

[54] AEROSOL CAN AND PISTON ASSEMBLY

[76] Inventor: Christian T. Scheindel, Star Rte.,
Randolph Center, Vt. 05061

[22] Filed: Sept. 11, 1974

[21] Appl. No.: 504,461

[52] U.S. Cl. 222/389; 92/242

[51] Int. Cl.² B67D 5/42

[58] Field of Search 222/389, 386, 386.5;
92/208, 212, 240, 242, 248, 243, 249

[56] **References Cited**

UNITED STATES PATENTS

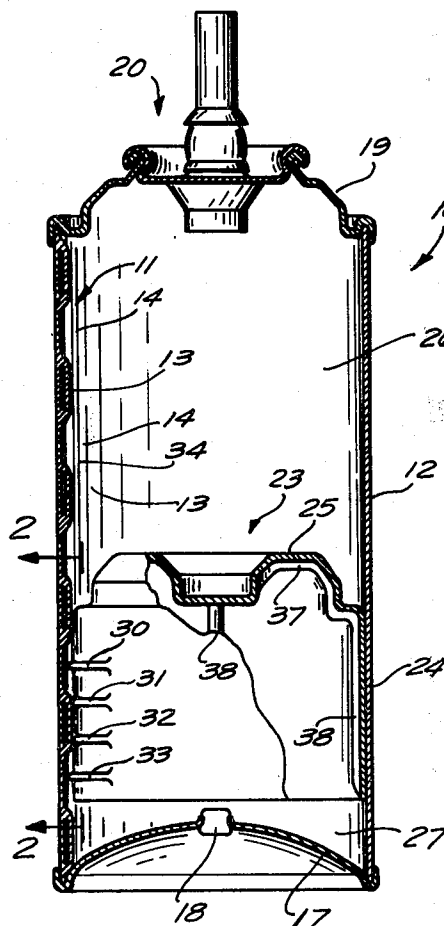
3,132,570	5/1964	Hoffman, Jr. et al.	222/389 X
3,381,863	5/1968	Towns	222/389 X

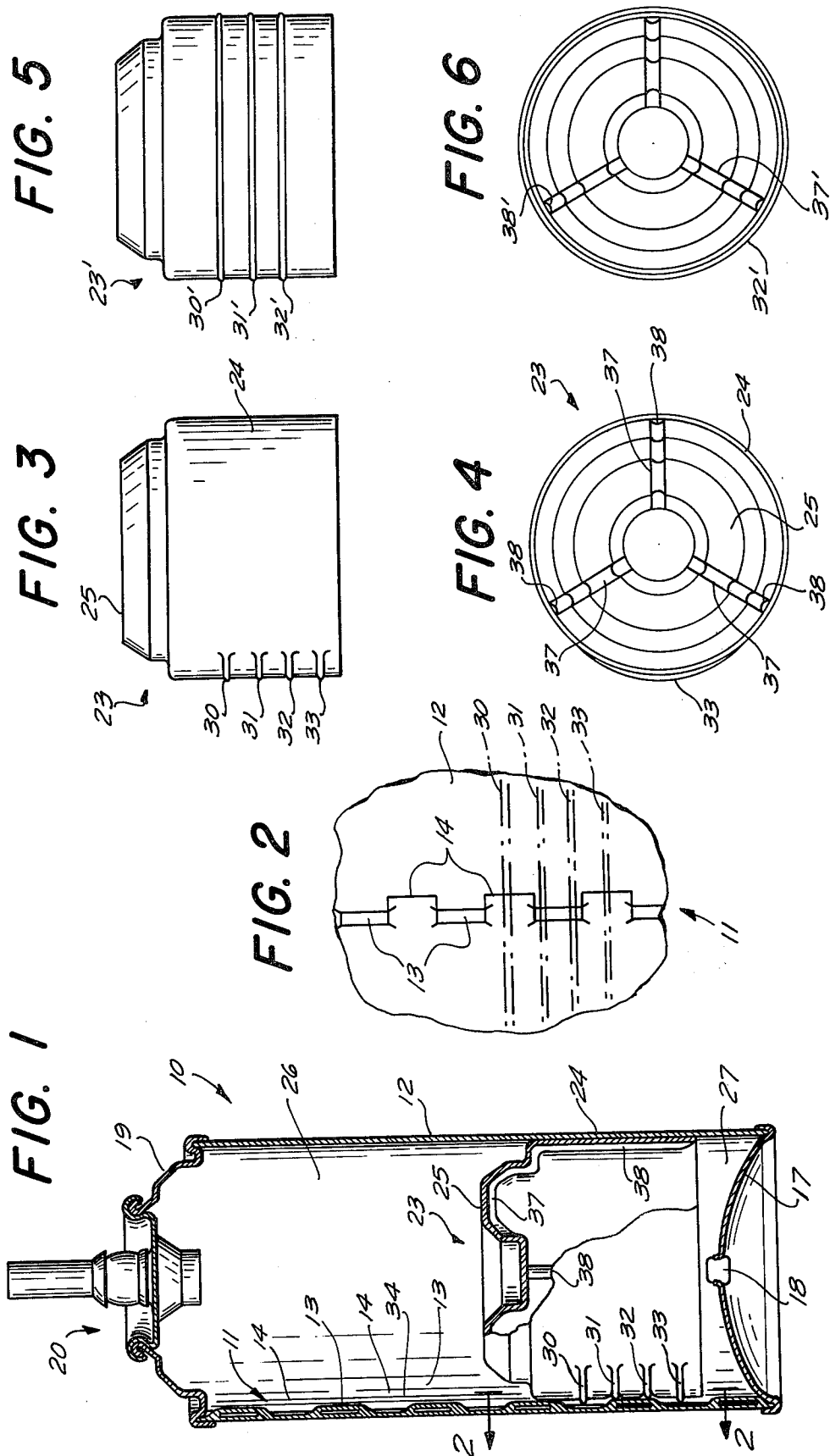
Primary Examiner—Drayton E. Hoffman
Assistant Examiner—Hadd Lane
Attorney, Agent, or Firm—Alan H. Levine

[57] **ABSTRACT**

A cylindrical can having a longitudinal seam presenting higher and lower inwardly projecting portions, and a piston within the can having at least three external ribs. The spacing between each two successive ribs is no greater than the length of one lower seam portion, and the spacing between two alternate ribs is greater than the length of one higher seam portion. The ribs may extend around the entire periphery of the piston or only a portion thereof. The top and side walls of the piston may be provided with inwardly projecting ridges.

9 Claims, 6 Drawing Figures





AEROSOL CAN AND PISTON ASSEMBLY

This invention relates to aerosol containers, and more particularly to a particular type of seamed can and a piston of special character for use with the can.

Aerosol cans for dispersing viscous products, such as cheese spreads and toothpaste, are commonly provided with a hollow piston slidable longitudinally within the can. The product to be dispensed is located above the piston, and a pressurized fluid, such as compressed air, fills the space within and below the piston. When the dispensing valve of the can is opened, the pressurized fluid pushes the piston upwardly in the can and the piston expels some of the product through the valve.

One type of can often used as an aerosol container is a three piece can having a meshed seam. The interior of such a can is not perfectly circular because the longitudinal seam of the can projects inwardly from the inner surface of the can side wall. Furthermore, the seam does not project inwardly in a uniform manner, but instead has alternating high and low portions along its length which project to a greater or lesser extent into the can. The piston is usually made of molded plastic and has a thin flexible side wall which tends to conform to the shape of the inner surface of the can side wall when the interior of the piston is pressurized. However, the piston wall is not flexible enough to conform to the interior shape of the can in the region of the seam. As a result, two spaces usually result between the can and piston walls, one on each side of the seam. These spaces constitute passages through which the pressurizing fluid beneath the piston can escape past the piston into the region of the can containing the product to be dispensed. Such escape of the pressurized fluid is, of course, disadvantageous since as the pressure beneath the piston is reduced, the ability of the piston to push the product out of the valve is reduced.

It is an object of the present invention to overcome this problem by providing a can having a meshed seam with a piston able to form a seal with the inner surface of the can wall so as to prevent escape of pressurized fluid into the region of the can filled with the product to be dispensed.

It is a more specific object of the invention to provide a piston having a plurality of external ribs so spaced apart that at least one of such ribs is always in engagement with a low portion of the meshed can seam to thereby form a seal with the can wall around the entire periphery of the piston.

It is another object of the invention to provide the top wall of such a piston with strengthening ridges, and to provide the side wall of the piston with integrally-molded inwardly projecting ridges to permit the side walls to be as thin and flexible as possible.

Additional objects and features of the invention will be apparent from the following description in which reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a longitudinal cross sectional view through an aerosol container according to the present invention;

FIG. 2 is a vertical cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is an elevational view of a piston according to the invention;

FIG. 4 is a bottom view of the piston of FIG. 3;

FIG. 5 is an elevational view of an alternative embodiment of a piston according to the invention, and FIG. 6 is a bottom view of the piston of FIG. 5.

The can 10 shown in FIG. 1 is a conventional three piece can having a meshed seam 11 (see also FIG. 2). The can side wall 12 is an initially flat piece of sheet metal bent into a cylindrical shape. One of the side edges of the sheet metal which meets at seam 11 has a square-wave-shaped configuration including square shaped fingers with square shaped valleys between them. The other of the side edges meeting at seam 11 has a series of slits extending inwardly from, and perpendicular to, the edge, the slits defining a series of square fingers between them. The fingers of the one edge and every other finger of the other edge are bent back upon the sheet and the bent back fingers are interlocked. The interlocked fingers produce a bulk resulting in higher portions 13 of the seam 11 projecting into the can. Alternating with the higher portions 13 are lower portions 14 comprising the unbent square fingers overlapping the margin of the opposite side of the initially flat metal sheet. The seam 11 is then soldered to make it fluid tight.

Crimped to the bottom edge of can side wall 12 is a bottom wall 17 having a hole through which a pressurized fluid is introduced into the bottom of the can after which the hole is closed by a resilient plug 18. Crimped to the top edge of can side wall 12 is a top wall 19 having a large opening into which a valve assembly 20 is seated. The edge of the valve assembly is crimped to the edge surrounding the opening in the top wall.

Slidable longitudinally within can 10 is a hollow piston 23, preferably formed of a molded plastic such as polyethylene, having a flexible side wall 24 and a top wall 25. The top wall 24 is shaped to conform to the shape of the lower surface of top wall 19 and valve assembly 20 so that when piston 23 reaches the top of the can 10 it can expel all or substantially all of the product through valve assembly 20. The region 26 within the can above piston 23 is filled with the product to be dispensed, and the region 27 within and below piston 23 is filled with a pressurized fluid, such as compressed air.

As thus far described, the aerosol container is completely conventional. However, the external surface of side wall 24 of piston 23 is furnished with at least three, and preferably four, ribs 30, 31, 32, and 33. The ribs extend horizontally along the periphery of the side wall 24, i.e., transverse to the longitudinal direction of seam 11, and are spaced apart along the length of the seam. The spacing between the ribs is critical. The spacing between each two successive ribs, e.g., ribs 30 and 31, is no greater than the length, measured along the length of seam 11, of one of the lower seam portions 14. The spacing between any two alternate ribs, i.e., any two ribs on opposite sides of a third rib, e.g., ribs 30 and 32 or ribs 31 and 33, is greater than the length of one of the higher seam portions 13. In this description, each higher seam portion 13 is considered to include the inclined sections 34 on each side of the higher portion which are the transitions between the higher and lower portions. Thus, the higher seam portions are considerably longer than the lower seam portions.

As a result of the rib spacing described above, at least one of the ribs 30-33 will always be in contact with one of the lower seam portions 14. For example, in FIG. 1, piston 23 is in a position in which rib 30 is in engage-

ment with a lower seam portion 14, ribs 31 and 32 are both in engagement with a higher seam portion 13, and rib 33 is in engagement with another lower seam portion 14. This engagement is permitted due to the flexibility of piston side wall 24. Ribs 31 and 32 can be pushed inwardly without ribs 30 and 33 being pushed in. Due to the engagement of rib 30 with lower seam portion 14, at the level of rib 30 the entire periphery of piston 23 engages the inner surface of the can side wall 12 to form a fluid-tight seal. At the levels of ribs 31 and 32, on the other hand, spaces remain between the piston and can side wall on each side of seam 11. At the level of rib 33, the entire periphery of piston 23 also engages the inner surface of the can side wall. Thus, rib 33, which is not essential, advantageously serves as a second back-up seal to the seal formed in part by rib 30.

As piston 23 moves upwardly in can 10, and rib 30 engages the next higher seam portion 13, rib 31 moves on to the adjacent lower seam portion 14, thereby preserving the seal between the regions 26 and 27 within the can. At no time are more than two of the ribs 30-33 in engagement with higher seam portions 13, and hence at least one rib is always in engagement with a lower seam portion 14.

On its underside, top wall 25 of piston 23 is formed with three radially-extending ridges 37 (see FIGS. 1 and 4) molded integrally with the remainder of the piston. These ridges add rigidity to the relatively thin top wall 24 and insure that the top wall does not collapse downwardly during a step in the can filling operation when suction is applied to the hole in the can bottom wall. Ridges 37 merge into ridges 38 extending downwardly along the inner surface of the piston side wall 24. Ridges 38 result from channels provided in the mold in which the piston is formed. The channels permit the molten plastic to flow quickly and evenly, making it possible to mold a thinner wall 24 than could be molded without the channels. A thin wall is, of course, desirable since the thinner the wall the more flexible it is and the more easily it conforms to the inner shape of the can side wall 12.

The piston 23' shown in FIGS. 5 and 6 is identical to piston 23 in most respects, and hence similar parts bear the same reference numerals as parts of piston 23, but followed by a prime. Piston 23', however, is only provided with the minimum three ribs 30', 31', and 32', and each rib extends around the entire periphery of the piston. The advantage of piston 23' is that no care need be taken concerning the angular orientation of the piston when the piston is inserted into can 10, since some part of the ribs will engage can seam 11. In contrast, when piston 23 is assembled with can 10, it must be oriented so that ribs 30-33 engage seam 11.

The invention has been shown and described in preferred form only, and by way of example, and many variations may be made in the invention which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment insofar as such limitations are included in the appended claims.

What is claimed is:

1. A can and piston assembly, comprising:

a. a cylindrical can having a longitudinal seam projecting into the can interior from the inner surface of the can side wall, said seam having higher portions and lower portions alternating with each other along the length of said seam, and

b. a cylindrical piston within said can having at least three external ribs extending transversely of said can seam and spaced apart along the length of said seam, the spacing between each two successive ones of said ribs being no greater than the length of one of said lower seam portions, and the spacing between any two of said ribs on opposite sides of a third rib being greater than the length of one of said higher seam portions.

2. A can and piston assembly as defined in claim 1 wherein said piston has four external ribs.

3. A can and piston assembly as defined in claim 1 wherein said piston is hollow and defined by a thin flexible side wall merging into a top wall, said ribs projecting from the exterior surface of said side wall.

4. A can and piston assembly as defined in claim 1 wherein said piston has a cylindrical side wall, and said ribs extend along only a portion of the periphery of said side wall, said side wall portion facing said can seam.

5. A can and piston assembly as defined in claim 1 wherein said piston has a cylindrical side wall, and said ribs extend along the entire periphery of said side wall.

6. A can and piston assembly as defined in claim 1 wherein said piston has an integral side and top wall formed of molded plastic, and a radially-extending ridge projecting from the interior surface of said piston top wall.

7. A can and piston assembly as defined in claim 6 including a plurality of said radially-extending ridges.

8. A can and piston assembly as defined in claim 6 including a downwardly-extending ridge projecting from the interior surface of said piston side wall, said downwardly-extending ridge merging into said radially-extending ridge.

9. A can and piston assembly as defined in claim 8 including a plurality of said radially-extending and downwardly-extending ridges, each radially-extending ridge merging into a downwardly-extending ridge.

* * * * *