

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) CONTAINER FOR PRESSURIZED GAS

(71) We, BUTANE MATCH AG., a body corporate organised according to the Laws of Switzerland, of Oetenbachgasse 28, 8001 Zurich, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a container for pressurized gas.

The present invention provides a sealed container for pressurized gas including a wall with a portion which can be pierced to permit gas to flow from the container and, disposed within the container adjacent said portion, a flow regulator including a chamber and a porous disk-like element disposed across the chamber such that, when the said portion is pierced, the gas flows through the porous disk-like element with a radial component of velocity.

Preferably, the flow regulator also includes a further porous disk-like element disposed across the chamber and a non-porous element positioned between the porous elements such that, when the said portion is pierced the gas flows through one of the porous disk-like elements with an outward radial component of velocity and through the other porous disk-like element with an inward radial component of velocity.

In the preferred embodiment of the present invention, the flow regulator also includes a further non-porous element disposed across the chamber between one of the porous disk-like elements and the portion of the wall which can be pierced, the further non-porous element having a passageway therein such that, when the said portion is pierced, the gas flows through the passageway.

Such a container for pressurized gas may be used in the gas lighter described and illustrated in our copending Application No. 25605/69 (Serial No. 1277293).

One form of container for pressurized gas according to the present invention and contain-

ing a flow regulator embodied in the lighter described in our copending Application No. 25605/69 (Serial No.), will

now be described in greater detail by way of example only with reference to the accompanying drawings, in which

FIG. 1 is a perspective view of the lighter, FIG. 2 is a longitudinal sectional view taken substantially on the line 2—2 as shown in FIG. 1,

FIG. 3 constitutes an enlargement of the upper portion of FIG. 2,

FIG. 4 is an exploded view showing the manner of assembly of disks making up the flow regulator,

FIG. 5 is a sectional elevation on an enlarged scale showing the disks of FIG. 4 assembled in the wall of a cartridge, and

FIG. 6 is a view similar to Fig. 5 showing a barrier wall of the cartridge prior to being pierced by the tapered end of a screw.

Referring to the drawings, the lighter, generally designated by the reference numeral 10 comprises a cartridge 11 containing fuel, for example, butane, under pressure, and a head assembly 12. As shown in the drawings, the cartridge 11 comprises a cylindrical container or tank formed of thermoplastics material suitable for injection moulding. One end of the cartridge 11 is closed by an end wall 13, and the other end is closed by a plug element 14, also formed of thermoplastics material. The plug element may be sealed to the wall of the cylindrical container in any preferred or convenient manner. It has been found that the conventional technique of spinning the plug element with respect to the container to form a heat seal 15 gives satisfactory results. A flange 16 on the plug element 14 rests on a shoulder 17 on the container.

The chamber 18 within the cartridge 11 may contain open cell polyether foam, and pressurized fuel, for example, butane fills the chamber 18 and the foam. A filling opening 19 in the bottom wall 13 provides for initial

introduction of the fuel into the chamber 18, and the opening is later closed by a spinning process.

5 The plug element 14 is provided with an internal recess 22 which contains a flow regulator generally designated by the reference numeral 23. This regulator 23 comprises a series of disks and is described in detail below. The barrier wall 24 of the plug element 14 is initially imperforate, as shown in FIG. 6, so that the pressurized fuel is confined within the cartridge 11 and cannot escape.

10 The head assembly 12 includes a head casting 26 and a metal screw 27 fixed to the casting. The casting 26 is designed so that it may be produced by low cost die casting procedures, and the screw 27 is a screw machine product. The screw 27 has a portion with external threads 28 and a smooth portion 29. The lower end of the screw 27 is provided with a tapered projection 31. The casting 26 is provided with an outer peripheral skirt 32 and an inner concentric sleeve 33, defining an annular space 34 between them. An end wall 25 36 is provided with radiating channels 37. The screw 27 is assembled relative to the casting 26 by pressing the smooth portion 29 into the interior of the central sleeve 33 until the upper end of the screw 27 engages the end wall 36. 30 An axial channel 30 in the wall of the sleeve 33 communicates with the channels 37 in the wall 36, and the channels 37 communicate with an axial passage 38 which leads to the flame port or outlet port 39. The port 39 emerges into a recess 40 through a protuberance 41 projecting into the recess. After assembly, the casting 26 and screw 27 function as a single integral unit.

40 The casting 26 may be knurled or otherwise roughened on its outer surface, as shown at 42 and 43, to facilitate manual grasping of the head assembly 12 for turning it with respect to the cartridge 11. The plug element 14 is provided with a central upstanding tubular portion 44 provided with internal threads 45. When the screw 27 is threaded into the plug element 14, the lower tapered projection 31 first punctures the barrier wall 24. Turning movement of the head assembly 12 in the opposite direction then lifts the tapered projection 31 of the screw to permit flow of fuel under pressure through the regulator assembly 23, and through a small opening 20 pierced in the barrier wall 24, and through the clearance space between the internal threads 45 and external threads 28. The screw threads thus form a helix path for flow of fuel under pressure to the upper end of the plug element 14. 55 The fuel under pressure then flows upwardly through the axial channel 30 and radial channels 37 to the passageway 38 and to the outlet port 39.

65 Sparking means is provided for igniting the fuel escaping from the outlet port 39 to form a flame. As shown in the drawings, this spark-

ing means includes a wheel 47 having a serrated periphery 48 and provided with oppositely extending integral hubs 49. These hubs 49 are received in aligned recesses provided on an upper wall 52 of the casting 26, and the wheel 47 extends through a slot 51 in this wall. A portion of the wall 52 is deformed to retain both hubs 49 in position, to prevent disassembly. A solid cylinder of spark-producing material 53 is slidably mounted within an integral guide tube 54 provided on the head casting 26, and extends through an opening 55. A coiled compression spring 56 within the tube 54 urges the member 53 in an upward direction to contact the periphery 48 of the wheel 47. 75 The lower end of the spring 56 engages a flange 57 which is supported on the outer surface of the sleeve 33 by friction-gripping leg elements 58. It will be observed that the tube 54 and spring 56 are positioned in the annular space 34 between the skirt 32 and the central sleeve 33. The skirt telescopes over the upwardly extending rim 60 of the cartridge 11 to exclude foreign matter from the annular space 34. 80 85 90

A bore 63 in the lower portion of the plug element 14 is closed by an apertured member 64 to form a recess 65 for reception of the flow regulator generally designated 23. As shown in the drawings, this regulator 23 comprises disks 66, 67, 68, 69. Disks 66 and 68 are formed of a non-porous elastomer which the gas does not penetrate. The disk 66 has a small central hole 70 aligned with the pierced opening 20. The disk 69 is formed of paper, for example, newsprint. Disk 67 is formed of a porous material, for example, Dacron (Registered Trade Mark). Disks 66, 67 and 69 fit within the bore 63, but the disk 68 is slightly smaller in diameter, so that an annular space is formed between the periphery of the disk 68 and the bore 63. 95 100 105

The flow pattern through the flow regulator 23 is shown in FIG. 5. Gas enters a central opening 20. It has been found that the regulator 110 ly outwardly through the material of the paper disk 69 into the annular space around the non-porous disk 68. Gas then flows radially inwardly through the interstices of the porous Dacron disk 67, and into the central opening 70 in the disk 66 and through the pierced opening 20. It has been found that the regulator 23 constructed in this manner is very inexpensive and yet provides accurate regulation of the maximum pressure at which the fuel can escape through the pierced opening 20. Thus, the maximum height of the flame is pre-determined by this flow regulator. Moreover, temperature variations and changes in pressure of the fuel within the cartridge have a minimal effect on the output pressure under flow conditions. 115 120 125

In operation, the cartridge 11 is connected to the head assembly 12 by relative turning movement between the threads 28 and 45, to 130

cause the tapered portion 31 of the screw 27 to puncture the barrier wall 24, as described above. The head assembly 12 is then turned in the opposite direction for a part of one revolution to permit gas under pressure to escape through the outlet port 39. The sparking wheel 47 is then manually rotated to ignite the fuel and form a flame 62 at the outlet port 39. The protuberance 41 keeps the flame spaced from the floor of the recess 40 to minimize transfer of the heat into the head casting 26. The height of the flame 62 is adjusted by turning of the head assembly 12 with respect to the cartridge 11; this relative turning movement changes the spacing of the tapered projection 31 of the screw with respect to the opening 20 which it has pierced in the barrier wall 24, and this tapered projection 31 serves as a valve to regulate the height of the flame 62. The maximum height of the flame is pre-set by the flow regulator 23. In order to extinguish the flame, the head assembly 12 is turned with respect to the cartridge 11 to move the tapered projection 31 of the screw 27 back into the barrier wall opening to shut off all flow of gas. From the above description, it will be understood that the screw 27 serves as the sole connecting means between the head assembly 12 and the fuel cartridge 11, pierces the cartridge wall 24 to permit escape of fuel under pressure, provides a helix flow path through the clearance space between the threads 28 and 45, and serves as a regulator valve for adjusting the height of the flame, and as a shutoff valve for extinguishing it. When the supply of fuel has been exhausted from the cartridge 11, the head assembly 12 is unscrewed from the cartridge and the cartridge is thrown away. A new duplicate cartridge having a supply of fuel under pressure is then threadedly connected by inserting the screw 27 into the internal threads 45 and then turning the head assembly 12 to cause the tapered projection 31 to pierce the barrier wall 24. Subsequent operation of the lighter 10 is the same as that previously described. When it is necessary to install a new solid cylinder 53 of sparking material, the head assembly 12 is unscrewed from the cartridge 11 to expose

the flange 57. The flange is then manually moved in a direction away from the outlet port 39, the friction legs 58 sliding on the outer surface of the central sleeve 33. The spring 56 may then be withdrawn axially from the tube 54, and a new solid cylinder 53 of sparking material inserted into the open end of the tube. The spring 56 and flange 57 are then reassembled, and the head assembly 12 is reinstalled on the cartridge 11.

WHAT WE CLAIM IS:—

1. A sealed container for pressurized gas including a wall with a portion which can be pierced to permit gas to flow from the container and, disposed within the container adjacent said portion, a flow regulator which includes a chamber and a porous disk-like element disposed across the chamber such that, when the said portion is pierced, the gas flows through the porous disk-like element with a radial component of velocity.

2. A sealed container as claimed in claim 1, wherein the flow regulator also includes a further porous disk-like element disposed across the chamber and a non-porous element positioned between the porous elements, such that, when the said portion is pierced, the gas flows through one of the porous disk-like elements with an outward radial component of velocity and through the other porous disk-like element with an inward radial component of velocity.

3. A sealed container as claimed in claim 2, wherein the flow regulator also includes a further non-porous element disposed across the chamber between one of the porous disk-like elements and the portion of the wall which can be pierced, the further non-porous element having a passageway therein such that, when the said portion is pierced the gas flows through the passageway.

4. A sealed container for pressurized gas substantially as described herein with reference to the accompanying drawings.

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2. A sealed container as claimed in claim 1, wherein the flow regulator also includes a further porous disk-like element disposed across the chamber and a non-porous element positioned between the porous elements, such that, when the said portion is pierced, the gas flows through one of the porous disk-like elements with an outward radial component of velocity and through the other porous disk-like element with an inward radial component of velocity.

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