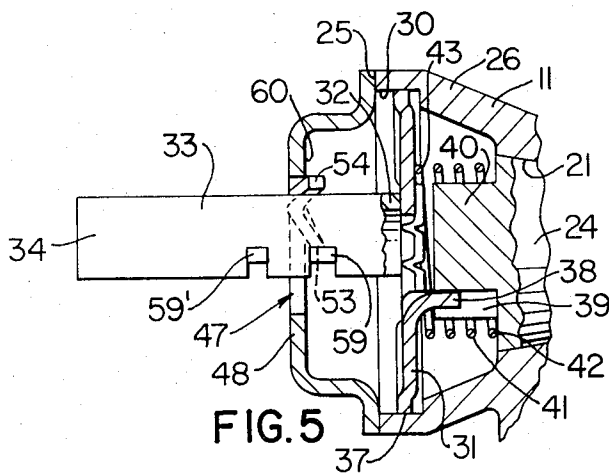
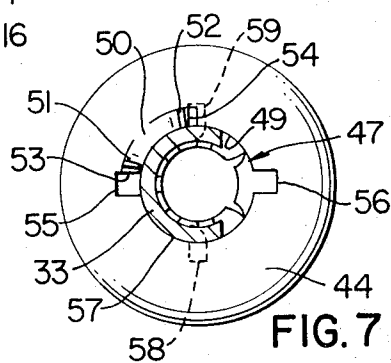
Attorney—James Candor

[57] **ABSTRACT**

A fuel control device wherein the manual selector is axially movable relative to a valve housing to unlock the selector therefrom and is movable in a rotational direction relative to the housing to drive a fuel control valve member between its operating positions. In order to prevent wobble of the selector as the same is being moved relative to the valve member and/or relative to the housing, the selector and the housing each respectively has a pair of axially spaced guides cooperating respectively with the pair of guides on the other member so that in all positions of the selector, the two axially spaced guides of the selector are cooperating with the axially spaced guides of the housing.

7 Claims, 8 Drawing Figures





FUEL CONTROL DEVICE AND SYSTEM UTILIZING THE SAME

This is a division of U.S. Pat. application Ser. No. 129,701, filed March 3, 1971, now U.S. Pat. No. 3,712,580.

This invention relates to an improved fuel control device as well as to an improved fuel control system utilizing such a fuel control device.

It is well known that various fuel control devices have been provided in the past wherein the manually operable selector means for the fuel control device that is adapted to drive the fuel control valve of the device between its various operating positions is adapted to be locked in an "off" position thereof so that in order to move the selector means from its "off" position to any "on" operating position thereof, the operator must axially move the selector means relative to the control device to unlock the selector means before such selector means can be moved in the operating direction thereof for moving the valve member between its various operating positions. Such operating movement of the selector means is normally a rotational movement thereof whereas the unlocking movement of the selector means is normally an axial movement transverse to such rotational movement and more particularly is an axial pushing-in movement on the selector means.

It has been found according to the teachings of this invention, that such prior known fuel control devices have excess wobble between the selector means thereof and the housing means carrying such selector means during the movement of the selector means relative to the valve member and/or relative to the housing means containing such valve member.

Accordingly, it is a feature of this invention to provide guide means for such a fuel control device which will substantially eliminate the aforementioned wobble between the selector means and the housing means during movement of the selector means.

In particular, one embodiment of this invention comprises a fuel control device having a housing provided with an inlet and an outlet separated from each other by a valve seat surface of the housing. A movable valve member is carried by the housing and cooperates with the valve seat surface so that in one position of the valve member relative to the housing, the inlet is interconnected to the outlet and in the other position of the valve member relative to the housing, the inlet is disconnected from the outlet. A movable selector is carried by the housing and has a part thereof operatively interconnected to the valve member for moving the valve member between the operating positions thereof as the selector is being moved in unison therewith between an "off" position thereof and an "on" position thereof. The selector and the housing respectively have lock means that cooperate together to lock the selector in its "off" position thereof when the valve member is in its "off" position. The selector is axially movable relative to the valve member to lock and unlock the lock means. The housing and the selector each respectively have a pair of axially spaced guide means cooperating respectively with the pair of guide means on the other member to prevent wobble of the selector as the same is being moved relative to the valve member and relative to the housing. By having such guide means axially spaced along the selector, the selector is positively held in two axially spaced locations thereof during any

movement of the selector so that adverse wobble cannot take place between the selector and the housing.

Accordingly, it is an object of this invention to provide an improved fuel control device 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 fuel control system utilizing such a fuel control device.

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 perspective view of the improved fuel control device of this invention.

FIG. 2 is an enlarged cross-sectional view taken on line 2—2 of FIG. 1 and schematically illustrates the fuel control system utilizing the fuel control device of FIG. 1.

FIG. 3 is a fragmentary, cross-sectional view taken on line 3—3 of FIG. 2.

FIG. 4 is a fragmentary cross-sectional view taken on line 4—4 of FIG. 2.

FIG. 5 is a fragmentary view similar to FIG. 2 and illustrates the selector means in its unlocked position relative to the housing of the fuel control device.

FIG. 6 is a view similar to FIG. 3 and illustrates the selector means being moved between its various "on" operating positions.

FIG. 7 is a view similar to FIG. 6 and illustrates the selector means disposed in its fully "on" position.

FIG. 8 is an exploded perspective view of the various parts of the fuel control device of FIG. 1.

While the various features of this invention are hereinafter described and illustrated as being particularly adapted to provide a fuel control device for a cooking apparatus 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 a fuel control device for other apparatus as desired.

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 FIGS. 1 and 2, the improved fuel control device of this invention is generally indicated by the reference numeral 10 and comprises a housing means 11 having a mounting portion 12 provided with opening means 13 therethrough for mounting the control device 10 to a desired supporting structure, such as the frame structure of a cooking apparatus, so that an inlet 14, FIG. 2, of the housing means 11 can be interconnected by a suitable conduit means or manifold 15 to a source of fuel 16 and an outlet 17 of the housing means 11 can be interconnected by suitable conduit means 18 to a fuel burner 19 for the cooking apparatus whereby the fuel control device 10 is adapted to be coupled into the fuel control system of this invention that is generally indicated by the reference numeral 20 in FIG. 2.

The housing means 11 of the fuel control device 10 includes an internal, frusto-conical valve seat surface 21 interrupted by the inlet 14 and having its smaller end or base 22 coaxially aligned with a passage means 23 that leads to the outlet 17.

A frusto-conical plug valve member 24 is disposed through an open end 25 of a housing part 26 of the

housing means 17 that defines the frusto-conical valve seat surface 21 and has an outer peripheral surface 27 mating with the internal frusto-conical valve seat surface 21 of the housing part 26 so as to be disposed in sliding, rotational and sealing relation therewith in a manner well known in the art. The plug valve member 24 has a passage means 28 interrupting the frusto-conical peripheral surface 27 thereof for mating with the inlet 14 when aligned therewith, the passage means also interrupting the smaller end or base 29 of the plug valve member 24 so as to be in aligned relation with the passage 23 of the housing means 11 in all rotational positions of the plug valve member 24 relative to the housing means 11.

The open end 25 of the housing part 26 is provided with an annular cylindrical interior surface 30 defining a guide means or surface of the housing means 11 as will be apparent hereinafter.

A drive disc 31 is fastened to one end 32 of a control shaft 33 having its other end 34 adapted to be interconnected to a suitable control knob or the like, such control knob or the like being illustrated in phantom lines in FIG. 2 and being generally designated by the reference numeral 35. The knob 35, the control shaft 33 and the drive disc 31 of the control device 10 comprise a selector means therefor that is generally indicated by the reference numeral 36 and is adapted to be movable relative to the housing means 11 as well as movable relative to the valve member 24 in a manner hereinafter described.

The drive disc 31 of the selector means 36 has a plurality of outer arcuate peripheral lugs or guides 37 disposed in sliding and engaging relation with the annular guide surface 30 of the housing means 11 in all rotational and axial positions of the selector means 36 relative to the housing means 11 whereby the peripheral surfaces 37 of the drive disc 31 and the cooperating annular surface 30 of the housing means 11 define one pair of cooperating guide means of the selector means 36 and the housing means 11 to be utilized in a manner hereinafter described to prevent adverse wobble of the selector means 36 relative to the housing means 11 of the control device 10.

The drive plate 31 of the selector means 36 has an outwardly directed tang 38 carved or stamped therefrom that is adapted to be received in a recess or slot 39 formed in an end 40 of the plug valve member 24 so as to spline the drive disc 31 thereto. In this manner, rotational movement of the disc 31 relative to the housing means 11 causes like rotational movement of the valve member 24 relative to the housing means. However, the spline connection between the drive disc 31 and the plug valve member 24 permits the drive disc 31 to be axially movable relative to the valve member 24 between the positions illustrated in FIGS. 2 and 5.

In order to maintain the frusto-conical peripheral surface 27 of the plug valve member 24 in sealing engagement with the frusto-conical internal surface 21 of the housing part 26 at all times, a compression spring 41 is disposed in the housing means 11 and has one end 42 bearing against the plug valve member 24 and the other end 43 thereof bearing against the drive disc 31 to tend to maintain the drive disc 31 in its axially out position as illustrated in FIG. 2 wherein the outer peripheral parts 37 of the drive disc 31 abut against a cup-shaped casing member 44 secured to the open end 25 of the housing part 26 by suitable fastening means 45

passing through ear means 46 of the casing or cover member 44. Thus, regardless of the axial position of the drive disc 31 relative to the housing means 11, the force of the spring 41 is to drive and maintain the plug valve member 24 to the right in FIG. 2 and, thus, into sealing engagement with the valve seat surface 21 of the housing means 11.

The cup-shaped casing 44 of the housing means has an opening 47 passing through the closed end 48 thereof with the opening 47 defining a circular internal peripheral surface 49 of the end wall 48 of the casing 44 that is coaxially aligned with the plug valve member 24. However, an arcuate section 50 of the end wall 48 of the casing 44 adjacent the arcuate internal surface 49 of the opening 47 is deformed at the opposed ends 51 and 52 thereof so as to define inwardly directed stop end wall means 53 and 54 for a purpose hereinafter described.

The end wall 48 of the casing 44 is also interrupted by a pair of slots or notches 55 and 56 disposed diametrically opposite each other and intersecting with the opening 47 as illustrated, the notches 55 and 56 defining locking means of the housing means 11 for a purpose hereinafter described.

The control shaft 33 of the selector means 36 is substantially C-shaped in cross section to define an arcuate outer peripheral surface 57 that is adapted to be disposed in sliding engagement as well as in rotational engagement with the circular internal peripheral surface 49 of the end wall 48 of the casing 44 as illustrated so as to be guided in its movement by such surface 49 not only in a rotational direction, but also in an axial direction.

In this manner, it can be seen that the shaft 33 of the selector means 36 has its guide means 57 being guided by the guide surface 49 of the casing 44 with such pair of cooperating guide means being axially along the selector means 36 from the pair of guide means defined by the peripheral means 37 of the drive disc 31 and the annular surface of the housing part 26.

The C-shaped shaft 33 of the selector means 36 has a pair of outwardly directed lock tangs 58 and 59 carved therefrom and being substantially diametrically located on the shaft 33 so as to be respectively alignable and axially movable in the lock notches 55 and 56 of the end wall 48 of the casing 44. Thus, when the tangs 58 and 59 of the C-shaped shaft 33 of the selector means 36 are respectively aligned with the notches 55 and 56 of the end wall 48 of the casing 44, the force of the compression spring 41 moves the selector means 36 to the left in FIG. 2 whereby the lock tangs 58 and 59 are respectively located within the lock notches 55 and 56 when the drive disc 31 abuts against the casing 44 as illustrated in FIG. 2 to limit further leftward movement of the selector means 36 under the force of the spring 41. Thus, rotational movement of the selector means 36 in the position of FIG. 2 is prevented by the lock tangs 58 and 59 in the lock notches 55 and 56.

However, when the shaft 33 of the selector means 36 is moved axially to the right in FIG. 2 to the position illustrated in FIG. 5 by the operator axially pushing-in on the selector means 36, the lock tangs 58 and 59 of the shaft 33 respectively clear the lock notches 55 and 56 of the end wall 48 of the casing 44 to permit the same to be rotated relative to the casing 44 because the lock tangs 58 and 59 are now disposed to the right of the inside surface 60 of the end wall means 48 of the casing

44 in the manner illustrated in FIG. 5. However, the lock tang 58 of the shaft 33 is then aligned in abutting relation with the stop surface 53 of the inwardly bent tang 51 of the casing 44 to prevent rotation of the shaft 33 in a clockwise direction in FIG. 1 so that the shaft 33 must be rotated in a counterclockwise direction in FIG. 1 to cause passage means 28 thereof to become alignable with the inlet 14 of the housing part 26. The passage 28 in full alignment with the inlet passage 14 of the housing part 36 when the shaft 33 has been rotated in a counterclockwise direction substantially 90° in the manner illustrated in FIG. 6 to the position illustrated in FIG. 7 where the stop tang 59 of the shaft 33 now abuts against the stop surface 54 of the inwardly bent tang 52 of the end wall 48 of the casing 44 to limit such counterclockwise movement of the shaft 33 relative to the housing means 11.

Because the lock tangs 58 and 59 of the shaft 33 are now disposed on the side 60 of the casing 44, such tangs 58 and 59 can ride against the surface 60 in all operating positions of the shaft 33 except when the shaft 33 has been turned to the "off" position as illustrated in FIGS. 2 and 3 where the force of the compression spring 41 is adapted to drive the lock tangs 58 and 59 as well as the shaft 33 to the left to lock the same in its "off" position as previously described.

However, it can be seen that when the shaft 33 is axially moved relative to the housing means 11 to unlock the shaft 33 from the lock notches 55 and 56 of the casing 44, the peripheral surface 57 of the shaft 33 is still in engagement with the peripheral surface 49 of the end wall 48 of the casing 44 and the peripheral surfaces 37 of the drive disc 31 axially spaced therefrom are in sliding engagement with the annular surface 30 of the housing part 26 so that two pairs of axially spaced cooperating guide means between the selector means 36 and the housing means 11 maintain the selector means 36 in positive relationship relative to the housing means 11 so that no adverse wobbling of the selector means takes place during the unlocking of the control shaft 33 from the casing 44. Further, during rotational movement of the unlocked control shaft 33 of the selector means 36, the cooperating pairs of axially spaced guide means previously described remain in cooperating contact with each other so that the selector means 36 is also prevented from adverse wobbling during rotational movement thereof.

The control shaft 33 has another pair of tangs 58' and 59' formed thereon in spaced relation to the tangs 58 and 59 and are utilized to limit and lock the control knob 35 on the control shaft 33.

The operation of the control device 10 as utilized in a fuel control system 20 will now be described.

Assuming that the selector means 36 is in its locked "off" position illustrated in FIG. 2, it can be seen that the plug valve 24 completely seals off the inlet 14 at the valve surface 21 of the housing part 26 with its peripheral surface 27 so that no fuel from the source 16 can flow to the burner means 19 through the control device 10.

When the operator desires to connect the fuel source 16 to the burner means 19, the operator first must push axially inwardly on the control shaft 33 toward the housing means 11 to cause the lock tangs 58 and 59 to clear out of the lock slots 55 and 56 in the end wall 48 of the casing 44 in the manner illustrated in FIG. 5 in opposition to the force of the compression spring 41 so

that the control shaft 33 can now be rotated in a counterclockwise direction in FIG. 1 to the fully "on" position illustrated in FIG. 7 or in any partially "on" position as illustrated in FIG. 6 to vary the interconnection of the inlet 14 with the passage 28 leading to the outlet 17. Of course, when the shaft 33 is rotated a full 90° in a counterclockwise direction, the tang 59 now abuts against the end surface 54 of the tang 52 of the casing 44 to locate the plug valve 24 in its fully "on" position for interconnecting the fuel source 16 to the burner means 19.

When the operator desires to disconnect the fuel source 16 from the burner means 19, the operator merely rotates the shaft 33 of the selector means 36 in a clockwise direction until the tang 58 abuts against the surface 53 of the tang 51 of the casing 44 as illustrated in FIG. 5 and the force of the compression spring 41 will then force the shaft 33 to the left to the position illustrated in FIG. 2 where the lock tangs 58 and 59 are now received in the lock notches 55 and 56 to prevent normal rotational movement of the control shaft 33 relative to the housing means 11 until the same is again axially moved relative to the housing means 11 to unlock the same.

Therefore, it can be seen that during such movement of the selector means 36 relative to the housing means 11, the two pairs of cooperating guide means respectively defined by the surfaces 57, 49 and 37, 30 prevent the selector means 36 from wobbling relative to the housing means 11 during the axial unlocking of the selector means 36 relative thereto as well as during rotational movement of the selector means 36 relative thereto.

Therefore, it can be seen that this invention not only provides an improved fuel control device 10 having many novel and unobvious features as set forth above, but also this invention provides an improved fuel control system utilizing such a control device.

While the form of the invention now preferred has been disclosed and described as required by the statutes, other forms may be utilized all coming within the scope of the appended claims.

What is claimed is:

1. In a fuel control system having a source of fuel and a burner means, the improvement comprising a fuel control device provided with a housing means having an inlet and an outlet separated from each other by a valve seat surface means of said housing means, a movable valve member carried by said housing means and cooperating with said valve seat surface means so that in one position of said valve member relative to said housing means said inlet is interconnected to said outlet and in other position of said valve member relative to said housing means said inlet is disconnected from said outlet, and a movable selector means carried by said housing means and having interconnection means operatively interconnected to said valve member for moving said valve member between said positions thereof as said selector means is being moved in substantial unison therewith between an "off" position thereof and an "on" position thereof, said selector means and said housing means respectively having lock means that cooperate together to lock said selector means in said "off" position thereof when said valve member is in said other position thereof, said selector means being axially movable relative to said valve member to lock and unlock said lock means, said hous-

ing means and said selector means each respectively having a pair of axially spaced guide means cooperating respectively with the other pair of guide means to prevent wobble of said selector means as the same is being moved relative to said valve member and relative to said housing means, one pair of cooperating guide means of said housing means and said selector means comprising a casing member of said housing means having a guide slot passing therethrough and receiving said cooperating guide means of said selector means, said guide means of said selector means that cooperates with said guide slot comprising a control shaft passing through said slot, said lock means of said housing means comprising notch means passing through said casing member with such notch means intersecting with said slot, said lock means of said selector means comprising two tang means carved from said shaft and being receivable in said notch means to lock said selector means in said "off" position thereof, said casing member having a pair of stops carbed therefrom and respectively being engageable with said tangs to limit rotational movement of said shaft relative to said housing means.

2. In a fuel control system as set forth in claim 1, the further improvement wherein said valve member comprises a rotatable valve member.

3. In a fuel control system as set forth in claim 2, the further improvement wherein said rotatable valve

member comprises a plug valve member.

4. In a fuel control system as set forth in claim 3, the further improvement wherein said interconnection means includes a compression spring acting against said plug valve member to tend to maintain the same in sealing relation against said valve seat surface means even though said selector means is being moved between its locked and unlocked positions.

5. In a fuel control system as set forth in claim 4, the further improvement wherein said plug valve member has a substantially frusto-conical configuration and said valve seat surface means of housing means is complementary thereto.

6. In a fuel control system as set forth in claim 4, the further improvement wherein said compression spring also acts against said selector means to tend to move the same relative to said valve member and toward its locked position.

7. In a fuel control system as set forth in claim 1, the further improvement wherein the other pair of cooperating guide means comprises a disc member carried by said selector means and having an outer periphery engaging an annular guide surface of said housing means whereby said outer periphery remains in guiding engagement with said annular surface during movement of said selector means relative to said valve member and relative to said housing means.

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