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Macartney et al.

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[54] APPARATUS FOR DETECTING AEROSOL LEAKAGE

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[58] **Field of Search** 73/40, 40.7, 37, 49.2, 49.3

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

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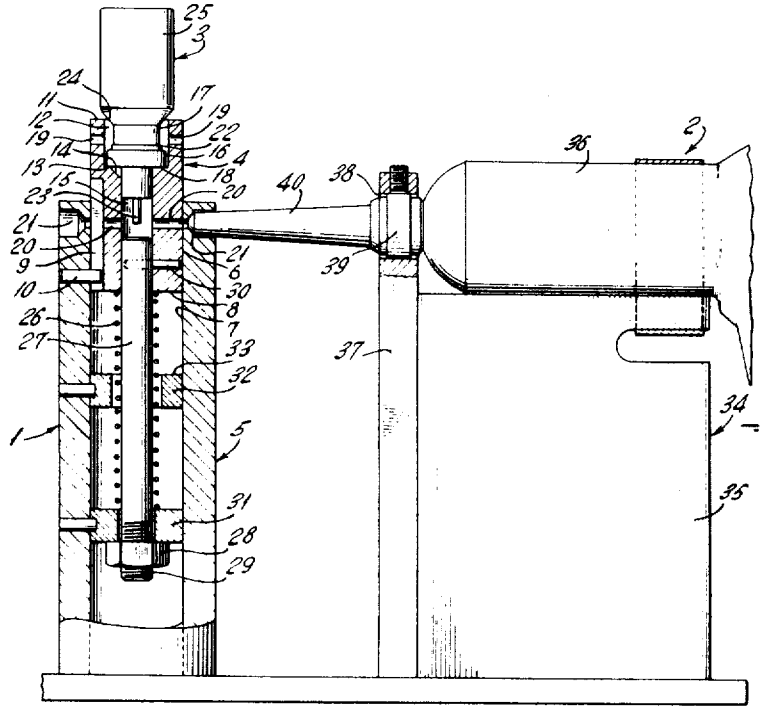
[57] **ABSTRACT**

A device for inspecting aerosol units for leakage at the valve stem and the crimp between the container and the valve assembly. This device includes hollow support means to hold the aerosol unit and means to separate the valve stem portion and the crimp portion of said unit. This device also includes two apertures in the side wall of the support means, one of said apertures being above and the other being below the means to separate the valve stem portion of the aerosol unit from the crimp portion.

5 Claims, 3 Drawing Figures



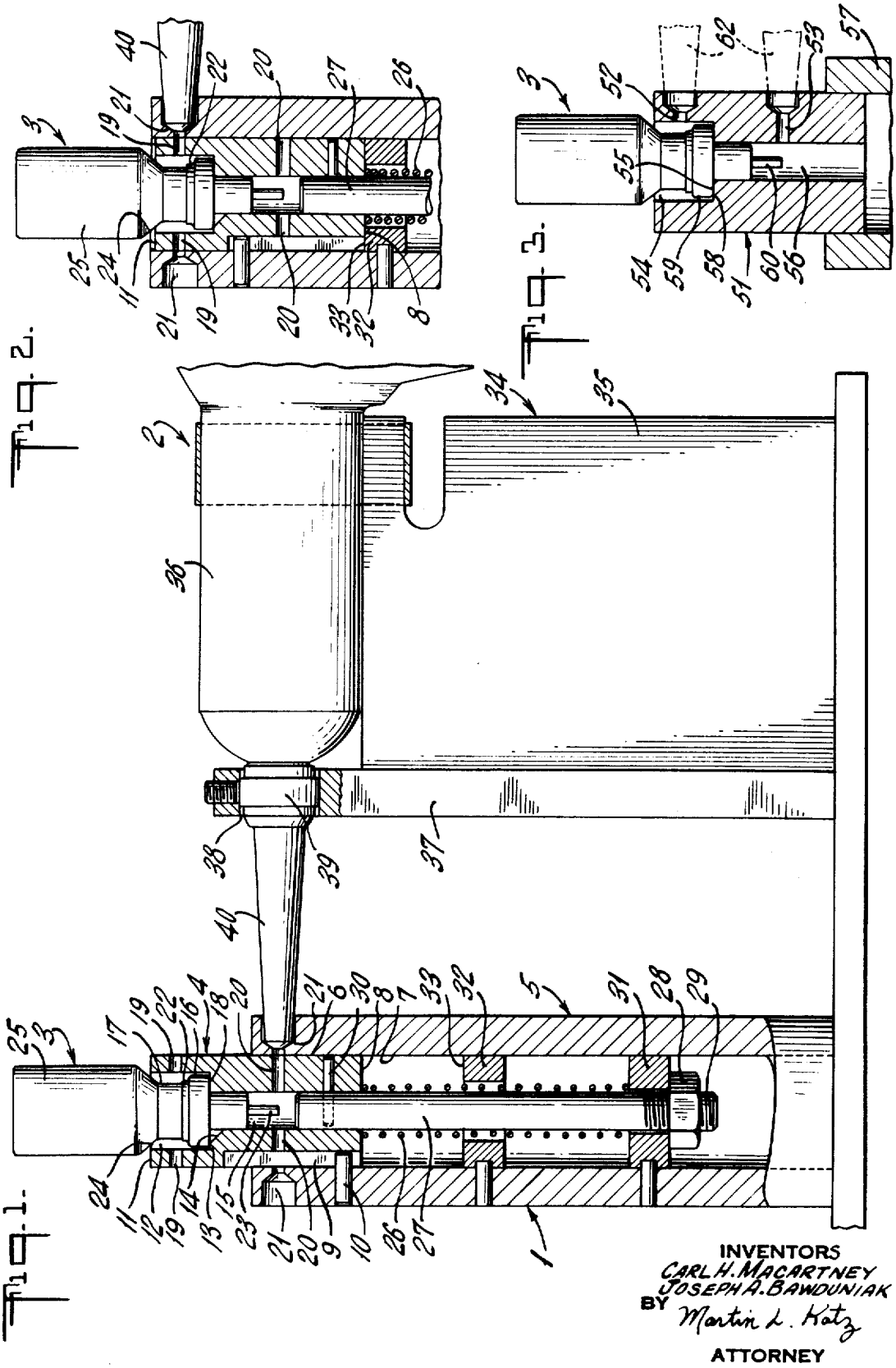


FIG. 1.

FIG. 2.

FIG. 3.

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APPARATUS FOR DETECTING AEROSOL LEAKAGE

This invention relates to a process and device for inspecting aerosol units for leakage.

More particularly, this invention relates to a process and device for inspecting filled aerosol units for leakage at the valve stem and at the crimp between the container and the valve assembly.

In recent years, aerosol products have achieved commercial success in many industries. A common problem, particularly in the pharmaceutical industry, is leakage of product from the filled unit. In the past, the only procedures for testing these units for leakage involved randomly selecting units to be tested, emptying these units, performing a loss analysis test on the contents of each unit, and using hot and cold water baths or foaming agents followed by searching for bubbles caused by leaks. The loss analysis procedure is time consuming and expensive since it results in the loss of the unit being tested and the water bath and coating techniques are somewhat inaccurate since small leaks cannot be detected.

Accordingly, it is an object of this invention to provide a process and device for facilitating the rapid and economic inspection of aerosol units for leakage.

It is a further object of this invention to provide a process and device which enables the operator to determine whether or not the leakage is from the valve stem or from the crimp between the container and the valve assembly of the aerosol unit.

These, and other objects and advantages of this invention, will become apparent from an examination of the following specification and disclosure wherein:

FIG. 1 is a sectional view of an aerosol unit being tested for leakage by the device of this invention;

FIG. 2 is a sectional view of an aerosol unit being tested for crimp leakage by the device of this invention;

FIG. 3 is a sectional view of a modified embodiment of a device of this invention.

Referring to FIG. 1, there is generally shown the inspection unit 1, a halogen leak detector 2 and an aerosol unit 3 in position to be inspected for stem leakage. The inspection unit 1 includes a puck 4 which is made of nylon. This puck is mounted in a sleeve 5 which is made of aluminum or some other suitable material. The puck has an outer edge 6 and is in sliding engagement with the inner edge 7 of the sleeve 5. The puck also has a flat bottom edge 8 and a groove 9 which engages the guide 10 so that the puck is properly aligned within the sleeve 5. The puck also has a top edge 11 and is hollow, the hollow portion having a large bore 12, shoulder 13, tapered edge 14 and small bore 15. The large bore is of a diameter which is larger than that of the cap 16 and neck 17 of the aerosol unit 3. The edge 18 of cap 16 rests on the shoulder 13 of the puck 4.

An upper aperture 19 and a lower aperture 20 are located in the puck 4. These extend through both sides of the puck 4 and communicate with aperture 21 in the sleeve 5 depending upon the position of the puck 4 within the sleeve 5. It may be observed that the crimp portion 22 of the aerosol unit 3 is sealed off from the valve stem portion 23. Upper aperture 19 and lower aperture 20 both communicate with the atmosphere when they are aligned with aperture 21 so that the halogen leak detector 2 will not draw against a vacuum. This permits more accurate and efficient utilization of the halogen leak detector.

The bottom edge 8 of the puck 4 is in engagement with a metal spring 26 which is shown in its extended position in FIG. 1. The spring 26 is mounted on a steel rod 27 which is adjustably mounted in the sleeve 5 by the movement of the rod collar 28 which is rotatable on threads 29 at the lower portion of the rod 27. Adjustment of the rod 27 results in the alignment of apertures 20 and 21 when the puck 4 is in its raised position. A metal pin 30 connects the puck 4 and the rod 27 and prevents the puck from being forced upward by the pressure of the spring 26 beyond the position shown in FIG. 1. The lower end of the spring 26 rests on the bottom collar 31 which

is mounted in a fixed position in the lower portion of the sleeve 5. A top collar 32 is also mounted in the sleeve 5 in a position at which the top aperture 19 will communicate with aperture 21 in the sleeve 5 when the puck 4 is depressed so that the bottom edge 8 is in contact with the top surface 33 of the top collar 32 as shown in FIG. 2.

The inspection unit also has a portion 34 upon which a General Electric Gun Probe, Model H-2, halogen leak detector 2 is mounted. This portion of the inspection unit has a section 35 upon which the barrel 36 of the halogen leak detector 2 rests and a section 37 which has an aperture 38 which engages the collar 39 of the probe portion 40 of the halogen leak detector 2.

As previously stated, the device of this invention is able to inspect filled aerosol units for leakage at the valve stem and at the crimp between the container and the valve assembly. When the device is in the position shown in FIG. 1, the aerosol unit 3 may be inspected for stem leakage. In this position the valve stem 23 is isolated from the crimp portion 22 by the abutment of the edge 18 of cap 16 of the aerosol unit 3 against the shoulder 13 of the puck 4. The aperture 20 in the puck is aligned with the aperture 21 in the sleeve 5. This enables a passageway to be formed from the space in small bore 15 to the probe portion 40 of the halogen leak detector 2. If there is any leakage from the valve stem portion 23 of the aerosol unit 3, it will be confined to this passageway and the halogen leak detector 2 will indicate the presence of the halogenated propellant which has escaped from the aerosol unit.

When it is desired to inspect the aerosol unit 3 for leakage from the crimp portion 22, the aerosol unit is pushed until the position shown in FIG. 2 is reached. In this position the bottom edge 8 of the puck 4 rests on the top surface 33 of the top collar 32 and the top aperture 19 in the puck 4 is aligned with the aperture 21 in the sleeve 5. Since the outside edge of the shoulder 24 of the bottle 25 is in contact with the top edge 11 of the puck 4, propellant which leaks from the crimp portion 22 passes through aperture 21 and is detected by the probe portion 40 of the halogen leak detector 2.

In operation, it is desired to have each aerosol unit in each position for 3–6 seconds before checking for leakage in that position in order to ensure an accurate reading.

FIG. 3 discloses an alternative embodiment of the device of this invention. In this embodiment, the inspection puck 51 has an upper aperture 52 and a lower aperture 53 and is hollow. The hollow portion has a large bore 54, shoulder 55, small bore 56 and base 57. In operation, an aerosol unit 3 is placed on the puck 51 so that the top 58 of the lip 59 of the unit 3 rests on the shoulder 55 of the puck. This isolates the stem portion 60 from the crimp portion 61 of the aerosol unit 3. To inspect the aerosol unit for crimp leakage, the probe portion 62 of a halogen leak detector is inserted in aperture 52 and to inspect the aerosol unit for stem leakage the probe portion 62 is inserted in aperture 53.

The device of this invention may be used alone to randomly test units or it may be installed on the production line to inspect each unit as the filling and closing of the unit is completed.

What is claimed is:

1. A device for inspecting filled aerosol units for leakage from the valve stem portion of the aerosol unit and the crimp portion of said unit comprising support means to hold a filled aerosol unit, said means being hollow, and having further means to separate the valve stem portion of the aerosol unit from the crimp portion of said unit, said support means also having first and second apertures in the side wall thereof, said first aperture being above said means to separate the valve stem portion of the aerosol unit from the crimp portion of said unit, and said second aperture being below said means.

2. A device as in claim 1 wherein said first and second apertures are in the same vertical plane.

3. A device as in claim 2 wherein said means to separate the valve stem portion of the aerosol unit from the crimp portion of said unit comprises a shoulder extending inwardly from a

large diameter bore to a small diameter bore in the hollow support means.

4. A device as in claim 3 wherein said support means are mounted for reciprocal up and down movement between a first position and a second position in a hollow sleeve having an aperture, provided, however, that when said support means are in said first position, the first aperture in said support means communicates with said aperture in said hollow sleeve, and when said support means are in said second position, the second aperture in said support means communicates with said aperture in said hollow sleeve.

5. A device as in claim 4 further comprising means to support a halogen leak detector, said halogen leak detector communicating with said aperture in said hollow sleeve.

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