PRESSURE EJECTION ATTACHMENT FOR PRESSURE DISPENSERS

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

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Claims. (Cl. 239—89)

The present invention relates to devices for injecting or charging liquids and semi-liquids under pressure, and especially to hand-operated devices of this type.

More specifically, the invention relates to an injection nozzle arrangement for injecting or charging liquids or semi-liquids (hereinafter referred to collectively as "fluids") at very high pressures which are supplied by self-emptying dispenser containers of known types in which they are maintained at a relatively low pressure sufficient primarily to cause ejection of the fluid through a discharge valve upon opening of the latter.

More particularly, the invention relates to an injection nozzle adapted to be connected with the discharge end of the container of a self-emptying dispenser housing therein a supply of fluid maintained under sufficient pressure to be ejected from a discharge valve at one end of the container when the valve is opened, said injection nozzle including a body member having a discharge end adapted to be held against a receiver for the fluid material, means for opening the valve on the transmission of an external force thereto to cause discharge of fluid therefrom, said nozzle providing a chamber for receiving the so-discharged fluid, and means acting, on the further application of external force, to cause ejection of such fluid through the nozzle at unit pressure which is a relatively large multiple of the applied unit force.

In the preferred form of the invention, the chamber of the nozzle is in the form of a cylindrical bore or passage into which a quantity of fluid from the dispenser is caused to flow on opening of the discharge valve, after which the flow from the bore causes the fluid to flow through the nozzle to the fluid receiver by the further application of external pressure to the container to eject the fluid against the resistance or back pressure of the receiver.

It is the general object of the invention to provide an injection nozzle arrangement for use with a valveless container, the nozzle being composed of two telescopic sections, one carrying a plunger and the other hav-
ing a narrow bore receiving the plunger for ejecting the fluid material at high pressure, the arrangement being such that during the initial movement of the container relative to the discharge end of the injection nozzle, which is held in a fitting of a lubricating system when the fluid is a lubricating grease, the discharge valve is opened, causing fluid material to enter the bore, while further relative movement of the container terminates the valve opening process and establishes a direct and rigid connection between the container and the plunger, so that the total pressure applied over the relatively large cross-sectional area of the container becomes effective upon the plunger of small diameter.

The commercially satisfactory embodiment of the invention illustrated in the drawings involves the use of a known type of container for fluid material, such as lubricating grease or other fluid, which is maintained under pressure by a piston acted upon by a gas under pressure at the bottom of the container, but as will be readily understood from the description hereinafter, the invention is adaptable to self-emptying containers of various types which discharge their contents through a controlled valve.

Referring now more specifically to the illustrated embodiment of the invention shown in the drawings, the numeral 12 designates the container of one known form of a pressure dispenser, shown in fragment, for which an attachment device of the invention may be provided. Such container is generally formed with a relatively wide opening defined by a curled or beaded edge 12, into which is set a cup-shaped closure 14, which widens inwardly and is formed with a curved lip 16 that fits and engages over the bead 12 of the container opening. At the bottom of the closure is formed with a central opening defined by an upstanding flange 18 that supports a resilient tubular body 20 housing the outlet valve of the container, which is not shown as such construction is well known in the art and is not thought necessary to be illustrated. An outlet nozzle 22, having a gradually sloping base 24, is mounted by such base on the resilient member 20; the sloping side wall of the nozzle base providing a shoulder for a purpose shortly to be described.

The device or attachment herein illustrated includes a preferably double-walled cylindrical tubular body, one wall containing an inner tubular of a smaller diameter adapted to receive therewithin the container nozzle 22, and may be guided therein, but less than the diameter of the wider part of the base 24 of the container nozzle, the other wall being in the form of an outer tubular cylinder 30 spaced from the inner cylinder 28 and connected thereto by an annular wall 32. The double-cylinder body is formed with a base by which it may be slidably and removably secured to the container 10 in such manner as to have a limited axial movement relative thereto. Such base may consist of a hollow conical section 34, preferably integral with the cylinders 28 and 30 and terminating in a cylindrical base 36 adapted to fit closely but slidably, to the limited extent indicated, within the opening of the closure 14, and provided with outwardly projecting lugs 38 that engage under the curved lip 16 of the closure 14 so as to resist the attachment.

The base 34, 36, like the rest of the injection nozzle so far described, is made of rigid plastic material which is sufficiently elastic to enable the base to be sprung or snapped into the closure 14.

The base is of such height that when the lugs 38 are engaged under the lip 16, the inner cylinder 28 will rest upon the surface of the shoulder formed by the nozzle base 24, while the lower edge of the cylindrical portion 36 will be in spaced relation to the bottom wall of the closure 14, thereby permitting relative axial movement between the double-walled cylinder and container 10, or tilting of the base portion into the closure, a distance sufficient to cause depression, axially or tiltedly, of the resilient member 20 to a degree adequate to open the valve therewithin.

The outer cylinder 30 may be formed with an inwardly offset flange or lip 40 at its free end, such lip terminating at a distance from the inner cylinder 28. The latter projects a short distance above the lip 40 and is formed with a closure wall 42 provided with openings 44 surrounding an upwardly projecting centrally disposed plunger 46, preferably of cylindrical shape and of smaller diameter than the cylinder 28.

The device of the present invention also includes a cylindrical injection nozzle, generally designated at 48, comprising a hollow cylindrical body 50 that fits snugly and slidably about the inner cylinder 28, and has a wall thickness to fit the space between the last-named cylinder and the inner edge of the flange 40 of the outer cylinder 30. The nozzle 50 is formed, at its lower end with an outwardly offset flange 52 engageable under the flange 40, and with a relatively thick wall 54 at its discharge end, such wall having an inwardly tapering recess 56 provided with a central opening 58, from which there extends downwardly a tubular sleeve 60 having a bore of an inner diameter adapted to receive snugly and slidably the plunger 46 at the end of the cylinder 28. Preferably, the sleeve 60 extends for a distance to encompass, when the nozzle 48 is in the non-operating position of FIG. 1, by its inner end portion, the upper end of the plunger 46, so that it is at all times in sliding engagement with the plunger. The lower end of the sleeve 60 is provided with slots or openings 62 that extend above the upper end of the plunger 46 in the non-operating position of the latter and also during the opening movement of the valve of the container.

Disposed within the space between the inner and outer cylinders 28 and 30, with its ends engaging the connection wall 32 and the flange 52 of the nozzle tube 50, is a coiled expansion return spring 64 which has an initial resistance to compression greater than the initial resistance of the sleeve 20 to the compression required for opening the dispensing valve. The spring normally acts to keep the parts 28 and 48 in the relationship shown in FIG. 1.

The recess 56 in the end wall 54 of the nozzle sleeve 50 may be of a shape adapted to receive and fit over the double-walled cylinder shown in fragment in FIG. 2 of a lubricating circuit.

The operation of the described injection nozzle is as follows:

To employ the injection nozzle assembly to form, with a self-emptying pressure dispenser containing fluid material, a lubricating, caulking, or other gum, the same is sprung by its cylindrical base portion 36 into the upper end of the cup-shaped closure 14 of the dispensing container 10. The discharge end of the nozzle 50 is then held against an object which is to receive a portion of the contents of the dispenser, such as the nipple 66 of the lubricating system of a mechanical apparatus, or against a wall having a crack or chink to be caulked. By holding the container and applying pressure against the bottom wall thereof, the container will move relative to the nozzle assembly until closure 14 engages the bottom edge of cylindrical base portion 36 as shown in FIG. 2. During this interval, the conical base 24 of nozzle 22 will bear against the lower edge of cylinder 28 which is initially held stationary by the relatively stiff spring 64, whereby axial or oblique pressure will be exerted on the resilient sleeve 20, which becomes compressed to cause opening the discharge edge of the inner cylinder 28. From the flow through the dispenser nozzle 22 into the inner cylinder 28 and through the openings 44 into the lower chamber of the injector nozzle body 50 and through the openings 62 into the bore of the sleeve 60, until the latter is at least partially filled. The lower edge of the cylindrical base part 36 having come into contact with the
closure 14, there is now a direct and rigid connection between the container 10 and plunger 46, so that the sleeve 20 is not subjected to increased compression when further pressure is applied against the bottom of the dispenser container which will then compress the spring 64, causing telescoping of nozzle body 50 with cylinders 28 and 30. The injection movement of the plunger 46 into the sleeve 60, after initially closing the inlet slots 62, then proceeds to exert pressure against the fluid which has been trapped within the sleeve to force it out of the nozzle under high pressure and into the nipple 66 of the lubricating system, or into the receiver to be consumed as the case may be, or into any other receiving element and against the resistance of such element.

It will be clear that repeated releasing of pressure against the bottom end of the container 10, when the spring and the resilient sleeve 20 will return the parts to the condition shown in Fig. 1, followed by the application of pressure after each release, in the nature of a pumping action, will repeatedly replenish the fluid within the sleeve 60 and inject at least a portion of it at high pressure into the fitting or region desired.

As will be apparent from the foregoing, the present invention which is in essence a device wherein is used entirely disposable by reason of the use of a low pressure container and of a nozzle assembly that can be molded cheaply of plastic material. The injection nozzle can be made a permanent part of the dispenser during the manufacture of the latter, or it can be in the form of a separate unit which is attachable to and detachable from an already existing dispenser provided with a discharge valve, for example, the aerosol dispenser type.

What I claim is:

1. An injection nozzle adapted to be connected with the discharge end of the container of a self-empting dispenser, and capable of being raised above the ground and sustained by the action of said spring, and having a seat engaging the body of the container when the valve is opened, said seat being made of a material which is not affected by the fluid, and providing a means by which the fluid is forced into the nozzle; provided, that said seat is made of a material which is not affected by the fluid, and that the said seat is made of a material which is not affected by the fluid.

2. An injection nozzle adapted to be connected with the discharge end of the container of a self-empting dispenser housing therein a supply of fluid material maintained under sufficient pressure to be ejected from a discharge valve at one end of the container when the valve is opened, said injection nozzle including a body member having a discharge end adapted to be held against a receiver for the fluid material, means for opening the valve on the transmission of an external force thereto to cause discharge of fluid therefrom, said nozzle providing a chamber for receiving the so discharged fluid, and means acting, on the further application of external force, to cause ejection of such fluid from said chamber at a unit pressure which is a relatively large multiple of the unit pressure applied.

3. An injection nozzle according to claim 2, including a cylindrical member extending therefrom, or a cylinder member extending therefrom, the first member having a bore adapted to receive the plunger and provided with a port for admitting into the bore the fluid material charged from the second member into the first member, said plunger acting, upon contact with a surface or member engaging the bore of the cylindrical member, to eject said bore, and means acting to open the container valve on initial relative movement between said members.

4. An injection nozzle according to claim 2, including means for connecting the same to the discharge end of a self-empting dispenser in such manner that a limited degree of relative movement between the nozzle and container is provided before the container transmits the full pressure exerted thereon directly to the plunger-carrying second member.

5. An attachment for a relatively low pressure self-empting dispenser for fluid material for the high pressure injection of such material after discharge from said dispenser, said dispenser including a normally closed discharge valve in said container, and valve operating means including a resilient sleeve compressible to open said valve and a rigid member mounted over said resilient sleeve and movable to compress the sleeve, said attachment comprising a tube engageable with said rigid member, means for mounting the tube on said container while allowing limited axial movement of the latter relative to the tube, whereby said initial relative movement of the container, pressure is exerted on the rigid member to effect compression of the resilient sleeve and opening of the valve, said tube having an axially extending plunger fixed thereto at its forward end; a tubular nozzle body telescopically slidable relative to the tube, interengaging means on said tube and nozzle body to prevent their disengagement in extended condition, said tube having a port in its end wall connecting the interiors of the tube and nozzle body, said nozzle body having a bore normally communicating with the interior thereof and arranged to receive said plunger, and resilient means of greater initial compression than said resilient sleeve and normally maintaining the tube and body in extended relation, said resilient means being compressible upon application of sufficient external axial pressure to the container to enable the plunger to traverse the bore and eject from the nozzle body the material trapped in the bore.

6. An attachment according to claim 5, wherein said passageways comprise openings in the wall of said bore, said slots being closeable by said plunger during the initial movement thereof.

7. An attachment according to claim 4, including a cylindrical member surrounding the tube and fixed thereon in spaced relation, the nozzle body being movable into the annular space between the tube and said member, the resilient means comprising a spring disposed in said space and urging the nozzle body into extended condition with respect to the tube, said means for preventing disengagement of the nozzle body and tube comprising interengaging flanges on the nozzle body and cylindrical member.

8. An attachment according to claim 7, wherein the means for mounting the attachment to the container comprises a tubular extension of the cylindrical member.

9. An attachment according to claim 4, wherein the means for mounting the attachment to the container is releasable from the container.

10. The combination of a pressure dispenser of the character described with an attachment for the ejection at much higher pressure of the material charged by said dispenser, said dispenser comprising a container having a normally closed discharge valve and means for operating the same and including a resilient member compressible to effect opening of said valve, said attachment comprising a tube disposed over said discharge valve, means on said tube for securing the same on said container while allowing limited relative axial movement between the container and tube, said tube presenting a shoulder against which the resilient member is compressed to open the valve upon movement of said container toward said tube, said tube having an extending plunger fixed thereon at its forward end; a tubular nozzle body telescopically fitted about the tube, spring means urging the nozzle body and tube into extended relation, interengaging means on said tube and
7 nozzle body acting to prevent their disengagement, passage means interconnecting the interiors of the tube and nozzle body, the latter having an axial bore for slidably receiving the plunger, the spring means being of greater initial compression resistance than said resilient member and being compressible on the further application of force to the container to cause the plunger to eject the contents of the bore from the nozzle body.

11. The combination of claim 10, wherein the wall of the bore overlaps the end of the plunger when the tube and nozzle body are in extended relation, a port in the inner end of the wall of the bore for connecting the interior thereof with the interior of the nozzle body, said port being closed on initial movement of the tube within the nozzle body.

12. The combination of claim 11 wherein the port is in the form of an open-ended slot at the inner end of the wall of the bore and is of such axial extent that it is stored by the plunger after initial movement thereof.

13. The combination of claim 10 including an outer cylinder concentric with the tube and radially spaced therefrom, said cylinder being connected to the tube at its inner end, the interengageable means comprising an inwardly offset flange at the outer end of cylinder and an outwardly offset flange at the inner end of the nozzle body said spring means being engaged against the flanges of the body member at one end and against the connection between cylinder and tube at its other end.

14. The combination of claim 13, wherein the means securing the attachment to the container comprises a resilient tubular extension of the said cylinder adapted to snap into position below a circular head on the container.

15. The combination of claim 10, wherein the means securing the tube on the container is releasable from the latter.

16. The combination of claim 10, wherein the container is provided at one end with an opening and with an inner extending cup-shaped closure set into said opening, the discharge valve being mounted on said closure, said closure having a beaded edge overhanging the interior thereof, and the means for securing said attachment to the container comprising a tubular extension of the tube having an end portion of greater outer diameter than the inner diameter of said beaded edge and capable of being sprung into position below such edge with a short space between itself and the bottom of the cup-shaped closure.

17. An injection nozzle adapted to be connected with the discharge end of the container of a self-emptying dispenser housing therein a supply of fluid material maintained under sufficient pressure to be ejected from a discharge valve at one end of the container when the valve is opened, said injection nozzle including a body member having a discharge end adapted to be held against a receiver for the fluid material, means for opening the valve on the transmission of an external force thereto to cause discharge of fluid therefrom, said nozzle providing a chamber for receiving the so-discharged fluid, and means acting, on the further application of external force, to cause ejection of such fluid from said chamber at a unit pressure which is a relatively large multiple of the unit force applied against the container; said injection nozzle comprising a body member having the discharge opening, said chamber leading to said opening and comprising a cylindrical bore within said body member and of small transverse dimension compared to that of the container, the means acting on the further application of external force comprising a plunger movable into the bore to eject the fluid from said bore and out of the nozzle.

18. An injection nozzle adapted to be connected with the discharge end of the container of a self-emptying dispenser housing therein a supply of fluid material maintained under sufficient pressure to be ejected from a discharge valve at one end of the container when the valve is opened, said injection nozzle including a body member having a discharge end adapted to be held against a receiver for the fluid material, means for opening the valve on the transmission of an external force thereto to cause discharge of fluid therefrom, said nozzle providing a chamber for receiving the so-discharged fluid, and means acting, on the further application of external force, to cause ejection of such fluid from said chamber at a unit pressure which is a relatively large multiple of the unit force applied against the container, the body member of said injection nozzle comprising a body member having the discharge opening, said chamber leading to said opening and including a cylindrical bore within said body member and of small transverse dimension compared to that of the container, the means for opening the valve being operable upon initial movement of the container in the direction of the nozzle when the latter is held against a receiver into which the fluid material is to be injected, to cause fluid to flow into the bore, the means acting on the further application of external force comprising a plunger movable into the bore to eject the fluid from said bore and out of the nozzle.

19. An injection nozzle adapted to be connected with the discharge end of the container of a self-emptying dispenser housing therein a supply of fluid material maintained under sufficient pressure to be ejected from a discharge valve at one end of the container when the valve is opened, said injection nozzle including a body member having a discharge end adapted to be held against a receiver for the fluid material, mean for opening the valve on the transmission of an external force thereto to cause discharge of fluid therefrom, said nozzle providing a chamber for receiving the so-discharged fluid, and means acting, on the further application of external force, to cause ejection of such fluid from said chamber at a unit pressure which is a relatively large multiple of the unit force applied against the container; said container valve being operable on axial depression, the nozzle including a cylindrical member telescoping within the body member, a return compression spring being disposed between said members, the body member having a bore communicating with the discharge end thereof, and the cylindrical member including a plunger movably in said bore, said cylindrical member providing an abutment positioned to effect opening of the valve of the container on initial axial movement of the container relative to said cylindrical member and while said cylindrical member is held against axial movement by the spring, said cylindrical member being acted on by the container after the valve has been opened to receive and transmit directly the thrust from the container to the plunger and against the resistance of the spring.

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