Aug. 2, 1960 J. R. FOCHT 2,947,126

MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

Filed Sept. 21, 1956 6 Sheets-Sheet 1

Fig 1

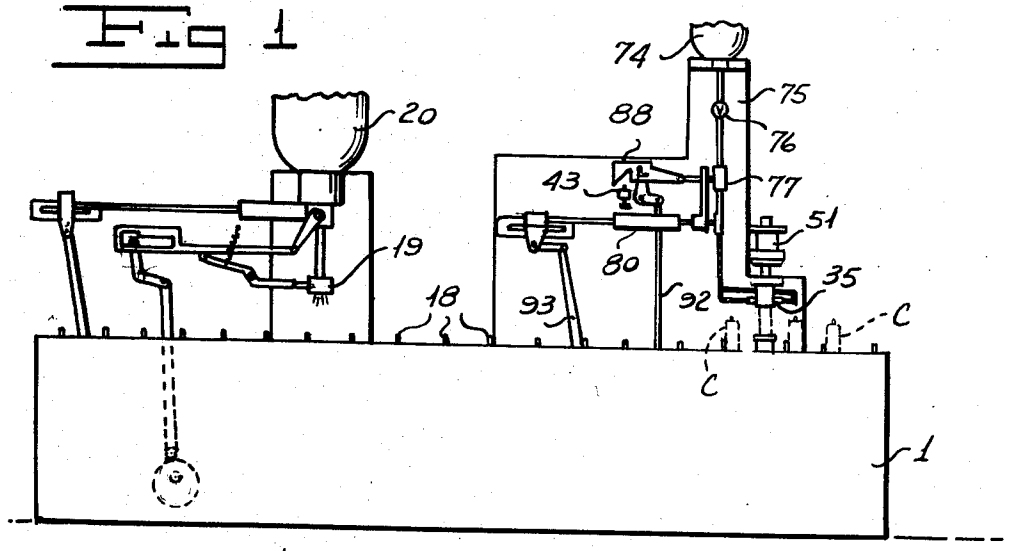
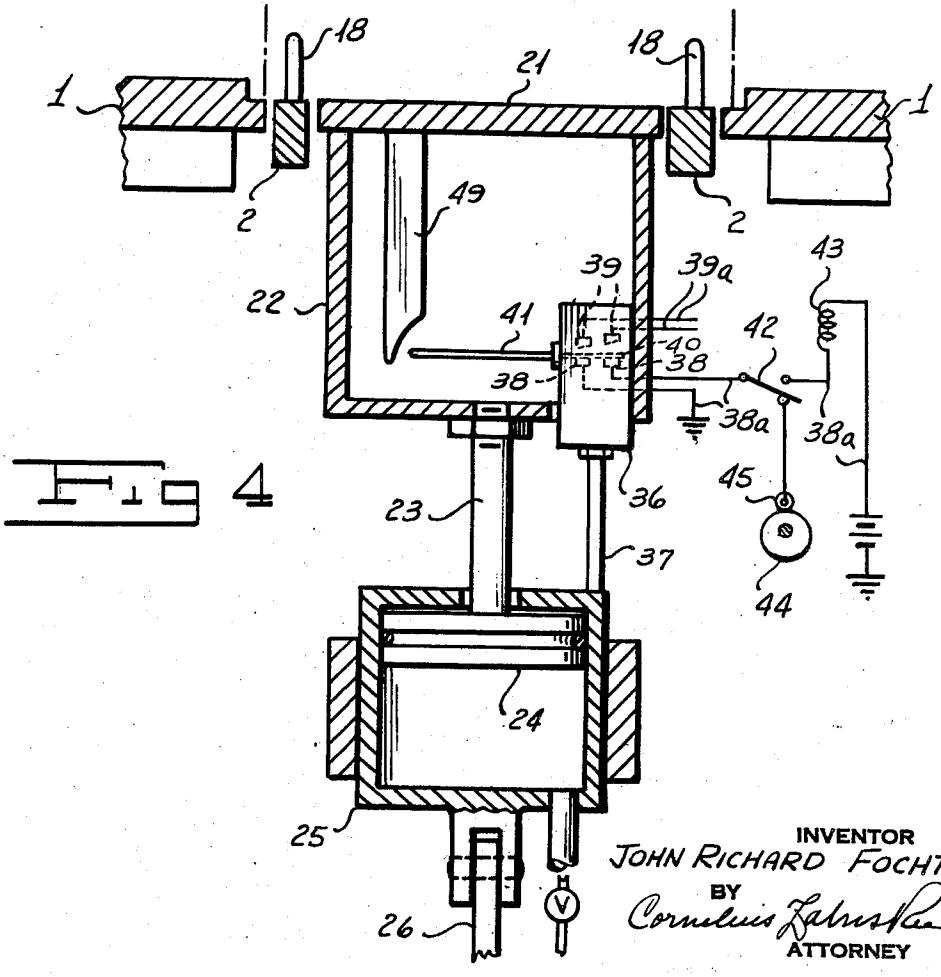


Fig 4



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MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

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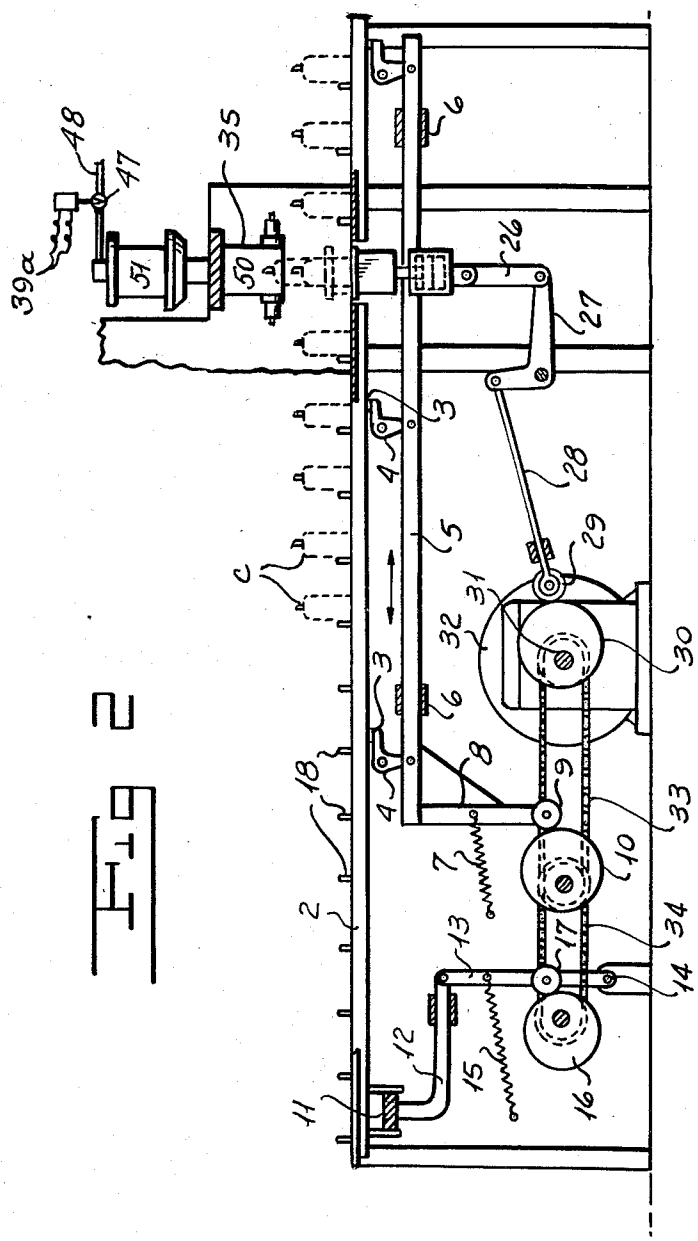


FIG 2

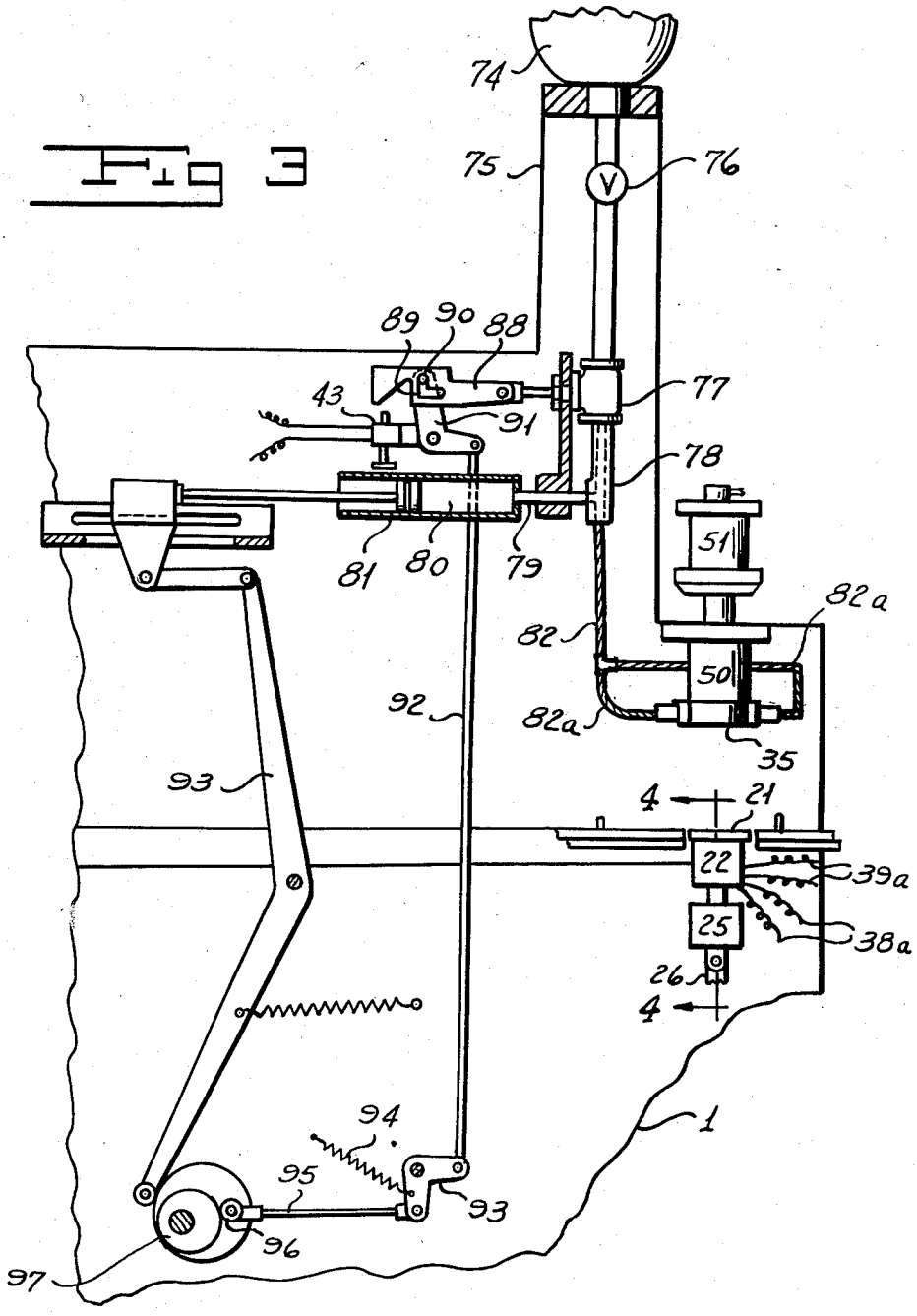
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MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

Filed Sept. 21, 1956 6 Sheets-Sheet 3

Fig 3



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MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

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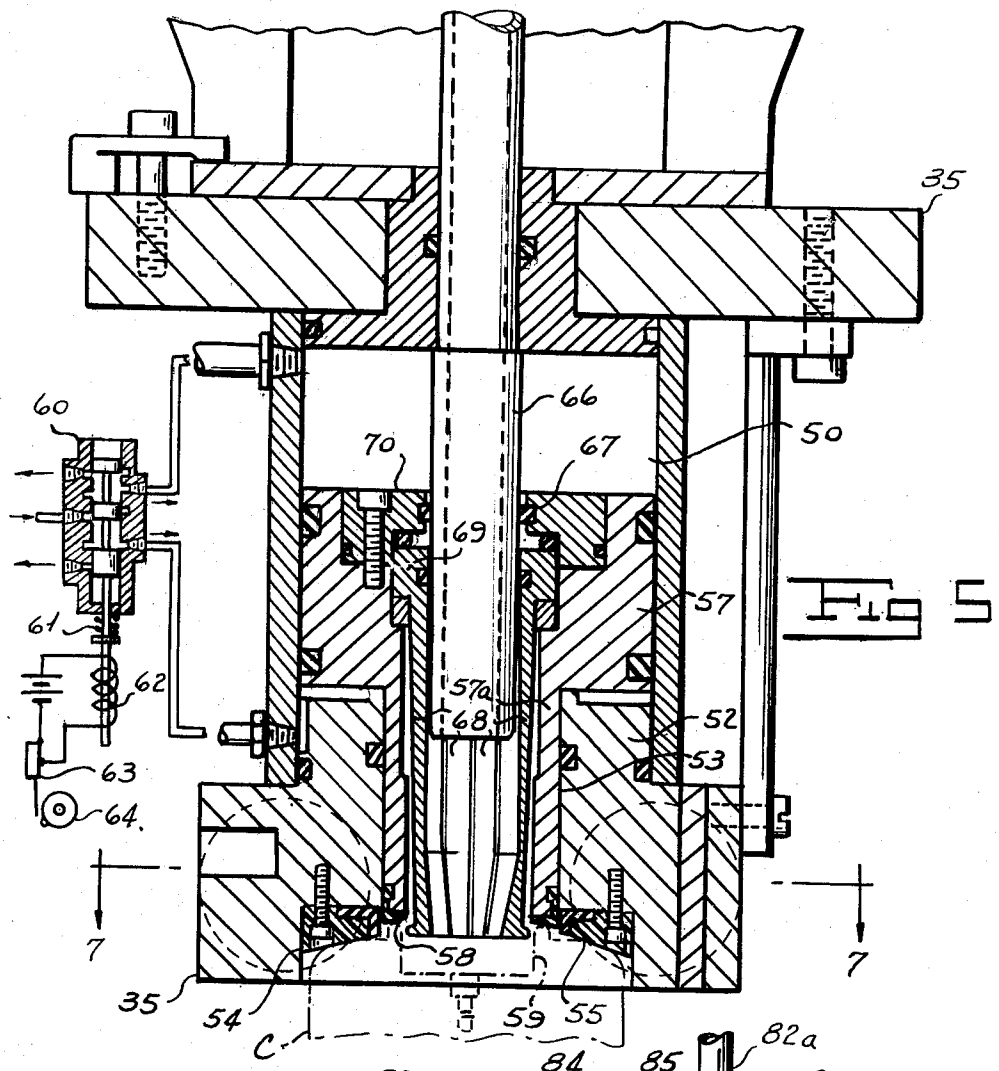


FIG 5

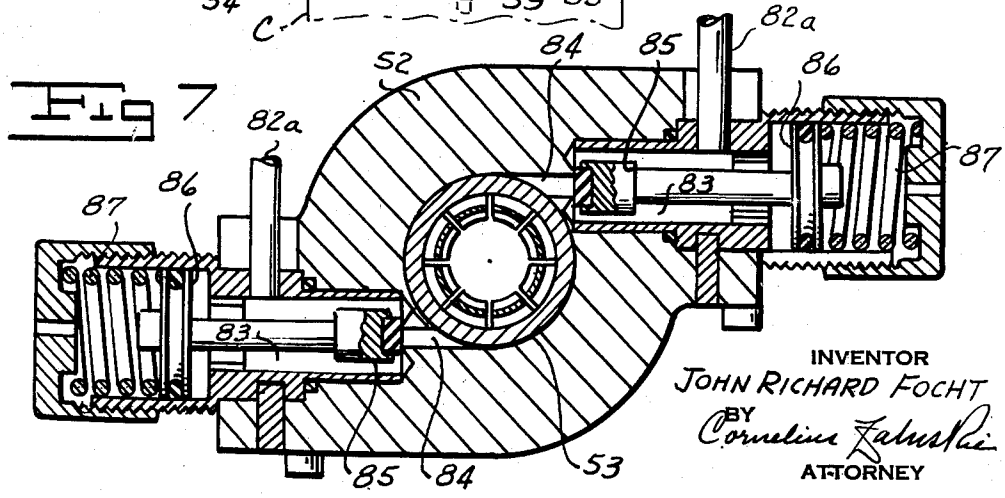


FIG 7

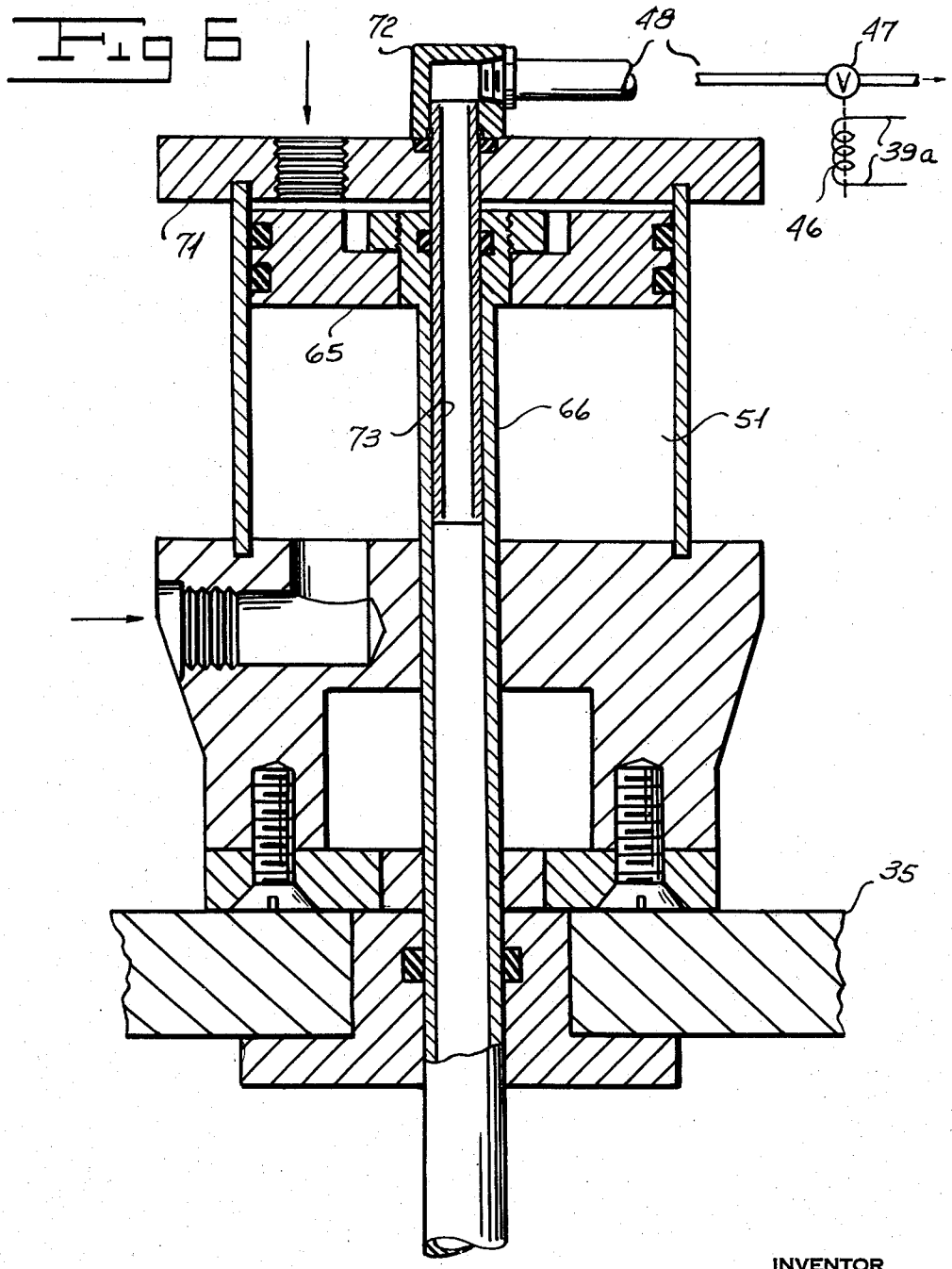
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MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

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Fig 6



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MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

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Fig 8

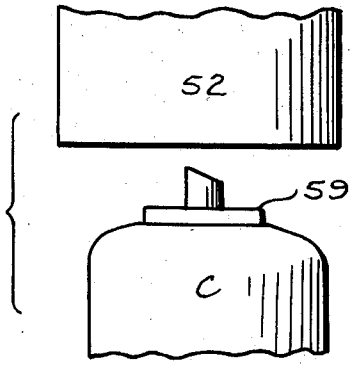


Fig 9

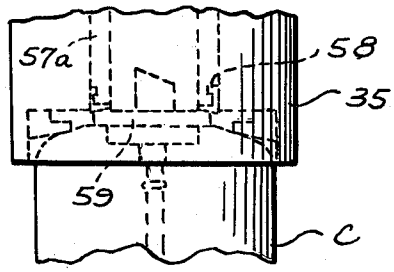


Fig 10

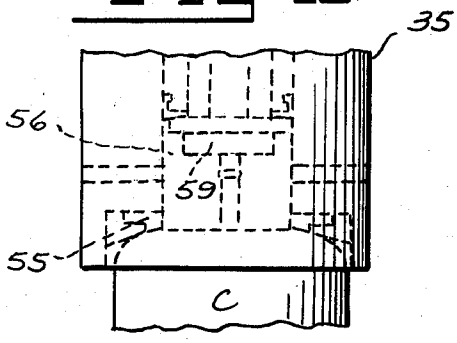
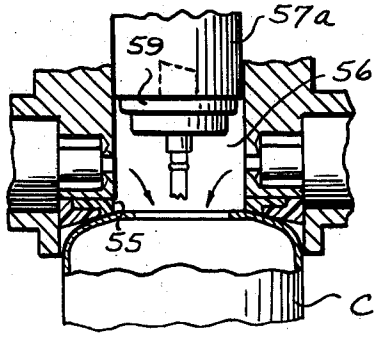


Fig 11



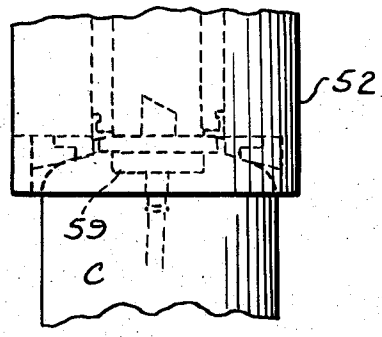


Fig 12

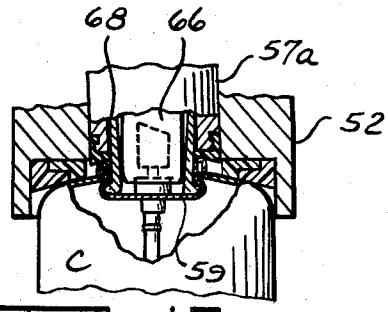


Fig 13

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United States Patent Office 2,947,126
Patented Aug. 2, 1960

2,947,126

MACHINE FOR FILLING AND CHARGING AN AEROSOL CONTAINER AND FOR SEALING THE LATTER

John Richard Focht, Yonkers, N.Y., assignor to Precision Valve Corporation, Yonkers, N.Y., a corporation of New York

Filed Sept. 21, 1956, Ser. No. 611,313

8 Claims. (Cl. 53—88)

This invention is a continuation-in-part of my copending application, Serial No. 505,880, filed May 5, 1955. It relates to a method and apparatus for filling aerosol dispensers, sometimes referred to as "Aerosol Bombs."

Heretofore the filling of such containers has been accomplished principally by one of two procedures. The first, known as the "cold fill," consists in first chilling or refrigerating both the concentrate and the propellent, then introducing them, while in this chilled condition, into the container and thereafter applying a closure on which a dispensing valve is mounted. This procedure requires refrigeration of the constituents, as stated, and is undesirable for this and several other reasons well understood in the art.

The other procedure is to first introduce the active ingredient into the container, then apply to the container and seal thereon a closure on which is mounted a normally closed dispensing valve, and thereafter introduce the propellent into the container through the discharge passage of the dispensing valve while the latter is held in open condition. This latter procedure obviates the necessity of refrigerating the components, but inasmuch as the discharge passage through the dispensing valve is relatively small and in some cases minute, this through-the-valve filling, while most commonly used prior to this invention, requires considerable time and constitutes a bottleneck in the packaging of aerosol materials.

The object of the present invention, as in my said prior application, is to provide a method and apparatus, whereby the active ingredient-propellant components may be introduced into the container without requiring refrigeration and through an unobstructed top opening in the container, so as to effect the filling operation in a minimum of time and in a more simple, efficient, economical manner than heretofore possible under prior practices.

A highly important feature of the present invention resides in the fact that the present invention permits all of the operations incident to filling and charging to be carried out at room temperature, and in a continuous manner and in a closed system.

A further feature of the invention is that the cap, which ordinarily constitutes the closure, may be completely equipped with a dispensing valve to which the discharge button may be affixed prior to the filling operation, whereas heretofore, in that practice wherein filling is accomplished through the valve passage, the button had to be left off of the valve stem until after the filling operation.

By the present invention it is possible to make a complete assembly of the cap with valve attached and button applied in a collateral or separate operation, so that when the cap is finally attached to the filled container, the package is complete and the filled container requires no further assembly operations. This is quite important from the standpoint of the filler who commonly carries out his operations independently of the manufacturer of aerosol valves and buttons.

In the preferred form of the invention, a measured quantity of the active ingredient is first placed in the can container. The cap, with valve and operating button attached, is then loosely placed over the top opening of the can and the can is thereupon placed in a propellant charging position. Here appropriate mechanism is operated to form a closed chamber about and above the top opening. This chamber is of sufficient size to permit elevating of the cap, with valve thereon, free from engagement from the top opening of the container and, when this has been accomplished, a measured charge of propellant, such as an appropriae Freon, is introduced into the container through the uncovered and unobstructed open top thereof, so as to instantaneously enter into the container in the desired and predetermined quantity.

By preference the propellant is introduced into the container tangentially of the top opening and along swirling paths, so as to effect minimum frothing or expansion thereof. As soon as the propellant has been introduced, the cap is immediately returned to a sealing position with respect to the top opening of the container and is immediately sealed in place, thereby completing the filling, charging and sealing operations. The resulting package is then ready for the market without any further assembly operations thereof.

The present invention permits the filling and charging of containers at high speed and in but a small fraction of the time heretofore required and without the necessity of refrigerating any of the ingredients.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and appended claims, when read in conjunction with the accompanying drawings.

The accompanying drawings show the preferred form of apparatus for practicing the method of this invention. Said apparatus, however, is to be understood as illustrative only, for the method may be carried out with other apparatus without departing from this invention and some steps of the method may be manually performed.

Fig. 1 is a side elevation of a machine embodying the present invention and showing in a more or less diagrammatic manner the means for introducing the active ingredient at a filling station and for thereafter moving containers in succession to said station and from said station to a charging and sealing station further along the machine.

Fig. 2 is a longitudinal section through the machine of Fig. 1. In this view the means for introducing the active ingredient is omitted, but the means for advancing and charging and sealing said containers is more fully shown.

Fig. 3 is a fragmental elevation showing the mechanism for supporting a container during the charging and sealing operations and for controlling the feed of propellant according to whether or not a container is present at the charging station.

Fig. 4 is a vertical section on the line 4—4 of Fig. 3 illustrating the container elevating mechanism and the controls therefor.

Fig. 5 is an enlarged view of the lower portion of the sealing head of the machine which includes means for lifting the closure and its valve free of the container during the charging of the container with the propellant and for subsequently applying the closure to the container and for securing said closure thereon.

Fig. 6 shows the upper portion of the sealing head, a portion of which is broken away in Fig. 5.

Fig. 7 is a horizontal section on the line 7—7 of Fig. 5 illustrating the valvular means for controlling the introduction of the propellant into the container.

Figs. 8–13 inclusive are views showing the relation of associated parts during different stages of charging and sealing the container.

The machine of this invention comprises any suitable frame or base 1 along the top of which extend a pair of parallel bars 2. These bars are spaced apart, as shown in Fig. 4, by transverse rods 3 which are supported from beneath by the horizontal arms of bell cranks 4 pivoted to the frame of the machine. The upright arms of these bell cranks are secured to an operating rod 5 adapted to reciprocate in guides 6. The rod 5 is normally retracted to the left in Fig. 2 by means of a spring 7 acting against a bracket 8 rigid with said bars so that the cam follower 9 is maintained at all times in engagement with an operating cam 10. As the cam 10 is rotated, the bell cranks 4 are oscillated and serve to periodically raise and lower the bars 2. These bars are rectilinearly reciprocated by a shoe 11 carried by an arm 12 which is in turn actuated by a lever 13, the lower end of which is pivoted at 14 to a support on the frame. A spring 15 normally retracts the bars 2 to the left, while a cam 16, acting against a follower 17, moves said bars to the right as the cam rotates.

By the construction thus far described, the bars are rectilinearily reciprocated to the right, then lowered by the bell cranks 4, and then retracted to the left in Fig. 2. Said bars are provided on their upper surfaces with drive pins 18 and, through the motions described, containers C, deposited on the left hand ends of the bars 2 between the pins 18, are advanced along a rectilinear path step by step.

As they are thus moved along, they are brought successively into cooperative relation with any appropriate mechanism for introducing into each individual container a measured quantity of the active ingredient. This filling mechanism may widely vary without departing from this invention, but, for the purpose of illustration, I have shown one form of filling apparatus in Fig. 1 of the drawings. This apparatus comprises a filler head 19 positioned beneath a reservoir 20 of active ingredient and, by any suitable mechanism properly timed with respect to the remainder of the operations of the machine, a measured quantity of the active ingredient is deposited in each container through the open top thereof. The mechanism which I employ in this connection may be the same as that used for injecting the propellant, as hereinafter described, although, as stated, any suitable mechanism may be employed for introducing the active ingredient into the container, this invention being particularly directed to the charging of the container with the propellant and the subsequent sealing of the container.

As each container leaves the filling station with the active ingredient therein, it is moved step by step to the charging station. During this travel, closures are loosely placed on the containers. This may be done either by any appropriate closure feeding means or it may be manually accomplished. In any event, these closures are equipped with appropriate dispenser valves and valve operating buttons and may be of the character shown in Abplanalp Patent No. 2,631,814.

Moving into the charging station, each container comes to rest on a pad 21. The pad is supported on a housing 22 which is in turn carried by the stem 23 of a piston 24 within a cylinder 25. The lower end of this cylinder is secured by a link 26 (Figs. 2 and 4) to a bell crank lever 27 which is in turn connected to a rod 28 terminating in a cam follower 29 which bears against a cam 30. The cam 30 is supported on a shaft 31 connected through any suitable change speed gearing with a prime mover 32 which may conveniently be an electric motor. This shaft 31 has sprocket and chain connections 33 and 34 with the shafts which carry cams 10 and 16, respectively, so that the operations of all the parts thus far described are synchronized. These several cams may be synchronized in other ways and the connections shown are therefore to be understood as solely illustrative of any appropriate connections.

As the container comes to rest on the pad 21, all of the remaining containers also come to rest and the cam 30 acts upon the bell crank 27 to elevate the cylinder 25. The interior of this cylinder below the piston 24 is at all times charged with air under pressure and consequently the cylinder 25 acts through the air cushion thus provided to raise the pad and the container thereon into cooperative relation with a charging and sealing head 35 positioned above and in vertical coaxial relation with the pad. The pneumatic cushion is provided to compensate for variations in container heights, for if one container is taller than the other the air cushion will allow the pad to yield slightly after the container has been forced into engagement with the head 35 without damage to the apparatus. This cushion also makes possible control of the charging operation, as presently described.

It will be noted from Fig. 4 that there is positioned within the housing 22 a micro switch 36. This micro switch is supported on a post 37 carried by the cylinder 25. The micro switch may be of any appropriate form. For illustration, it is shown as having two sets of contacts 38 and 39, each set of which is adapted to be bridged by a bridge piece 40, carried by a pivoted arm 41 which is preferably of resilient form. The bridge piece 40 in normal position is arranged to bridge the contact 38 and close a circuit 38*a* which includes a normally open relay switch 42 beyond which the circuit includes the coil of a solenoid 43. The purpose of this solenoid is to control the feed of propellant into the container, as hereinafter described. The normally open switch 42 maintains the circuit 38*a* de-energized until a container is in raised position against the charging head 35 or should be in such position. This switch 42 is adapted to be closed by a cam 44 synchronized with the other operations of the machine and acting against a cam follower 45 connected to the arm of the switch 42.

The contacts 39 are included in an electric circuit 39*a* which includes a solenoid 46 (Fig. 6). This solenoid, when energized, opens a normally closed valve 47 in a pipe connection 48, leading to the upper portion of the head and adapted to produce a partial vacuum within a chamber in the head as hereinafter explained.

The arm 41 projects laterally of the micro switch and below a switch operating member 49 attached to and depending from the pad 21, so as to lie in the path of the arm 41 (Fig. 4). The function of the parts shown in Fig. 4 is to elevate a container into engagement with the head 35. This mechanism is timed to raise and lower the pad 21 once for each container. If no container is in place on said pad, the cylinder 25 and housing 22 will be con-jointly raised without affecting operation of the micro switch 36, but since the cam 44 is synchronized with these operations, the switch 42 will be closed and the solenoid 43 will be energized to preclude, in the manner hereinafter described, the feed of the propellant when there is no container there to receive it. However, if there is a container on the pad 21, when the latter is raised, said container will come into engagement with the head 35 before the upward movement of the cylinder 25 has completed its up-stroke and, inasmuch as the pad 21 will be arrested by engagement of the container with the head, the upward overtravel of the cylinder 25 will cause concurrent elevation of the micro switch, so that the operating arm 41 thereof will engage with the member 49, break the circuit 38*a* and complete the circuit 39*a* to energize solenoid 46 (Fig. 6) and admit suction into the head.

The head 35 is shown in Figs. 5 and 6 in central section with the lower portion of the upper part of the head being also shown in Fig. 5 and the upper part in Fig. 6. This head comprises a lower cylinder 50 and an upper cylinder 51, connected together as a unit. The lower cylinder 50 has a bottom cylinder head 52 provided therein with a central passage 53. The lower face of this cylinder head is provided with a recess 54 and in this recess is secured a resilient gasket 55. The diameter of

the passage 53 and the inner diameter of the gasket are substantially equal to or slightly greater than the diameter of the top opening of the container C. When the container is elevated by the pad 21, the gasket 55 seats on the breast of the container directly about said container opening and forms with said breast an impervious seal, so that there is provided, above the container about the opening and within the passage 53, a closed chamber which is indicated in Figs. 10 and 11 by the reference character 56, and may be referred to as a charging chamber.

Positioned within the lower cylinder 50 is a piston 57. This piston has a depending tubular stem 57*a* which has a sliding fit within the passage 53 of the cylinder head 52. The lower end of this tubular stem carries a resilient gasket 58 which, when the piston is in its lowermost position, engages with the upper surface of the closure or cap 59, as indicated in Fig. 5, but more clearly illustrated in Fig. 9, to form with said cap, an impervious seal.

The piston 57 is adapted to be raised and lowered by compressed air fed into the cylinder 50 above or below said piston. The feed of this compressed air, as well as the exhausting of such air from the alternate ends of the cylinder, may be accomplished by means of the valve mechanism 60, shown in Fig. 5. This valve mechanism is of a well known type and it is shown as a slide valve, the slide of which is impelled in one direction by a spring 61 and in the other direction by a solenoid 62. The operation of the solenoid is controlled by a micro switch 63 operated in synchronism with the other parts of the machine by a cam 64 driven from the shaft 31 through appropriate gearing.

The upper cylinder 51 is provided therein with a piston 65 which may be moved up and down by compressed air, the admission and discharge of which may be controlled by the same type of slide valve mechanism, as shown in Fig. 5, for controlling the admission and exhaust of compressed air from the lower cylinder 50.

The upper piston 65 is provided with a tubular stem 66 which extends downwardly into the lower cylinder 50, as shown in Fig. 5, and through a packing 67 which seals the upper chamber of the lower piston from the interior of the central passage through the lower piston and the stem of the latter.

Positioned within the lower piston and its stem are a series of crimping jaws 68, the upper portions of which are resiliently associated with and form part of a collar 69 clamped in place by a set-in ring 70 (Fig. 5). The tubular stem 66 of the upper piston serves the dual purpose of communicating suction into the interior of the piston stem of the lower piston and also operates as an actuator for the crimping jaws 68. As shown in Figs. 5 and 6, appropriate piston rings and seals in the form of O-rings with packing are provided to preclude leakages of plus and minus pressures.

In order that suction may be communicated into the interior of the stem 66 of the upper piston, there is mounted on the cylinder head 71 of the upper cylinder 51, a fitting 72. The suction pipe 48, hereinbefore referred to, leads to this fitting and from this fitting a tube 73 projects downwardly into the stem 66 with a close sliding fit, as shown in Fig. 6, so that suction may be communicated to the interior of the lower piston 57 irrespective of reciprocation of the upper piston 65.

It will be apparent from the description, as thus far advanced that, after the container has reached a charging station and is elevated on the pad 21, it will assume the position shown in dotted lines in Fig. 5. After it has come into this position, slight upward overtravel of the cylinder 25 (Fig. 4) will lift the micro switch, cause its operating arm 41 to engage with the member 49, break the circuit 38*a* and close the circuit 39*a*. The closing of this circuit will energize the solenoid 46 (Fig. 6), open the valve 47, and communicate suction to the interior of the passage 52 of the lower cylinder head 35. This suction will be exerted upon the cap 59 which is loosely resting in the top opening of the container C, so that said cap becomes, in effect, anchored to the lower piston.

The operation is so synchronized that immediately thereafter, compressed air is admitted into the cylinder 50 below the piston 57 and said piston is elevated carrying with it the cap 59, so that the parts occupy the positions shown in Fig. 11. As these parts are elevated, they leave below them the closed sealed chamber 56 which has been referred to as the charging chamber. This chamber is of a diameter substantially co-extensive with the top opening in the container and of a depth sufficient to completely separate the closure cap 59 from said container. It is through this charging chamber that the propellant is fed into the container in an unobstructed manner.

The propellant is adapted to be contained, at room temperature, in an appropriate tank 74 (Fig. 3) supported on an upstanding frame 75 of the base 1. It is fed from this tank through a manually operable shut-off valve 76 to an automatic valve 77. Below this valve is a hollow fitting 78 having an interior passage. Intermediate the ends of this passage, it is connected by a pipe 79 to a cylinder 80 having therein a piston 81. The upper end of the passage in the fitting 78 is connected to the normally open automatic valve 77, while its lower end has a flexible tubular connection 82 provided with branches 82*a* which lead to pockets 83 (Fig. 7) arranged at the opposite sides of the lower portion of the lower head 52 of the lower cylinder 53. These pockets are each provided with discharge ports 84 which lead into the passage 53 of the lower head substantially tangentially thereof and from the opposite sides of the same, as clearly shown in Fig. 7. As the propellant feeds into said passage, i.e., into the filling chamber 56, it enters said chamber tangentially and, if under pressure, its passage will be with a swirling motion which will continue as the propellant passes through said chamber and is deposited in the container. The propellant is, in fact, fed under pressure and its entry into the filling chamber is controlled by differential pressures.

In each of the pockets 83 is a valve 85 which normally seals the corresponding orifice 84. The stem of this valve is connected to a piston 86 back of which is positioned a spring 87 which normally forces the piston inwardly to seat the corresponding valve 85. The pistons 86, are of much greater diameter than the valve 85, but the springs are so tensioned that, under the pressure of the propellant in the tank 74, the valves will remain closed. However, if a greater pressure is placed on the propellant in the pockets 83, that pressure may be sufficient to unseat the valves 85 and feed the propellant into the container. The control of this feed and the placing of the propellant under this greater pressure is accomplished by the mechanism shown best in Fig. 3.

As hereinbefore stated, the valve 77 is normally open, but is adapted to be closed by a slide 88 connected to the valve stem. This slide is provided with a bayonet slot 89 into which extends a pin 90, carried by the upright arm of a bell crank 91. The horizontal arm of said crank is connected by a link to a second bell crank 93, normally retracted by a spring 94 but having an operating rod 95 with a cam follower 96 acted upon by a cam 97 operatively connected to the main drive shaft.

Through these connections, the cam 97 operates to periodically oscillate the bell crank 91 alternately in clockwise and counterclockwise directions. If the pin 90 of said bell crank is occupying the upright portion of the bayonet slot 89, the oscillation of said bell crank will move the slide 88 to the right from the position shown and close the valve 77. However, if the slide is tilted upwardly, so that the pin occupies the horizontal portion of the bayonet slot, the oscillation of the bell crank 91 will not effect movement of the slide 88 and the valve 77 will remain open.

The position of the slide relative to the pin 90 is con-

trolled from the micro switch **36** (Fig. 4). Thus if there is no container on the pad **21**, when the latter is raised, the solenoid **43** will be energized and its core will move upwardly, engage the under side of the slide **88**, and lift said slide, so that the pin **40** will be in the horizontal portion thereof. Consequently, the bell crank **91**, when oscillated, will leave the valve **77**. On the contrary, if there is a container in place when the pad **21** is raised, the solenoid **43** will remain unenergized and the pin **90** will effect closing of the valve **47** when the bell crank **91** is oscillated.

Propellant from the tank **74** normally fills the entire system from the tank **74** down to and including the pockets **83** (Fig. 7). When the piston **81** (Fig. 3) is moved to the left, the valve **77** being open, propellant is drawn from the tank into the cylinder **80** and thus the whole system, including said cylinder, will be filled with liquid.

The piston **81** is operated in synchronism with the remaining parts of the machine by a cross head **92** connected to a rocker arm **93** having a cam **94** which is, in turn, driven from the main shaft. The piston **81** is drawn back to fill the cylinder **80** and, as it reverses its stroke and moves forward, it forces the liquid from the cylinder **80** into the fitting **78**. If no container is in engagement with the filling and charging head **35**, the solenoid **43** will have been energized and the material forced out of the cylinder **80** by the piston **81**, will merely flow back into the tank **74**, leaving the system completely filled as before. However, if a container is in proper position for charging with the propellant, the valve **77** will be closed by the slide **88** at the time when the piston **81** moves forwardly. Consequently, since the propellant within the cylinder cannot flow back into the tank **74**, it must flow through the connection **80** into the twin pockets **83** (Fig. 7) and the pressure resulting from the actuation of the piston **81** will produce sufficient differential pressures against the pistons **86** to overcome the tension of the springs **87** and a quantity of the propellant, measured by the capacity of the cylinder, will be injected into the container. The parts are so synchronized that, as soon as the forward stroke of the piston **81** is completed, with perhaps slight lag, the valves **85** (Fig. 7) will immediately close, thus completing the charging of the container with propellant.

Immediately thereafter the lower piston **57** (Fig. 5), which has remained elevated during its charging operation and has held the closure cap in the raised position shown in Fig. 11, will be lowered by venting the lower portion of the cylinder **51** and admitting compressed air to the upper portion thereof through the valve **60** (Fig. 5). As this piston is lowered, it seats the closure cap **59** in the top opening of the container and immediately thereafter the upper piston **65** (Fig. 6) is forced downwardly by compressed air, so that the lower end of its stem **66** forces the crimping jaws **68** radially apart to crimp the closure cap firmly within the top opening of the container and thus seal the container in closed position. It should be noted that during all of the operations described, the dispensing valve on the closure cap remains closed. There is no charging or filling through the dispensing valve which remains closed throughout and the charging operation completely by-passes the closure cap and valve and is accomplished through the sealed charging chamber **56** which is substantially co-extensive in horizontal dimension with the top opening in the container, as shown in Fig. 11.

Figs. 8–13 graphically show the several coacting relations between the container C and the head **35** during the operations which have been described. Fig. 8 shows the container as it is moved into cooperative relation with the head **35**. Fig. 9 shows these two parts in cooperative relation, but prior to the lifting of the cap. Fig. 10 shows an elevation of the parts with the cap lifted, while Fig. 11 shows a section of the parts at this time to provide the charging chamber **56** through which the charging takes place. Fig. 12 shows the next step of returning the cap to position in the filler opening, and Fig. 13 shows the crimping operation during which the cap is crimped in the top opening of the container to form a firm permanent seal therewith.

Particular attention is called to Fig. 11 which shows the co-extensive relation between the filling chamber and the container opening. This relationship permits unrestricted feed of the propellant into the container with the swirling motion to which I have referred and which I have found to be the most effective, efficient and satisfactory way in which to introduce the propellant.

When all the propellant has been introduced, there remains no culdesac in the filling chamber which would cause waste of the propellant. The propellant is all directed into the container and as soon as the feed of propellant stops, the cap is lowered to entrap the propellant and thereafter sealed in place to preclude the escape thereof.

It will be apparent from the foregoing detailed description that I have provided for the first time in this art a method and apparatus wherein it is practical and efficient to fill, charge and seal an aerosol package without refrigeration and at room temperature and while the dispensing valve remains in closed position. Never before has this been practically possible in this art. The present invention thus constitutes a revolutionary change over prior practice and this change results in marked economies, the speeding up of packaging of aerosols and it does a better job without waste of either time or materials.

The foregoing description sets forth the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An aerosol charging and sealing machine comprising: means for supporting a container having a top opening with a valved cap loosely engaged therewith, a charging and sealing head provided therein with a chamber, means for imparting relative movement between such a container and the head to engage the container with the head with the container opening registering with the head chamber, means to engage and lift the valved cap free from the container and thereafter return it into engagement therewith, means for injecting a predetermined measured charge of propellant into the head chamber and through said chamber and container top opening into the container while the valved cap is lifted free from the container to permit unrestricted passage of propellant into the container, means for sealing the valved cap to the container after it has been returned to engagement therewith, said means for injecting the propellant comprising a propellant source, a conduit leading from said source to the head chamber, a cylinder connected to said conduit, a piston within said cylinder, and means, synchronized with the other parts of the machine, for operating said piston to draw into the cylinder a predetermined quantity of propellant from said source and then pressure feed said propellant to said head chamber.

2. An aerosol charging and sealing machine as in claim 1, comprising a valve in said conduit between the cylinder and the head chamber for normally precluding the passage of propellant into the head chamber, and valve opening means coacting with said valve and operable during the feeding movement of the piston to open said valve and permit the passage of the propellant to the head chamber.

3. An aerosol charging and sealing machine as in claim 1, comprising differential pressure means normally restraining the propellant against entry into the head chamber but operable by the increased pressure exerted

by the piston on said propellant to pass the propellant fed by said piston to the head chamber.

4. An aerosol charging and sealing machine as in claim 1, comprising a normally open valve in said conduit between the propellant source and the cylinder, and means for closing said valve when a container is in cooperative charging relation with the head and while the piston in said cylinder is in retracted position to direct the propellant then contained in the cylinder to the head chamber when the piston moves on its feed stroke.

5. An aerosol charging and sealing machine as in claim 4, wherein the means for producing relative movement between the container and the head comprises a pad on which the container is adapted to rest, said pad being supported by a cushioning mechanism interposed between the pad and its operating means, and a switch mechanism operable by said cushioning mechanism and electrically connected to means for controlling the operation of said normally open valve.

6. An areosol charging and sealing machine as in claim 5, wherein the cushioning mechanism comprises a cylinder movable toward and away from the head, a piston connected to the pad, with compressed air in the cylinder back of the piston to permit over-travel of the cylinder in the direction of the head after the container on the pad has been engaged with the head, said switch mechanism being partially on the pad and partially on the cylinder of the cushioning mechanism and operable by over-travel of the latter.

7. An aerosol charging and sealing machine comprising: means for supporting a container having a top opening with a valved cap loosely engaged therewith, a charging and sealing head above the supporting means provided therein with a chamber, means for lifting the container to engage the container with the head with the container opening registering with the head chamber, means to engage and lift the valved cap free from the container and thereafter return it into engagement therewith, means for injecting a predetermined measured charge of propellant into the head chamber and through said head chamber and container top opening into the container while the valved cap is lifted free from the container to permit unrestricted passage of propellant into the container, means for sealing the valved cap to the container after it has been returned to engagement therewith, said means for lifting the container to engage it with a head comprising a pad to support the container beneath the head, a cylinder movable toward and away from the head, a piston in said cylinder connected to the pad with compressed air in the cylinder back of the piston to permit overtravel of the cylinder in the direction of the head after the container on the pad has been engaged with the head, and means for moving said cylinder toward and away from the head.

8. An aerosol filling, charging and sealing machine, comprising: a filling station and a charging and sealing station, means at the filling station to deposit a predetermined quantity of active ingredient in said container while at the filling station, means for conveying a container having a top opening step by step along a predetermined path past the filling station and the charging and sealing station with a valved cap loosely positioned in the top opening of the container prior to the arrival of the container at the charging and sealing station, there being provided at the charging and sealing station a charging and sealing head having therein a chamber, means for imparting relative movement between the container and head to engage said container with the head with the top opening of the container registering with the head chamber, means to engage and lift the valved cap free from the container and thereafter return it into engagement therewith, means for injecting a predetermined measured charge of propellant into the head chamber and through said head chamber and top opening of the container into the container while the valved cap is lifted free from the container to permit unrestricted passage of the propellant into the container, and means for sealing the valved cap to the container after it has been returned to engagement therewith.

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