

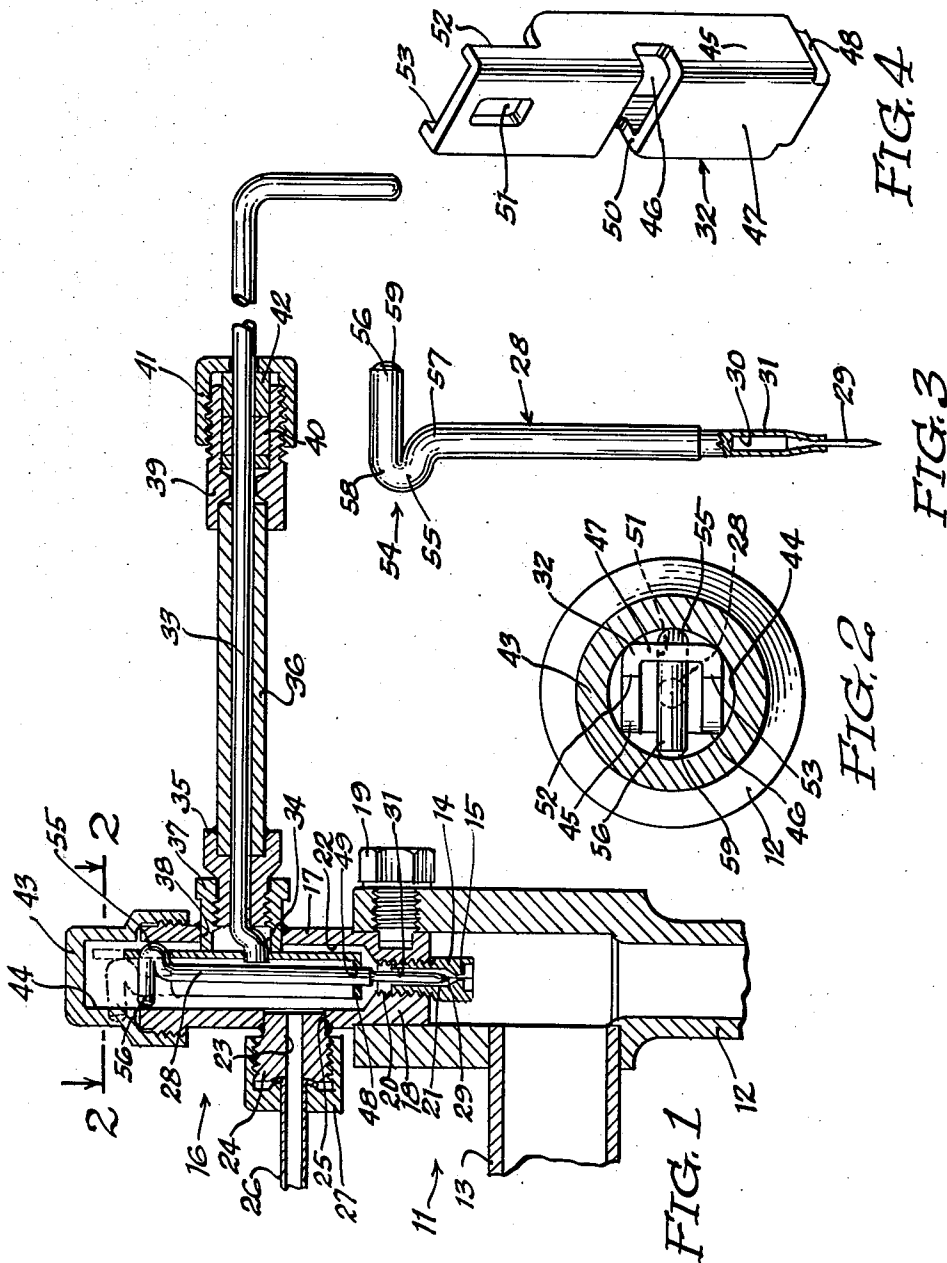
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ORIFICE CLEANING MECHANISM FOR BURNERS

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ORIFICE CLEANING MECHANISM FOR BURNERS

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This invention relates to burners for vaporized fuel, and particularly to an orifice cleaning mechanism for such burners.

One principal object of the invention is to provide a new and improved orifice cleaning mechanism comprising a cleaning rod which is readily removable and replaceable without completely disassembling the mechanism.

A further object is to provide a new and improved orifice cleaning mechanism in which an orifice cleaning rod is mounted on a reciprocable carriage in such a manner that the rod may readily be removed without the necessity for removing the carriage or otherwise disassembling the mechanism.

Another object is to provide such a new and improved orifice cleaning mechanism which is highly effective and dependable yet is simple and low in cost.

Further objects and advantages of the invention will appear from the following description, taken with the accompanying drawings, in which:

Figure 1 is a central longitudinal sectional view taken through a fragment of a burner for vaporized fuel, to illustrate an exemplary orifice cleaning mechanism constituting an illustrative embodiment of the invention.

Fig. 2 is an enlarged cross-sectional view taken generally along a line 2—2 in Fig. 1.

Fig. 3 is an enlarged elevational view, partly in longitudinal section, of an orifice cleaning rod embodied in the mechanism of Fig. 1.

Fig. 4 is an enlarged perspective view of a reciprocable carriage for the cleaning rod of Fig. 3.

If the drawings are considered in greater detail it will be seen that they illustrate a portion of a burner 11 for vaporized gasoline, kerosene or other hydrocarbon fuels. As shown in fragmentary fashion in Fig. 1, the illustrated portion of the burner 11 may comprise a fuel-air mixing tube 12 which delivers fuel mixture to the burner proper (not shown). A lateral air intake tube 13 communicates with the upper end of the mixing tube 12.

Fuel vapor is admitted axially to the upper end of the mixing tube 12 by means of a nozzle 14 formed with a metering orifice 15, which may be of extremely small size, particularly when the burner is designed to burn at a low fuel rate and hence to give a low heat output. Such burners find one application, for example, in portable vapor fuel lamps of the incandescent mantle type.

It has been found that the metering orifice 15 tends to become clogged, either with foreign particles entrained in the fuel vapor, or by carbon and gum deposited in the orifice due to the effect of heat upon the hydrocarbon fuel. Accordingly, it has become more or less standard practice to provide some sort of a mechanism for periodically cleaning the orifice in burners of this type.

Thus the illustrated burner 11 comprises a cleaning mechanism 16 having an elongated, generally tubular body 17 with a slightly reduced front end portion 18 which is received in the entrance end of the mixing tube

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12. A set screw 19 retains the body 17 in the mixing tube 12. It will be seen that the nozzle 14 is threadedly received in an axial opening 20 which is formed in the front end of the body 17. The orifice 15 is connected to the opening 20 by means of an enlarged bore 21, formed in the nozzle 14 to the rear of the orifice. The rear end of the opening 20 flares into an enlarged bore 22 extending the length of the body 17.

Fuel vapor enters the bore 22 through a passage 23 in a fitting 24, which is mounted in an opening 25 extending laterally in the body 17 from the bore 22. A fuel-supply pipe 26 is connected to the fitting 24 by means of an annular clamping nut 27. The pipe 26 may extend to a vapor generator (not shown).

To clean the orifice 15, a cleaning rod 28 is received in the bore 22. It will be seen from Fig. 3 that the cleaning rod 28 has a needle point 29 which in this case is fixedly mounted in a socket 30 formed axially at the front end of the cleaning rod. As shown in Fig. 1, the needle point 29 is adapted to move through the orifice so as to dislodge any foreign material. The cleaning rod 28 has a reduced front end portion 31 of such size as to be received within the bore 21, formed in the nozzle 14, with ample clearance for the passage of fuel vapor around the reduced portion.

The cleaning rod 28 is supported for reciprocation along the bore 22 by means of a carriage 32. A shaft 33 is provided for reciprocating the carriage. It will be seen that the shaft 33 has an eccentric end portion in the form of a crank 34 which engages the carriage 32.

The shaft 33 is journaled in a fitting 35 and an extension tube 36. The fitting 35 is threadedly received in a bushing 37 which is mounted in a lateral opening 38 formed in the body 17. Thus the crank 34 projects into the bore 22, for engagement with the carriage 32. At its outer end, the extension tube 36 is connected to a packing sleeve 39 which receives a packing ring 40. A packing nut 41 is threaded onto the sleeve to force an annular gland 42 against the packing ring 40.

While it is possible to remove the operating shaft 33 by unscrewing the fitting 35, the fitting 35 is often practically inaccessible in a compactly designed burner. Accordingly, it might be necessary to disassemble a considerable portion of the burner to expose the fitting 35 and thus permit removal of the shaft 33. Such removal of the shaft is necessary to disengage the crank 34 from the carriage and thereby permit removal of the carriage from the bore 22.

Due to the small size and delicacy of the needle point 29, it may occasionally be necessary or desirable to remove and replace the cleaning rod 28. In the illustrated cleaning mechanism, the cleaning rod 28 may be removed quite readily, without any necessity for removing the operating shaft 33 or the carriage 32. To this end, the body 17 is arranged to be closed by a removable member in the form of a cap 43, threadedly received on the rear end of the body. Formed in the cap 43 is a blind bore 44 constituting a rearward extension of the bore 22. It will be evident that removal of the cap 43 will expose the rear ends of the carriage 32 and the cleaning rod 28.

In the illustrated cleaning mechanism 16, the cleaning rod 28 and the carriage 32 are formed so that the rod will be removably retained on the carriage. While the carriage may assume various forms, it is illustrated as an elongated sheet metal channel having flanges or walls 45 and 46 connected by a web or side wall 47. A turned up flange provides a front wall 48 formed with an aperture 49 adapted to receive the front end of the cleaning rod 28. The flanges 45 and 46 and the web 47 are proportioned so that the carriage 32 will be freely slidable within the bore 22. It will be understood that the aperture 49

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is axially disposed so as to center the cleaning rod 28 relative to the orifice 15.

To receive the crank 34, the carriage 32 is formed with a transverse slot 50. In this instance, the slot extends through the web 47 and portions of the flanges 45 and 46.

To retain the cleaning rod 28 so that it will reciprocate with the carriage 32, a lateral seat in the form of a slot or recess 51 is formed in the rear end portion of the carriage 32. In the illustrated construction the slot 51 extends through the side wall or web 47. In the neighborhood of the slot 51, the flanges 45 and 46 are cut away to define notches 52 and 53.

The cleaning rod 28 is retained on the carriage 32 by means of a rear end portion 54 comprising lateral formations or elements in the form of first and second lateral lugs or arms 55 and 56. As shown, the lugs 55 and 56 are formed by bending the rear end portion 54 in one lateral direction, as indicated at 57, and then doubling back the end of the rod in the opposite lateral direction, as indicated at 58.

As clearly shown in Fig. 1, the first lateral lug 55 is adapted to be received in the slot 51 formed in the carriage 32. It will be seen that the slot 51 is elongated to accommodate the lug 55. The second lug 56 serves to retain the first lug 55 in the slot 51. Thus the second lug 56 has a rounded end surface 59 adapted to slide along the bores 22 and 44 in the body 17 and the cap 43. Engagement between the second lug 56 and the bores 22 and 44 prevents lateral movement of the first lug 55 out of the slot 51. It will be evident from Fig. 1 that the lugs 55 and 56 also serve to center the rear end of the cleaning rod 28 in the bore 22.

It will be seen that the retaining lug 56 moves into the bore 44 along the rearward portion of the range of reciprocation afforded by the carriage 32. Thus the cleaning rod 28 may be removed by the following simple procedure: The cap 43 is unscrewed so as to expose the rear end of the cleaning rod 28. Next, the shaft 33 is rotated to shift the carriage 32 and the cleaning rod 28, to their most rearwardly displaced positions. This moves the retaining lug 56 out of the bore 22. Accordingly, the rear end of the cleaning rod 28 may be swung laterally, as indicated in dotted lines in Fig. 1, to disengage the lug 55 from the slot 51. It is then possible to withdraw the cleaning rod 28 rearwardly from the bore 22. The rod may be replaced by a reversal of these operations.

It thus is possible to remove the cleaning rod without any necessity for removing the operating shaft 33. In compactly designed burners this is often a very important advantage. It will be evident that this advantage has been achieved without unduly complicating the orifice cleaning mechanism. Accordingly, the entire mechanism may be made at extremely low cost.

Various modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention as exemplified in the foregoing description and defined in the following claims.

I claim:

1. In a burner for vaporized fuel, the combination comprising a body having a bore therein, means defining an axial fuel metering orifice at one end of said bore, an orifice cleaning rod in said bore and having a front end portion with a needle point movable into and out of said orifice, a carriage supporting said cleaning rod for axial reciprocation in said bore, said carriage comprising an elongated channel-shaped member having side flanges and a connecting web, said carriage having a front end flange with an aperture therein removably receiving the front end portion of said cleaning rod, said cleaning rod having a rear end portion bent laterally in one direction and doubled back to define a lateral lug and then extending laterally in the opposite direction to define a lateral arm, said web having a slot adjacent its rear end disengageably receiving and retaining said lug, a cap removably mounted

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on said body and having a blind bore therein constituting a continuation of said bore in said body, said lateral arm having its end slidably engageable with said bores in said body and cap for retaining said lug in said slot, a laterally extending shaft rotatably mounted on said body and having a crank projecting into said bore therein, a transverse slot in said web receiving said crank so that said carriage will be reciprocated axially of said bore when said crank is rotated, said crank retaining said carriage in said bore, said cleaning rod being removable from said carriage by removing said cap, shifting said carriage rearwardly to move said arm out of said bore in said body, moving said lug laterally out of said slot, and withdrawing said rod rearwardly.

2. In a burner, the combination comprising a body having a bore therein, means defining an orifice at one end of said bore, an orifice cleaning rod in said bore and having a front end portion with a needle point movable through said orifice, a hollow carriage reciprocally received in said bore and having a front end wall with an axial aperture therein for receiving the front end portion of said cleaning rod, means for reciprocating said carriage axially of said bore, said cleaning rod having a rear end portion with first and second lateral lug elements extending generally in opposite directions, said carriage having a lateral wall with a slot therein disengageably receiving said first lug element so that said rod will reciprocate with said carriage, a closure removably mounted on said body and having a bore therein constituting a continuation of the rear end of said bore in said body, said second lug element being disposed for slidable engagement with said bore in said closure to retain said first lug element in said slot, said cleaning rod being removable from said carriage by removing said closure member, operating said reciprocating means to shift said carriage rearwardly and thereby move said second lug element out of said bore in said body, moving said rear end portion of said cleaning rod laterally to disengage said first lug element from said slot, and withdrawing said cleaning rod rearwardly out of said bore in said body.

3. In a burner for vaporized fuel, the combination comprising a body having a bore therein, means defining an axial fuel metering orifice at one end of said bore, an orifice cleaning rod in said bore and having a front end portion with a needle point movable through said orifice, a carriage reciprocally received in said bore and having a front wall with an aperture therein for receiving the front end portion of said cleaning rod, a laterally extending shaft having an eccentric end portion projecting into said bore, means on said body supporting said shaft for rotation, means on said carriage for receiving said eccentric end portion so that rotation of said shaft will reciprocate said carriage axially of said bore, said eccentric end portion retaining said carriage in said bore, said cleaning rod having a rear end portion with first and second lateral lugs extending in opposite directions, said carriage having a rear end portion comprising a side wall formed with a slot disengageably receiving said first lug so that said rod will reciprocate with said carriage, a closure removably mounted on said body and having a blind bore therein constituting a continuation of the rear end of said bore in said body, said second lug being disposed for slidable engagement with said blind bore to retain said first lug in said slot, said cleaning rod being removable from said carriage by removing said closure member, rotating said shaft to shift said carriage rearwardly and thereby move said second lug out of said bore in said body, moving said rear end portion of said cleaning rod laterally to disengage said first lug from said slot, and withdrawing said cleaning rod rearwardly out of said bore in said body.

4. In a burner, the combination comprising a body having a bore therein, means defining an orifice at one end of said bore, an orifice cleaning rod in said bore and having a front end portion with a needle point mov-

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able into and out of said orifice, a carriage supporting said cleaning rod for reciprocation in said bore, means for reciprocating said carriage axially of said bore, said carriage comprising an elongated channel-shaped member having side flanges and a connecting web, said carriage having a front end flange with an aperture therein removably receiving the front end portion of said cleaning rod, said cleaning rod having a rear end portion bent laterally in one direction and doubled back to define a lateral lug and then extending laterally in the opposite direction to define a lateral arm, said web having a slot adjacent its rear end disengageably receiving and retaining said lug, and a cap removably mounted on said body and having a blind bore therein constituting a continuation of said bore in said body, said lateral arm having its end slidably engageable with said bores in said body and cap for retaining said lug in said slot, said cleaning rod being removable from said carriage by removing said cap, shifting said carriage rearwardly to move said arm out of said bore in said body, moving said lug laterally out of said slot, and withdrawing said rod rearwardly.

5. In a burner, the combination comprising a body having a bore therein, means defining an orifice at one end of said bore, an orifice cleaning rod in said bore and having a front end portion with a needle point movable through said orifice, a carriage reciprocally retained in said bore, means for reciprocating said carriage axially of said bore, said carriage having a front portion with

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an opening extending axially therein and disengageably receiving the front portion of said rod, interlocking male and female formations for effecting reciprocation of said rod along with said carriage, said male formation projecting laterally into said female formation, one of said formations being on said carriage near the rear end thereof and the other of said formations being on said rod, a closure element removably mounted on said body and having a bore therein constituting a continuation of the rear end of said bore in said body, and a lateral projection on said rod extending away from said formation on said carriage and slidably engaging said aligned bores in the course of reciprocation of said carriage for retaining said male and female formations in interlocking engagement, said carriage being open opposite said formation thereon to provide for lateral movement of said rod away from said formation on said carriage to disengage said male and female formations and thereby release said rod for removal from said body with said closure element removed and said carriage moved rearwardly to position said lateral projection out of said bore in said body.

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