April 14, 1959 R. B. NEBINGER 2,881,576

METHOD AND DEVICE FOR PRESSURE FILLING AEROSOL DISPENSERS

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Fig. 1

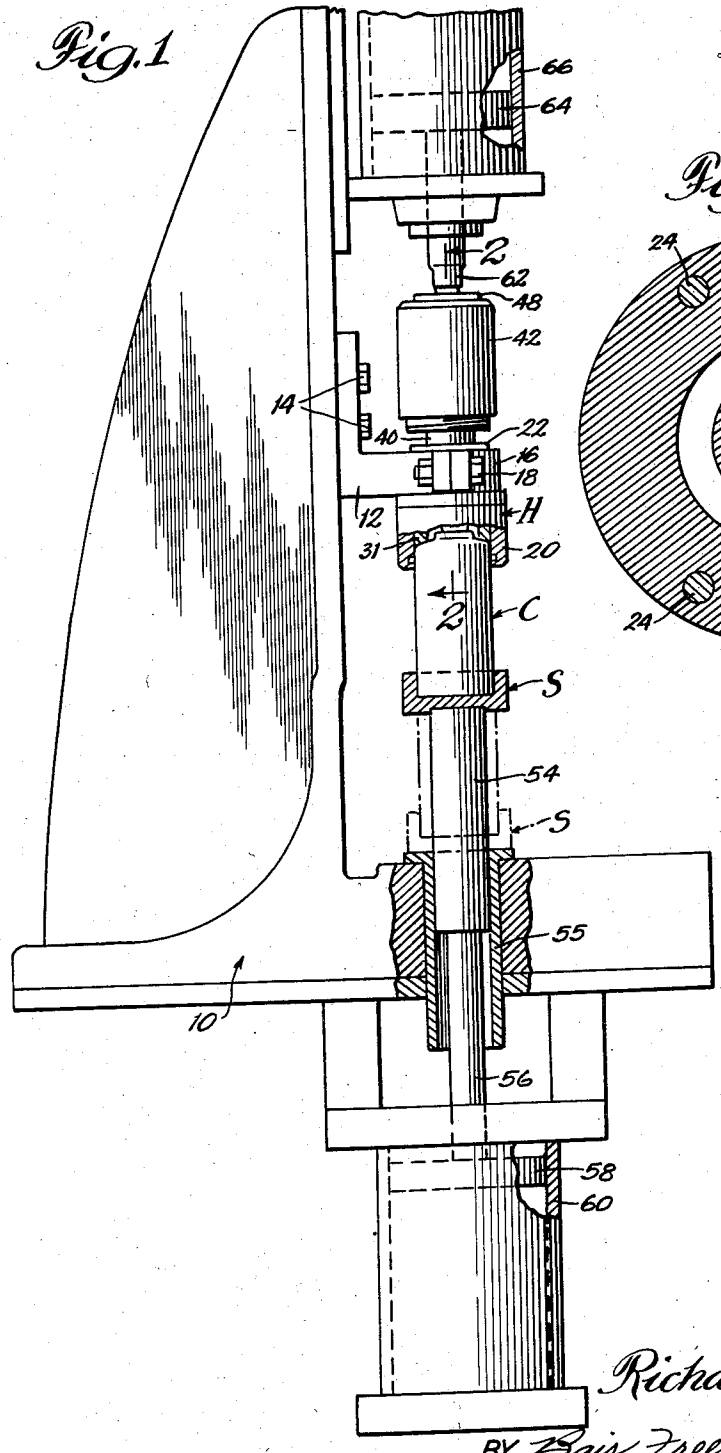


Fig. 4

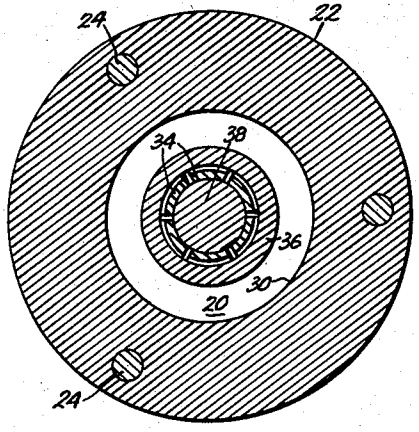
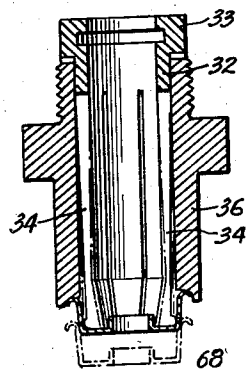


Fig. 5



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Fig. 2

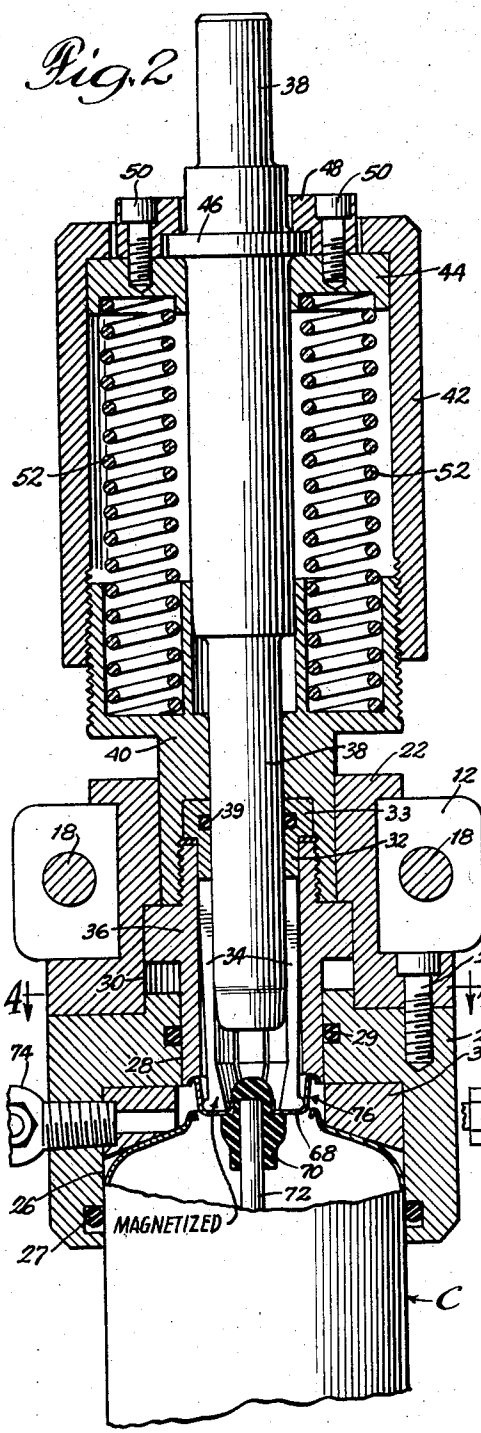
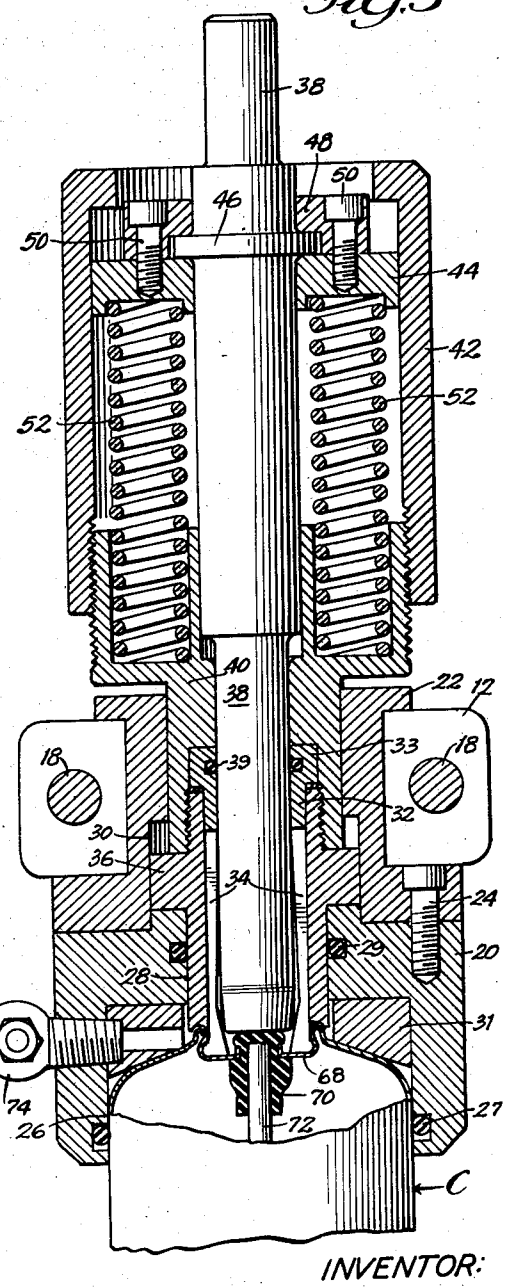


Fig. 3



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METHOD AND DEVICE FOR PRESSURE FILLING AEROSOL DISPENSERS

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1 Claim. (Cl. 53—88)

This invention relates to a method and a device for pressure filling aerosol dispensers at substantially room temperature.

Heretofore, aerosol containers have been filled with highly volatile fluid by either of two methods: (1) A refrigeration method in which the pressurizing gas (usually Freon) is introduced into the dispensing can at a temperature below its boiling point (minus 20° F. to 0° F.) or (2) a pressure filling method in which the can is pressurized through the aerosol dispensing valve which has previously been assembled to the can. The refrigeration method is not desirable since considerable capital investment is necessary for the refrigeration equipment plus its daily high cost of operation. The pressure filling method is good from the standpoint that refrigeration of materials (Freon and the aerosol formula) is not necessary. However, it is slow because of the relatively small inlet hole in the dispensing valve through which the Freon is introduced into the can. While this hole is small from a filling standpoint, it is much larger than is used on aerosols filled by refrigeration, but the smaller hole is more desirable from the standpoint of subsequent use of the aerosol dispenser.

One object of my present invention is to provide a method whereby to fill crown type aerosol cans without refrigeration which method is independent of the dispensing valve on the can and the small size of the hole in such valve.

Another object is to provide a filling device which utilizes my method and which is so designed as to permit relatively fast filling of the can at substantially room temperature with a minimum of loss of fill between filling operations on successive cans.

A further object is to provide a filling device which cooperates with a crown cap to hold its face spaced from a container to which the cap is subsequently crimped after the filling operation, and upon completion of the filling operation moves the crown cap into the can and crimps it in position relative thereto, thus sealing the contents of the can whereupon it may be removed from my filling device.

With these and other objects in view, my invention consists in the steps of my disclosed filling method and in the construction, arrangement and combination of the various parts of my device for pressure filling aerosol dispensers, whereby objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claim and illustrated in detail on the accompanying drawings, wherein:

Fig. 1 is a side elevation partly in section of a machine for pressure filling aerosol dispensers and similar containers to which my filling device has been applied so that it can operate according to my method;

Fig. 2 is an enlarged vertical sectional view on the line 2—2 of Fig. 1 showing details of construction of the filling device;

Fig. 3 is a similar sectional view showing some of the parts in a different position during operation;

Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 2; and

Fig. 5 is a sectional view similar to a portion of Fig. 2 showing a modified construction of crimping collet.

On the accompanying drawings I have used the reference character H to indicate in general my can receiving, filling and crimping head, S a can support and C a can to be filled. The filling machine above referred to is shown generally at 10 and the head H is mounted thereon by means of a bracket 12 secured to the frame 10 as by screws 14, a clamp cap 16 being secured to the bracket 12 by clamp screws 18 to hold the head H in position.

The head H comprises a can receiving sleeve 20 and a sleeve extension 22 secured thereto as by screws 24. The sleeve 20 has a can receiving bore 26 and the can C is sealed relative to this bore by means of an O-ring 27. A shoulder washer 31 is secured in the bore 26 for the can C to abut against. The sleeve 20 also has a collet sleeve receiving bore 28 in which a collet sleeve and crown depressor 36 is slidable and sealed relative thereto by an O-ring 29. The sleeve extension 22 also has a collet sleeve receiving bore 30 to receive an enlarged part of the sleeve 36 and slidably guide the same.

In the sleeve 28 is a collet 32 having a head 33 at its upper end and a plurality of collet fingers 34 extending downwardly and formed by three saw cuts extending radially through the collet itself which is tubular in character. The cuts just referred to are in three planes passing through the axis of the collet as shown in Fig. 4. The collet head 33 is retained by a plunger guide sleeve 40 threaded to the collet sleeve 36, and a collet actuating plunger 38 is slidable in the sleeve 40. A third seal is provided between the plunger 38 and the collet 32 consisting of an O-ring 39. The collet fingers 34 (or at least the lower end thereof) are preferably magnetized as indicated by legend in Fig. 2.

The plunger guide sleeve 40 has a guide sleeve extension 42 adjustable relative thereto by being threaded thereon. A stop disc 44 is slidably mounted therein and thus guided by the guide sleeve. The stop disc 44 is secured to the plunger 38 by forming a flange 46 on the plunger and securing a stop disc keeper 48 to the stop disc 44 as by screws 50. Return springs 52 are interposed between the plunger guide sleeve 40 and the stop disc 44.

As shown in Fig. 1, means is provided for actuating the can support S comprising a support plunger 54 slidable in a guide sleeve 55 and connected to a support piston rod 56 extending into a support cylinder 60 wherein a support piston 58 is mounted on the piston rod so that the support S can be raised and lowered by pneumatic or hydraulic pressure the flow of which is suitably controlled to and from said cylinder 60.

There is also provided a head piston rod 62 connected to the collet actuating plunger 38 and to a head piston 64 in a head cylinder 66 so that pneumatic or hydraulic pressure may be utilized to actuate the plunger 38.

Referring to Fig. 2, the can C is adapted to have a crown cap 68 crimped thereto and this cap may be initially provided with a suitable dispensing valve or a seal grommet 70 and a dip tube 72 extending to a position adjacent the bottom of the can C. Aerosol cans in general may have integral dispensing valves or separate dispensing valves which are connected with the crown cap 68 after piercing the seal grommet 70, and my method for filling aerosol cans or the like is applicable to either type of dispenser and also to dispensers for other products. It is not limited to aerosol dispensers.

A filling valve 74 for the freon or other pressurizing gas is provided and communicates through the shoulder

washer 31 with a chamber indicated at 76 and this chamber, together with the slots between the collet fingers 34 and what little space there is below the plunger 38 when in the position of Fig. 3, represents the volume of freon that will be wasted each filling operation. The chamber just mentioned is advantageously kept to a minimum and that minimum can obviously be quite small during operation as will hereinafter appear so as to minimize the wastage.

Practical operation

With the support S lowered from its elevated position in Fig. 1 to the dotted position illustrated, the crown cap 68 which carries the dispensing valve or the grommet 70 as the case may be is elevated within the can receiving sleeve 20 until it is supported against the lower ends of the fingers 34 by magnetic attraction thereto. An empty can C is placed on the support S and the necessary hydraulic or pneumatic operation performed to elevate the can to the position shown in Fig. 2. In this position it will be noted that the cap 68 is spaced from the neck of the can C so that gas can flow freely from the chamber 76 into the can.

At this time the chamber 76 is sealed off from atmosphere by the O-rings 27, 29 and 39 so that the valve 74 can be opened for permitting inflow of the freon from a proportioning pump (not shown) for the necessary period of time to charge the can to the desired pressure as required whereupon the hydraulic or pneumatic operation for the head piston 64 is performed to lower the collet actuating plunger 38 from the position of Fig. 2 to the position of Fig. 3. The first downward movement of the collet fingers 34 which engage the bottom wall of the crown cap 68 and the sleeve 36 which engages its upper flange force the crown cap into the neck of the can C by reason of the springs 52 moving the sleeves 40 and 36 downwardly until the enlargement on 36 engages the top of the sleeve 20 whereupon the springs are compressed as shown in Fig. 3 as the plunger 38 moves further downwardly and engages the internal taper of the collet fingers 34 to expand the collet by camming action, and thus crimp the crown cap to the can. A suitable gasket is usually provided in the upper flange of the crown cap to assure a seal but no attempt has been made to illustrate it on the drawings.

The valve 74 is closed just about the time the cap 68 starts to move downwardly from the position of Fig. 2 and the cap has been crimped in position on the can in Fig. 3.

The plunger 38 is then elevated and the support S lowered, whereupon the pressure remaining in the chamber 76 will force the can C downwardly with the support and thus remove the can from the can receiving head H whereupon the filled can may be removed from the machine either manually or automatically and replaced by an empty can and the filling cycle repeated.

Magnetizing of the collet fingers 34 is one practical way to hold the crown cap 68 away from the open upper end of the can C during the filling operation. An alternative arrangement is disclosed in Fig. 6 which illustrates the fingers 34 initially spread by solid lines and contracted by dotted lines when the cap is mounted thereon, thus frictionally holding the cap instead of depending on magnetism for this purpose. The cap is a slight snap fit onto the fingered lower end of the collet.

Some changes may be made in the construction and arrangement of the parts of my device for pressure filling aerosol dispensers and the method steps disclosed may be varied to some extent without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claim any modified forms of structure, use of mechanical equivalents or mechanically equivalent method steps which may reasonably be included within their scope.

I claim as my invention:

A machine for filling crown type cans with fluids that are highly volatile at normal room temperatures comprising a stationary head defining a can-receiving opening in one side thereof, a movable can-receiving support positioned to the one side of said head opposite the can-receiving opening, means for moving said can-receiving support toward said can-receiving opening to present a can therein for filling thereat and to move the filled can away from said head to permit removal thereof from said can-receiving support, seal means in said head for sealing a can relative thereto when the can is positioned in said can-receiving opening, said stationary head carrying a sleeve slidable therein and sealed relative thereto and extending therefrom to the side opposite said one side, a segmented crimping collet carried by said sleeve and being magnetized to provide means assisting to support a crown cap thereon, said cap when carried on said head being normally in spaced relation from a can that is operatively received in the can-receiving opening of said head, a collet actuating plunger slidable in said sleeve and sealed relative thereto, said plunger being operatively connected with said sleeve through springs located outwardly of said stationary head which permit of simultaneous movement of said plunger and sleeve to a position whereat the crown cap engages a can and thereafter permits of additional movement of the plunger relative to the sleeve to effect expanding the collet for crimping the crown cap to the can, said head with a can operatively positioned in the can-receiving opening cooperating with said sleeve and plunger carried by said head to define a pressure chamber for receiving therein highly volatile fluid under pressure, means for effecting movement of the plunger and sleeve to effect moving the crown cap into closing relation with the can and to effect crimping the crown cap to the can, means for introducing fluid under pressure through said stationary head into said pressure chamber and thereby into the can while the crown cap is spaced therefrom.

References Cited in the file of this patent

UNITED STATES PATENTS

1,294,820	Middleton	Feb. 18, 1919
2,763,415	Bagarozy	Sept. 18, 1956