

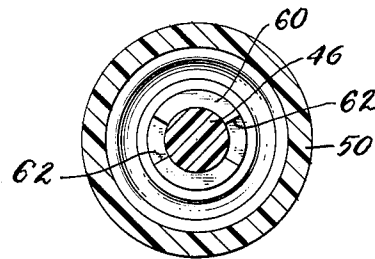
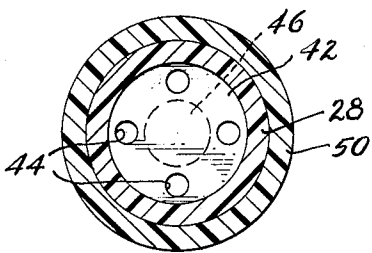
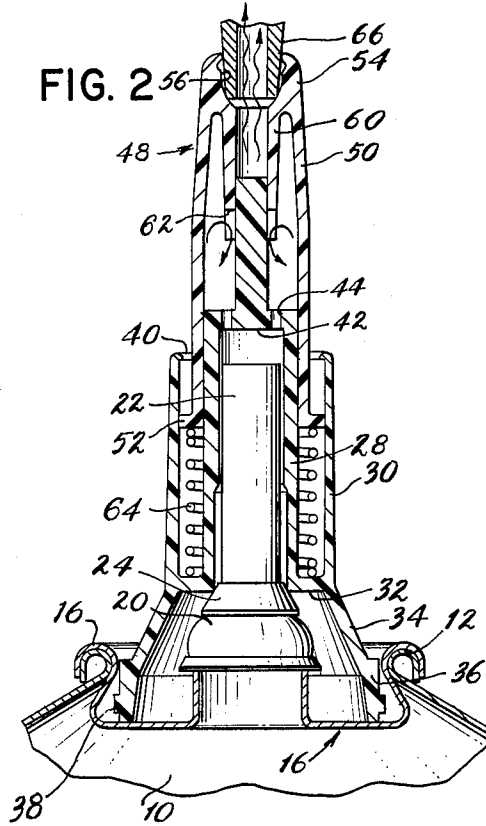
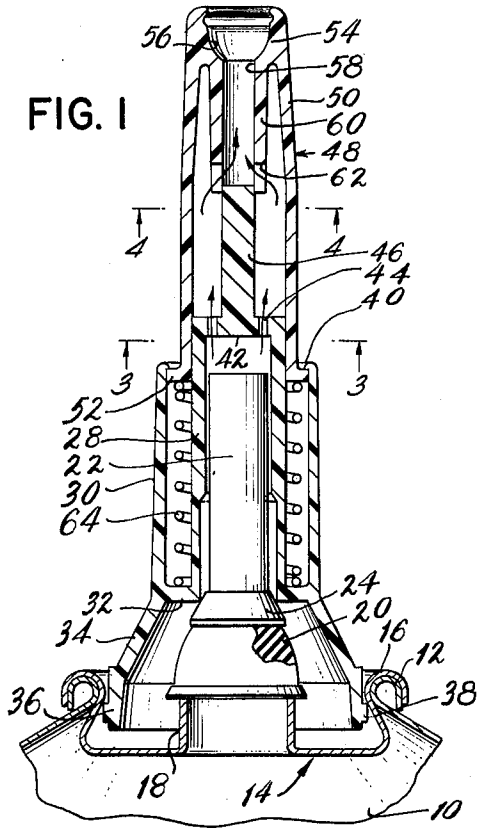
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PRESSURE EJECTION ATTACHMENT FOR PRESSURE DISPENSERS

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PRESSURE EJECTION ATTACHMENT FOR PRESSURE DISPENSERS

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19 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 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 through the nozzle at a 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 a plunger slides through the bore on 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 valved container for fluid material, the nozzle receiving the fluid at relatively low pressure and ejecting it at much higher pressure on the manual application of a force of comparatively low unit value.

In particular, it is an object of the invention to equip a self-emptying type of container having a usual type of discharge valve, with an injection nozzle arrangement whereby the contents of the container, which ordinarily are discharged at pressures up to a maximum of about 100 lbs./sq. in. can be injected at a place of use at pressures of 2,000 to 3,000 lbs./sq. in., or higher, despite the fact that the container itself may not be able to withstand a pressure higher than about 200 lbs./sq. in.

A further object of the invention is to provide a high pressure, manually operated dispensing device or gun in which the container for the fluid is under such relatively low pressure that it can be made inexpensively of light metal construction, while the nozzle structure can be made wholly of molded plastic, so that not only the container but with it also the nozzle can be discarded after the container has been emptied of its contents.

It is still another object of the invention to provide a nozzle arrangement for use with a container having a discharge valve, the container being adapted to house a quantity of a fluid under a relatively light pressure sufficient to cause ejection of the fluid through the valve, the

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nozzle including means whereby on initial axial pressure applied to the container, the valve is opened for a sufficient interval to allow the discharge of fluid into a bore in the nozzle body in which a plunger reciprocates, after which the connection between the interior of the bore and the interior of the container is broken, and a high pressure is built up in the bore upon direct transmission to the plunger of the total force applied to the container, so that the resistance or back pressure of the receiver is overcome.

It is a further object of the invention to provide an injection nozzle construction which in one embodiment is especially adapted for use in association with the outlet valve of a container for viscous fluids in which the fluid is maintained under a relatively low pressure sufficient to cause the ejection of the fluid upon opening of the valve, the construction being such that upon initial axial movement of the container when the nozzle end is held against a receiver for the fluid, the normal valve of the container is opened to admit fluid into a cylinder in the nozzle, the nozzle being provided with a plunger which, upon further movement of the container in the axial direction, forces the fluid trapped in the cylinder to be ejected under high pressure from the nozzle.

A still further object of the invention is to provide a high pressure injection nozzle structure embodying a plunger and cylinder which can be attached to a standard type of self-emptying dispenser provided with the usual discharge valve, the connection of the nozzle with the container of the dispenser being wholly with the exterior of the container, so that a self-emptying dispenser designed for operation at relatively low internal pressure, can be quickly and easily converted into a high pressure gun without any alteration of the dispenser structure.

The foregoing and other objects and advantages of the invention will be apparent to those skilled in the art from the embodiment thereof shown in the accompanying drawings and from the description following. It is to be understood, however, that such embodiment is shown by way of illustration only, to make the principles and practice of the invention more readily comprehensible, and without limitation of the invention to the specific details therein shown.

In the drawings:

FIG. 1 is a vertical sectional and partly elevational view of an embodiment of an injecting attachment of the present invention, shown at rest in mounted position on a pressure dispenser;

FIG. 2 is a view similar to that of FIG. 1, on a slightly reduced scale, showing the attachment in injecting position and mounted over a nipple of a lubricating system;

FIG. 3 is a section taken on line 3—3 of FIG. 1; and

FIG. 4 is a section taken on line 4—4 of FIG. 1.

Briefly described, the specific embodiment of the present invention about to be described in detail provides an injection nozzle assembly which may be permanently or detachably secured to the container of a pressure dispenser, such assembly when held against a fitting or other receiver into which one or more portions of the contents of the container are to be injected, while external pressure is applied to the container, first effects, on initial relative movement between the container and nozzle assembly, the opening of the discharge valve of the container to charge a quantity of the fluid material contained therein into a space within the nozzle assembly, whereupon further application of external force causes discharge of the material at a greatly multiplied unit pressure through a narrow bore in the nozzle. In this preferred embodiment, the external force is applied to the container itself; 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, for example, against 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 drawing 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 10 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. 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 comprising an inner tubular cylinder 28 of an inner diameter adapted to receive therewithin the container nozzle 22, and may be guided thereon, 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 section 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 detachment.

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 lower edge of 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 in 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 end of the nipple 66 (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 gun, 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 of the discharge valve of the dispenser. Fluid will then 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 bottom 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 recesses to be caulked, 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 makes what is in effect a high pressure gun 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 of, 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-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 external force applied.

2. 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 the 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, a cylindrical member telescoping therewith, and a return spring between the said members and normally maintaining them in extended relationship, the second member communicating with the interior of the first member and having a plunger extending forwardly thereof, the first member having a bore adapted to receive the plunger and provided with a port for admitting into the bore fluid material charged from the second member into the first member, said plunger acting, upon telescopic relative movement between the members, to eject material collected in said bore, and means acting to open the container valve on initial relative movement between said members.

3. An injection nozzle according to claim 2, including means for connecting the same to the discharge end of a self-emptying 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.

4. An attachment for a relatively low pressure self-emptying dispenser for fluid material for the high pressure injection of such material after discharge from said dispenser, said dispenser including a container, a normally closed discharge valve on 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 on such axial 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 resistance than said resilient sleeve and normally maintaining the tube and body in extended relation, said resilient means being compressible on 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.

5. An attachment according to claim 4, wherein, in its non-operative position, the plunger is received within the rearward end of the bore, the wall of the bore having one or more passageways connecting the interiors of the nozzle body and bore, said passageways being so disposed that they are closed after initial movement of the plunger relative to the nozzle body.

6. An attachment according to claim 5, wherein said passageways comprise open-ended slots 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 thereto in spaced relation, the nozzle body being movable into the annular space between the tube and cylindrical member, the resilient means comprising a spring disposed in said space and urging the nozzle body into extended condition with reference to the tube, the 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 on 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 discharged 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 axially 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, interengageable means on said tube and

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 bead 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 inwardly 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 openable 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 movable 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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