Oct. 6, 1942. M. D. HUSTON 2,298,212

OIL VALVE CLEANER

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Fig.1

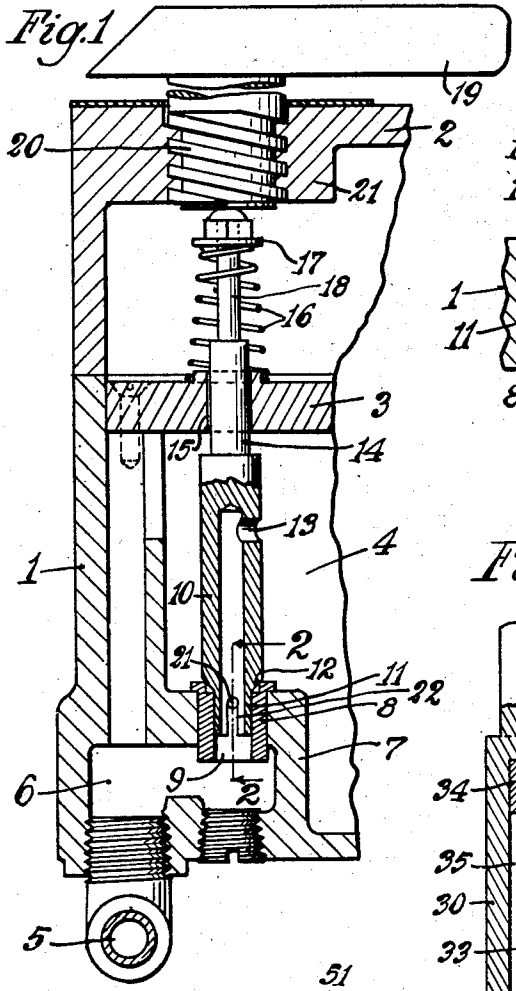


Fig.2

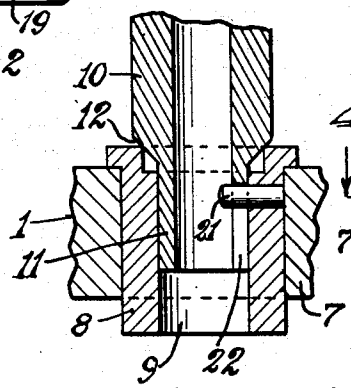


Fig.3

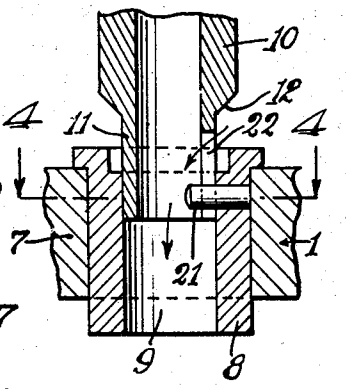


Fig.4

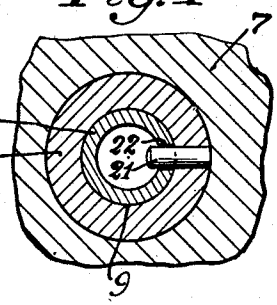


Fig.5

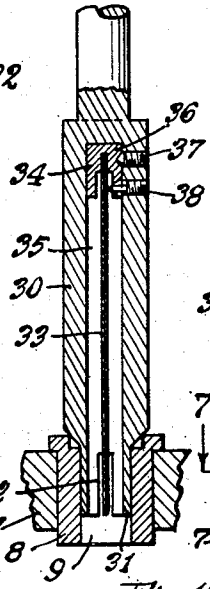


Fig.6

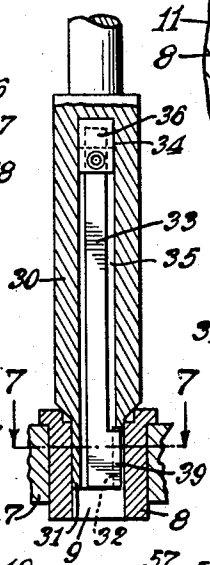


Fig.7

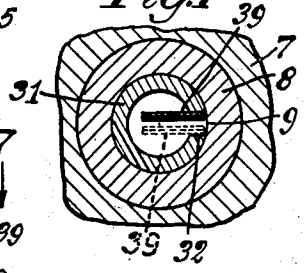


Fig.8

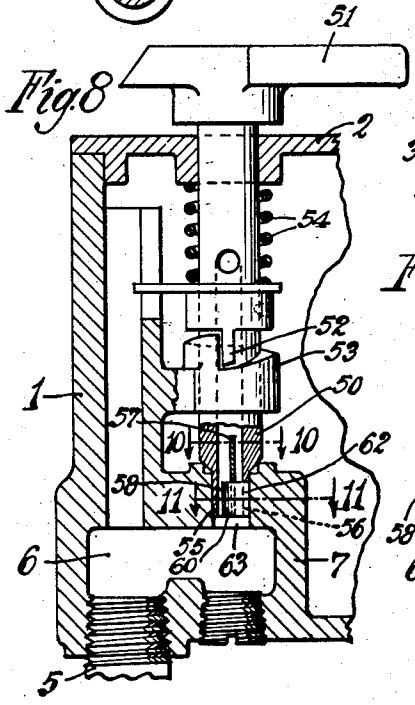


Fig.9



Fig.10

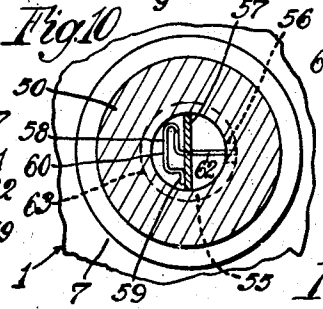
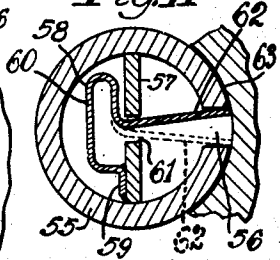


Fig.11



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Fig. 12

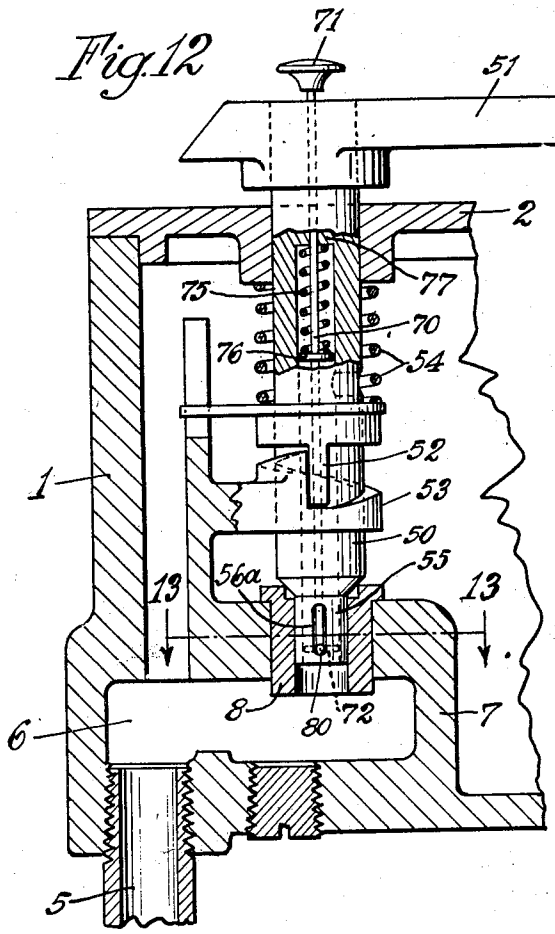


Fig. 13

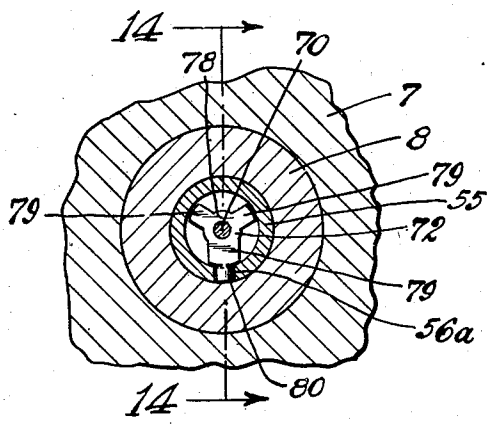


Fig. 14

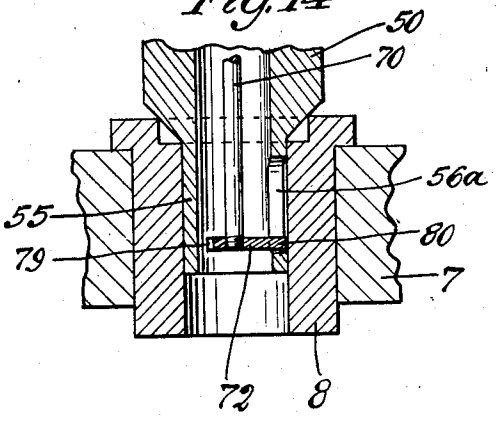
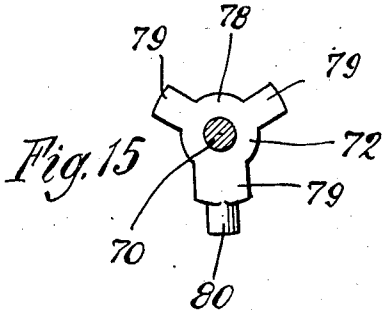


Fig. 15



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OIL VALVE CLEANER

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Application October 21, 1940, Serial No. 362,112

15 Claims. (Cl. 251—29)

My invention relates to an improved cleaning means for cleaning oil valve metering slots.

One purpose is the provision of improved means for keeping the slot in an oil valve from filling up with foreign matter.

Another purpose is the provision of means for keeping the oil valve slot or slots clean in response to movement of the valve member itself.

Another purpose is the provision of means for cleaning the oil valve slot or slots in response to varying temperatures.

Another purpose is the provision of improved means for cleaning the oil valve slot or slots in response to rotation of the stem.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a partial vertical section along the axis of the valve;

Fig. 2 is a section on the line 2—2 of Fig. 1 on an enlarged scale;

Fig. 3 is a section similar to Fig. 2 showing the parts in a different position;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a section through a valve illustrating a variant cleaning means;

Fig. 6 is a similar section through the structure of Fig. 5, taken at an angle of ninety degrees;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a section similar to Fig. 1, through a variant form of the device;

Fig. 9 is a detail;

Fig. 10 is a section on the line 10—10 of Fig. 8, on an enlarged scale;

Fig. 11 is a section on the line 11—11 of Fig. 8, on a still larger scale;

Fig. 12 is a vertical section through a variant form;

Fig. 13 is a section on the line 13—13 of Fig. 12;

Fig. 14 is a section on the line 14—14 of Fig. 13; and

Fig. 15 is a plan view of the cleaning blade on an enlarged scale.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the drawings, 1 generally indicates a float valve housing, the details of which do not of themselves form part of the present invention. 2 is a top or cover therefor. 3 is an intermediate partition or support. 4 indicates the inner chamber of the float valve, which is normally partially filled with oil or a similar liquid fuel. 5 is the oil outlet passage means, which may be connected to a space 6 within an interior wall 7. The horizontal portion of the interior wall 7 may receive any suitable valve seat element 8, defining the valve passage 9.

10 is a valve member or hollow stem having a lower portion 11, penetrating the valve aperture, a tapered or conic shoulder 12 opposed to the upper surface or surfaces of the valve seat, an upper aperture or air vent 13, and an upper solid stem 14 penetrating the aperture 15 in the partition 3, whereby the stem or valve structure as a whole is guided for movement in a generally vertical path.

16 is a coil spring compressed between the top of the wall 3 and a washer 17 on an upwardly extending stem portion of reduced diameter 18 whereby the spring 16 tends to hold the valve or valve stem structure in a raised position. It may be depressed against the spring 16 by any suitable means, for example an exterior manual knob or handle 19, screw threaded as at 20 into a thickened portion 21 of the top wall 2. It will be understood that the handle 19 may be rotated to raise the screw threaded portion 20 and thereby to permit the spring 16 to raise the valve structure and permit the flow of fuel across the valve seat.

Rotation of the hollow stem 10 is prevented by a pin 21 extending into a slot 22, which slot provides a passage for the flow of fuel through the aperture 9 when the valve element 10 is in the raised position in which it is shown in Fig. 3. The small slot is effective to provide a close gauging of the fuel passing therethrough. It is important to prevent a deposit of wax or any gummy or solid material in this slot, since the accuracy of the control of the fuel flow is thereby affected. The pin 21 constitutes a wiping or cleaning device which, in response to the raising or lowering of the structure 10, scrapes any solid or gummy deposit from the walls of the slot 22.

Referring to the form of Figs. 5 to 7, I illustrate a similar valve element 30, with the bottom reduced cylindrical portion 31, having a metering slot 32. 33 indicates a thermostatic leaf or bimetallic strip secured at its upper end, as at 34, within the hollow 35 of the member 30. It may be positioned, for example, in a plug 36, held in position by a set screw 37. 38 indicates an adjusting screw for adjusting the thermostatic leaf. The leaf has a bottom offset 39, which penetrates the slot 32, and, as the bimetallic strip 33 flexes in response to temperature

changes, wipes back and forth and clears the slot 32 of any deposited material. It will be effective, for example, to squeeze out any material which tends to settle in or clog the aperture before it has a chance to solidify.

Referring to the form of Figs. 8 to 11, I illustrate means for cleaning the slot in response to rotation of the valve element. I illustrate, for example, a valve element 50, which may be rotated by an exterior handle 51. It carries an abutment 52 riding on a spiral cam 53, whereby rotation of the handle 51 bodily raises and lowers the member 50. The spring 54 tends normally to urge the valve element 50 toward closed position. The lower reduced diameter portion 55 is provided with a metering slot 56. The hollow of the valve 50 may have mounted in or pressed therein a plate or leaf 57, which is fixed in relation to the walls of the member 50. Secured to it, for example by welding, is a spring scraper, generally indicated as 58, which may, for example, be welded at one end, as at 59, and may be provided with a recurved portion 60, passing through a slot 61 of the member 57. Extending outwardly from the recurved portion is a generally radial portion 62, the end of which extends through the slot 56 and abuts frictionally against the wall of the valve aperture 63. It will be understood that, as the valve structure 50 is rotated, the spring end 62 is given a wiping movement, indicated by the range between the full line and the dotted line position of Fig. 11, which is effective to clean the slot 56 by squeezing or otherwise ejecting any solid or gummy material which may tend to gather there.

Referring to the form of Figs. 12 and following, I illustrate a cleanout member which operates through the normal valve mechanism, but independently thereof. I illustrate it in connection with the same type of structure shown in Fig. 8, but in the place of having the cleaning member operate in response to movement of the valve element 50, I provide an independent stem 70, having an exterior operating handle 71, located above the handle 51 of the valve 50 and extending downwardly through the central bore of the valve element 50, to terminate at its lower end, with the cleaning blade 72 extending into the metering slot 56*a* in the reduced portion 55 of the valve member 50. The metering slot may be cleaned manually independently of the location of the valve handle 51 by merely successively raising and lowering the handle 71. The stem 70 and the blade 72 may be kept in a predetermined relation to the slot 56*a*. For example, they may be urged to a downward position by a coil spring 75 compressed between an abutment 76 on the stem 70 and the upper end 77 by the central bore of the valve member 50. It will be noted that the blade 72 may include a central disc or hub 78, three generally radial projections 79 extending outwardly therefrom, and a cleanout pin 80 mounted on and extending outwardly of one of said radial projections.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

It will be understood, for example, that, whereas I employ the term "slot," I intend this term to be sufficiently broadly interpreted to cover a valve opening even though the length of the opening may not exceed its width.

The use and operation of my invention are as follows:

In fuel flow control valves of the type herein described and shown, I employ a relatively restricted slot to provide an accurate metering of the flow of fuel, for example to a liquid hydrocarbon burner. The valve may be used for other purposes, so I do not wish my claims to be limited specifically to metering oil or metering fuel. However, my invention may very practically be applied to metering liquid hydrocarbon fuel for burners and the like.

It is important to maintain a very close control of the volume of fuel delivered, especially at low fire or pilot flame. The metering slot 22, 32 or 56 provides an advantageous metering means, since the effective fuel admisison length of the slot may be varied by raising and lowering the stem or valve member.

In employing slots of this type where a restricted aperture is provided, a difficulty arises from impurities in the fuel. These impurities, solids, gummy material, wax, or the like, may tend to clog up and affect the effective cross sectional area of the aperture provided by the slot. In practice such a slot may be closed up very rapidly, especially in areas where the fuel is supplied with a substantial proportion of impurities. I provide ready means for keeping the slot clear in response to or in the course of the normal operation of the valve.

Thus, in the form of Figs. 1 to 4, I provide a pin 21 registering in the slot 22. As the stem is moved up and down, the pin wipes against the walls of the slot and keeps the slot clean and positively forces impurities, solid deposists, or the like, from the slot.

In the form of Figs. 5 to 7 I provide thermostatic means which, in response to the frequent changes in temperature to which the valve structure is submitted, keeps the slot open by the movement of the bimetal element back and forth.

In the form of Figs. 8 to 11 I illustrate an embodiment of my invention adaptable for use where the valve stem or element is rotated in the course of raising and lowering it. The spring end 62, which may for example be of bronze, wipes the slot and tends to keep the slot 56 clean.

As to the form of Figs. 8 and following, the operator may, in order to get complete cleaning effect, positively rotate the knob 51 back and forth, in addition to the cleaning effect which may result from ordinary setting or changing of setting of the stem. The same is, of course, true of the form of Fig. 1. However, the normal use of the stem in each case results in a cleaning effect where the burner flame is being adjusted or changed from time to time.

I claim:

1. In combination, a valve seat, a movable valve element therefor, having a metering slot, means for adjustably moving the valve to vary the effective area of the metering slot to control liquid flow therethrough, and means for cleaning said metering slot in response to the adjustable movement of the valve element.

2. In combination, a valve seat, a movable valve element therefor, having a metering slot, means for adjustably moving the valve to vary the effective area of the metering slot to control liquid flow therethrough, and means for cleaning said metering slot in response to the adjustable

movement of the valve element, including a cleaning member fixed in relation to the valve seat and penetrating said slot at all normal positions of the valve element.

3. In combination, a valve seat, a movable valve element therefor, having a metering slot, means for adjustably moving the valve to vary the effective area of the metering slot to control liquid flow therethrough, and means for cleaning said metering slot in response to the adjustable axial movement of the valve element.

4. In combination, a valve seat, a movable valve element therefor, having a metering slot, and means for cleaning said metering slot in response to rotary movement of the valve element.

5. In combination, a valve seat, a movable valve element therefor, having a metering slot, means for adjustably moving the valve to vary the effective area of the metering slot to control liquid flow therethrough, and means for cleaning said metering slot in response to the adjustable axial movement of the valve element, including a cleaning member fixed in relation to the valve seat and penetrating said slot at all normal positions of the valve element.

6. In combination, a valve seat, a movable valve element therefor, having a metering slot, means for adjustably moving the valve to vary the effective area of the metering slot to control liquid flow therethrough, and means for cleaning said metering slot during the normal operation of the valve.

7. In combination, a valve seat, a movable valve element therefor, having a metering slot, and means for cleaning said metering slot during the normal operation of the valve, including a thermally flexing element having a portion penetrating said slot.

8. In combination, a valve seat, a hollow movable valve element therefor, having a metering slot in the wall thereof, and means for cleaning said metering slot, including a flexible member mounted within the hollow of the valve element and having a portion penetrating said slot.

9. In combination, a valve seat, a hollow movable valve element therefor, having a metering slot in the wall thereof, and means for cleaning said metering slot, including a thermally flexible member mounted within the hollow of the valve element and having a portion penetrating said slot.

10. In combination, a valve seat, a hollow movable valve element therefor, having a metering slot in the wall thereof, and means for cleaning said metering slot, including a flexible member mounted within the hollow of the valve element and having a portion penetrating said slot and in frictional contact with a portion of said seat exterior to said slot.

11. In combination, a valve seat, a hollow movable valve element therefor, having a metering slot, and means for cleaning said metering slot, including a cleanout member mounted within said hollow valve element and including a portion movably penetrating said slot.

12. In combination, a valve seat including a cylindrical portion and a laterally extending portion concentric with and located at one end of the cylindrical portion, a valve member having a hollow cylindrical portion longitudinally movable in the cylindrical portion of the seat and a laterally extending portion permanently associated with the hollow cylindrical portion, adapted to engage the laterally extended portion of the valve seat, a metering slot extending through the hollow wall of the cylindrical portion of the valve, below the laterally extended portion and adapted to be masked by the cylindrical portion of the valve seat, means for imparting a metering movement to the valve to vary the effective opening of the metering slot, and means extending through, and adapted to be displaced with respect to, the slot in response to the movement of the valve, to clean the metering slot.

13. In combination, a valve seat, a movable valve element therefor having a metering opening therein, means for adjustably moving the valve element in relation to the seat to vary the effective area of the metering opening and thereby to control the flow of liquid therethrough, and means for cleaning said metering opening during the normal operation of the valve.

14. In combination, a valve seat, a movable valve element therefor having a metering opening therein, means for adjustably moving the valve element in relation to the seat to vary the effective area of the metering opening and thereby to control the flow of liquid therethrough, and means for cleaning said metering opening during the normal operation of the valve, including an element normally fixed in relation to the valve seat and extending into said opening.

15. In combination, a valve seat, a movable valve element therefor having a metering opening therein, means for adjustably moving the valve element in relation to the seat to vary the effective area of the metering opening and thereby to control the flow of liquid therethrough, and means for cleaning said metering opening in response to the normal operation of the valve.

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