

SPECIFICATION

TITLE OF THE INVENTION: FUELING NOZZLE

TECHNICAL FIELD

[0001.] The present invention relates to a fueling nozzle, more specifically to the structure of a flow rate adjustment mechanism.

BACKGROUND ART

[0002.] In the case of fueling with a fueling nozzle, in cases such as full tank fueling where a vehicle's fuel tank is fueled to its maximum capacity, preset fueling where a predetermined quantity or amount of fuel oil is fueled, and integer fueling where a fueling amount is rounded to a nearest integer value, it is necessary to perform a small amount fueling at a minute flow rate during a final stage of fueling.

[0003.] As seen in Patent Document 1, therefore, in the preset fueling and the integer fueling, flow rate is adjusted with a solenoid valve mounted to a fueling device itself, or a fueling operator manually fine-tunes a fueling lever of the fueling nozzle to reduce the flow rate.

[0004.] A fueling nozzle suitable for manual micro-fueling in the latter case has been put into practical use. As shown in Fig. 10, the fueling nozzle is equipped with a flow rate control mechanism 7, where a through-hole 5 is formed in a main valve 4, which is mounted to a valve rod 3 linked to the amount of displacement of a fueling lever and constantly biased in the closing direction by a spring 2, and opening degree between the through-hole 5 and the valve rod 3 (fueling lever 1) is adjusted with a small valve 6, allowing fine adjustments of the flow rate.

[0005.] In this fueling nozzle, when the fueling lever 1 is lifted against the biasing force of the spring 2, the small valve 6 moves away from the main valve 4, the through-hole 5 opens, and when the fueling lever 1 moves to a limit point, the main valve 4 moves in accordance with the amount of movement of the fueling lever 1, and a liquid flowing in from a fueling hose connection port 10 is discharged from an end of a nozzle tube.

[0006.] On the other hand, the flow rate control mechanism 7 can adjust the opening degree of the through-hole 5 with the small valve 6 in response to the displacement amount of the fueling lever 1 in a state where the main valve 4 is seated on the valve seat and the small valve 6 is away from the through-hole 5. To ensure the flow rate adjustment in the minute flow rate region and sealing at the time of closing, the small valve 6 is formed, as shown in Fig. 11, with a surface 6a facing the through-hole 5 in a conical (tapered) shape, and a center mounting hole 8 is fixed to an end of the valve rod 3.

[0007.] The main valve 4 is made of an elastic material such as rubber considering the sealing with the valve seat 9, therefore, there is a fear that it may wear out due to load concentration on an outer periphery of the through-hole 5.

PRIOR ART DOCUMENT
PATENT DOCUMENT

[0008.] Patent Document 1: Japanese Laid-Open Patent Publication No. Showa 61-217397

OUTLINE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0009.] The present invention has been made in view of the above-mentioned problems, and the object thereof is to provide a fueling nozzle that can easily adjust a minute flow rate while improving durability of a main valve that constitutes a flow rate control mechanism.

MEANS OF SOLVING THE PROBLEMS

[0010.] In order to solve such problems, a fueling nozzle according to the present invention that receives a liquid from a fueling hose at an inflow port and discharges it from a nozzle end part through a main valve that is opened and closed with a fueling lever through a valve rod that always biased in a closed valve direction is characterized in that a flow control mechanism that can be operated with the fueling lever is mounted upstream of the main valve.

EFFECTS OF THE INVENTION

[0011.] The small valve comes into surface contact with an outer surface of the through-hole of the main valve, and the size of a gap between the small valve and the through-hole, or valve opening degree corresponds to displacement amount of the fueling lever.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012.] [Figure 1] A view showing a fueling nozzle according to an embodiment of the present invention.

[Figure 2] An enlarged view showing a valve mechanism part of the fueling nozzle shown in Fig. 1.

[Figure 3] An enlarged view showing a small valve that constitutes a flow rate control mechanism of the fueling nozzle shown in Fig. 1.

[Figure 4] A view showing a valve mechanism part according to the second embodiment of the present invention.

[Figure 5] An enlarged view showing a small valve that constitutes a flow rate control mechanism of the fueling nozzle shown in Fig. 4.

[Figure 6] A view showing a valve mechanism part according to the third embodiment of the present invention.

[Figure 7] An enlarged view showing a small valve that constitutes a flow rate control mechanism of the fueling nozzle shown in Fig. 6.

[Figure 8] A view showing a valve mechanism part according to the fourth embodiment of the present invention

[Figure 9] An enlarged view showing a small valve that constitutes a flow rate control mechanism of the fueling nozzle shown in Fig. 8.

[Figure 10] A view showing an example of a conventional fueling nozzle with a flow rate control mechanism.

[Figure 11] An enlarged view showing a small valve that constitutes the flow rate control mechanism shown in Fig. 10.

MODE FOR CARRYING OUT THE INVENTION

[0013.] Figures 1 to 3 show a fueling nozzle with a flow rate control mechanism according to an embodiment of the present invention. In the fueling nozzle which is configured to receive a liquid from a fueling hose at an inflow port 11 and discharge it from a nozzle end part 16 through a main valve 15 that is opened and closed with a fueling lever 14 through a valve rod 13, which is constantly biased in the closing direction with a spring 12, the main valve 15 is formed with a through-hole 17, and a flow rate control mechanism 19 is provided to adjust opening degree of the through-hole 17 by opening and closing it with a small valve 18 located upstream of the through-hole 17.

[0014.] In this embodiment, as shown in Fig 3, the small valve 18 has a protruding part 20, which is coaxial with the valve rod 13 and can advance and retreat in the through-hole 17 of the main valve 15, on a surface facing the through-hole 17; a protruding part 21 that can advance and retreat in the through-hole 17 and adjust opening degree of the through-hole 17; and a flat part 22 that can close the through-hole 17 of the main valve 15.

[0015.] According to this embodiment, when the valve is closed, the flat part 22 of the small valve 18 comes into surface contact with the outer peripheral surface of the through-hole 17 to closes it. Further, when adjusting a minute flow rate, the protruding part 21 for flow rate adjustment moves in the through-hole 17 in response to displacement of the valve rod 13, changing a gap with the through-hole 17 to adjust the minute flow rate.

[0016.] In this way, the valve can be closed without concentrating the load of the small valve 18 in a region 15a that forms an outer peripheral surface of the through-hole 17, that is, a region of the through-hole 17 facing the small valve.

[0017.] Figures 4 and 5 show the second embodiment of the present invention, in which a taper part 23 is formed on the side surface of the protruding part 21 for flow rate adjustment so that the through-hole side becomes smaller.

[0018.] According to this embodiment, when adjusting the minute flow rate, the position of the taper 23 facing the through-hole 17 changes, that is, the diameter of the taper 23 changes according to the movement of the valve rod 13, so that the opening degree can be finely adjusted.

[0019.] Figures 6 and 7 show the third embodiment of the present invention, in which notches 24 are formed on the side surface of the protruding part 21 for flow rate adjustment, preferably at positions at equal intervals relative to the valve rod 13, and in this embodiment, at two opposing positions.

[0020.] According to this embodiment, the minute flow rate can be adjusted by the gaps between the notches 24 of the protruding part 21 and the through-hole 17, and the minute flow rate can be easily adjusted. In addition, forming the notches 24, 24 at equal intervals allows the pressure applied to the small valve 18 to be equalized, resulting in stable valve opening degree at the time of minute flow rate adjustment.

[0021.] Figures 8 and 9 show the fourth embodiment of the present invention, in which slopes 25, where the through-hole side become closer to the valve rod side, are formed at positions, preferably at equal intervals relative to the valve rod 13 on the side surface of the notch (the third embodiment's reference numeral 24) of the protruding part 21 for flow rate adjustment.

[0022.] According to this embodiment, the minute flow rate can be adjusted by the gaps between the slopes 25 of the notches and the through-hole 15, and the minute flow rate can be adjusted because the distances between the slopes 25 and the through-hole 17 change according to the movement of the valve rod 13.

INDUSTRIAL APPLICABILITY

[0023.] According to the present invention, even a fueling nozzle for large flow rate fueling can finely adjust minute flow rate by operating the fueling lever.

DESCRIPTION OF THE REFERENCE NUMERALS

[0024.]

- 11 inflow port
- 12 spring
- 13 valve rod
- 14 fueling lever
- 15 main valve
- 16 nozzle end part
- 17 through-hole
- 18 small valve
- 19 flow rate control mechanism
- 20 protruding part
- 21 protruding part
- 22 flat part

CLAIMS

[Claim 1] In a fueling nozzle that receives a liquid from a fueling hose at an inflow port and discharges it from a nozzle end part through a main valve that is opened and closed with a fueling lever through a valve rod that always biased in a closed valve direction, a flow control mechanism that can be operated with the fueling lever is mounted upstream of the main valve.

[Claim 2] The fueling nozzle as claimed in claim 1, wherein said flow control mechanism comprises a through-hole formed in the main valve and a small valve with a protruding part that can block the through-hole and advance and retreat in the through-hole.

[Claim 3] The fueling nozzle as claimed in claim 2, wherein a tapered portion is formed on a side face of the protruding part

[Claim 4] The fueling nozzle as claimed in claim 2, wherein a notch is formed on the protruding part.

[Claim 5] The fueling nozzle as claimed in claim 4, wherein a slope is formed in the notch.