The invention is concerned with a gas refill cartridge for use in refilling the fuel reservoirs of gas burning cigarette lighters. The cartridge has a shell with a neck fitted with a closure valve that can be opened by an axial force directed into the neck. The shell is made in two parts, each of which is formed with the neck and houses most of the valve and the other of which provides a reaction for a valve spring which urges the closure member on to a seating.

One common kind of compressed gas refill cartridge for use in refilling the fuel reservoirs of gas burning cigarette lighters has a shell with a neck fitted with a closure valve which incorporates a closure member that is urged by a spring onto a seating to close the valve. The closure member can be forced off its seating, to open the valve, by an axial force directed into the neck of the cartridge, such force being provided in use by the reaction between engaging parts of the valve and cigarette lighter when the cartridge is fitted to the fuel reservoir inlet of a cigarette lighter during a refueling operation. In cartridges of this kind it has previously been usual for the spring, which urges the closure member towards its seating, and in effect locates the valve mechanism in position, to take its reaction from a disc which is a jam fit within a tubular collar which projects as an extension of the neck into the shell. The provision of the collar and disc lead to appreciably costly production and assembly steps but a more serious objection is that the existence of the collar prevents the cartridge from being completely emptied. This is because the collar projects freely into the shell as a solid tube, both in order to provide sufficient strength and resilience to support the disc, and to avoid the complex tooling operations which would be necessary to provide the collar with ports. As a result when the cartridge is inverted neck downwards in the refueling position an annular internal trough is formed in the shell around the collar and liquefied gaseous fuel cannot escape from the trough as the only way into the cartridge neck is through the collar.

In accordance with the present invention the shell of a cartridge of the kind described is formed in two parts which are secured together, one of the shell parts being formed with a neck and providing a seating for the valve closure member and its seating and the second shell part providing the reaction for the closure member spring. In this way the disc and collar may be eliminated thus providing a saving in the cost of the cartridge and enabling the cartridge to be completely emptied. The spring may take its reaction either directly or indirectly from an abutment or abutments, such as an annular shoulder on the second shell part or it may take its reaction from the wall of the second shell part opposite to the neck. Thus, in the usual case in which the shell is bottle shaped, standing normally with its neck uppermost, the first and second shell parts will be upper and lower shell parts. There are advantages in then providing the junction between the upper and lower shell parts around the peripheral wall of the bottle, possibly at the bottom but preferably nearer to the top of the bottle.

One convenient way of providing a shoulder on the lower shell part is then to arrange for the internal width of the lower shell part to be slightly less than the internal width of the upper shell part, at the annular junction between the two shell parts, so that an internal annular shoulder is formed around the upper part of the lower shell part. Since this shoulder will be larger, in the case of a circular bottle, diameter than the area of the closure member over which the spring applies its loading to the closure member, special arrangements must be made to interpose the spring between the shoulder and the closure member. In one case the spring is a spirally helically coiled compression spring the narrower end of which engages the closure member and the larger end of which sits on the shoulder. In an alternative form an annular washer rests in the shell with its edge on the shoulder and a helically coiled compression spring, which is interposed between the washer and the closure member, is located in position by a stem extending downwards from the closure member. In another example, the spring may be formed integrally with the closure member from a resilient plastics material. This integral spring may be a ring which rests on the annular shoulder and is connected to the closure member by a number of resilient webs.

If the spring takes its reaction from the bottom wall of the lower shell part, in the case of a bottle shaped cartridge, the bottom wall of the lower shell part preferably has a central upward protrusion within the cartridge. This protrusion enables a relatively short spring, such as a helically coiled compression spring, to be used, and may provide a positive lateral location for the end of the spring remote from the closure member. The upward protrusion preferably has a thin wall, similarly to the rest of the shell, so that a correspondingly shaped recess is provided in the underside of the bottom wall of the shell. If this recess is shaped substantially coincidently to the shape of the outer surface of the neck of the shell, a number of the cartridges can be stacked neatly one on top of the other. The recess may also be used to accommodate lighter accessories, such as replacement flints, cleaning brushes etc.

The shell parts of the cartridge may be made of any suitable material but plastics materials are preferred because they can be readily moulded to appropriate shapes. The two parts of the shell may be secured and sealed together by a separate junction piece, adhesives, or any of the conventional thermoplastic welding techniques. The two shell parts will be secured together after assembly of the valve mechanism and if the two shell parts are to be secured together by spin welding, a force is preferably applied into the neck of the first shell part to hold the valve closure member off its seating during the welding operation otherwise damage may occur to the valve mechanism as a result of different parts of the mechanism receiving relative frictional torque from the two relatively rotating shell parts.

Three examples of cartridges constructed in accordance with the present invention are illustrated in FIGURES 1 to 3 and the accompanying drawings which are central vertical sections, with some parts broken away and parts in elevation. In each case the cartridge has a bottle shaped shell formed by upper and lower plastic mouldings 4 and 5 of circular section, which, after insertion of the valve mechanism, are welded together at substantially the position of maximum diameter of the bottle. The upper shell part 4 is formed with a hollow neck 6 leading to an
externally screw threaded tubular spigot 7. An annular sealing washer 8 is located in the neck 6 beneath a downwardly facing shoulder at the top of the neck and forms a seating for a valve closure member 9 which is movable upwards and downwards within the neck 6 and is formed integrally with upper and lower stems 10 and 11. The stem 10 has a circular section and the inner wall of the spigot 7 has a square section.

In the FIGURE 1 example the lower end of the stem 11 is located in a tubular guide 12 formed integrally with an integral upward protrusion 13 of the lower shell part 5. A helically coiled compression spring 14 surrounds the stem 11 and is trapped between the upper edge of the guide 12 and the underside of the closure member 9. The spring 14, taking a reaction from the guide 12, normally holds the closure member 9 on its seating 8 to seal the outlet through the neck 6 and the spigot 7. In use the cartridge is inverted and the spigot 7 screwed into a complementary internally screw threaded inlet socket of the fuel reservoir of a gas burning cigarette lighter. The socket will contain a plunger which enters the spigot 7, engages the end of the stem 10, and pushes the closure member 9 off its seating against the action of the spring 14 as the cartridge is screwed into the socket. The liquefied gas in the cartridge is then free to flow out of the cartridge around the closure member 9, and along the four passageways formed around the stem 10 in the spigot 7 into the lighter reservoir. When the cartridge is subsequently unscrewed from the inlet socket of the lighter reservoir, the valve closure member 9 returns to its seating under the action of the spring 14 to reseal the cartridge.

The protrusion 13 in the case of the lower shell part 5 provides a recess 15 in the base of the cartridge. This recess has a similar shape to the external configuration of the neck 6 and spigot 7 so that two identical cartridges can be stacked closely one on top of the other.

In the FIGURE 2 example, at least the lower shell part 5 is made of translucent plastic material and is marked with graduations 16 so that the level of liquefied fuel in the container can be read, the graduations representing units of volume necessary for refueling particular lighter reservoirs.

In this example the closure member 9 is urged on to its seating by a spirally helically coiled compression spring 17 the upper narrower end of which surrounds the stem 11 and abuts against the underside of the closure member 9 and the larger diameter lower end of which sits on and takes a reaction from a shoulder 18 formed by part of the upper edge of the lower shell part 5 overlapping the inner surface of the upper shell part 4.

In the third example, the closure member 9 is urged against its seating by a helically coiled compression spring 19 which takes its reaction indirectly from the shoulder 18 through the intermediary of a washer 20 which rests on the shoulder 20. The washer 20 has a central hole 21 through which the stem 11 can move upon movement of the closure member 9 and the lower end of the spring 19 abuts the washer 20 around the hole 21. In this case, the closure member 9 and then stems 10 and 11 are manufactured integrally with one another as a long drawn brass eyelet.

We claim:

1. In a gas refill cartridge for use in refilling the fuel reservoirs of gas burning cigarette lighters and adapted to contain liquefied fuel gas under pressure, said cartridge having a shell defining a neck, and a closure valve fitted within said neck and incorporating a seat, a closure member, and a spring surrounding a part of said closure member and urging said closure member onto said seat whereby said closure member can be forced off said seat to open said valve by an axial force directed into said neck of said cartridge, the improvement in which said shell comprises first and second parts and means securing said first and second parts together, said first shell part defining said neck and providing a housing for said valve closure member and said seat and said second shell part having an upwardly protruding base wall, the external surface of said base wall defining a socket and the internal surface of said base wall providing a reaction surface for said closure member spring and defining means for centering the inner ends of said closure member and spring.

References Cited

UNITED STATES PATENTS
3,201,012 8/1965 Malglaive
3,495,739

FOREIGN PATENTS
1,227,980 4/1960 France
819,227 10/1937 France
250,616 9/1912 Germany
782,114 9/1957 Great Britain
413,714 12/1966 Switzerland

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