

Jan. 4, 1966

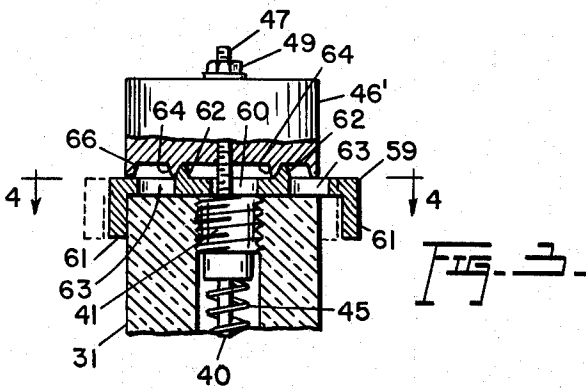
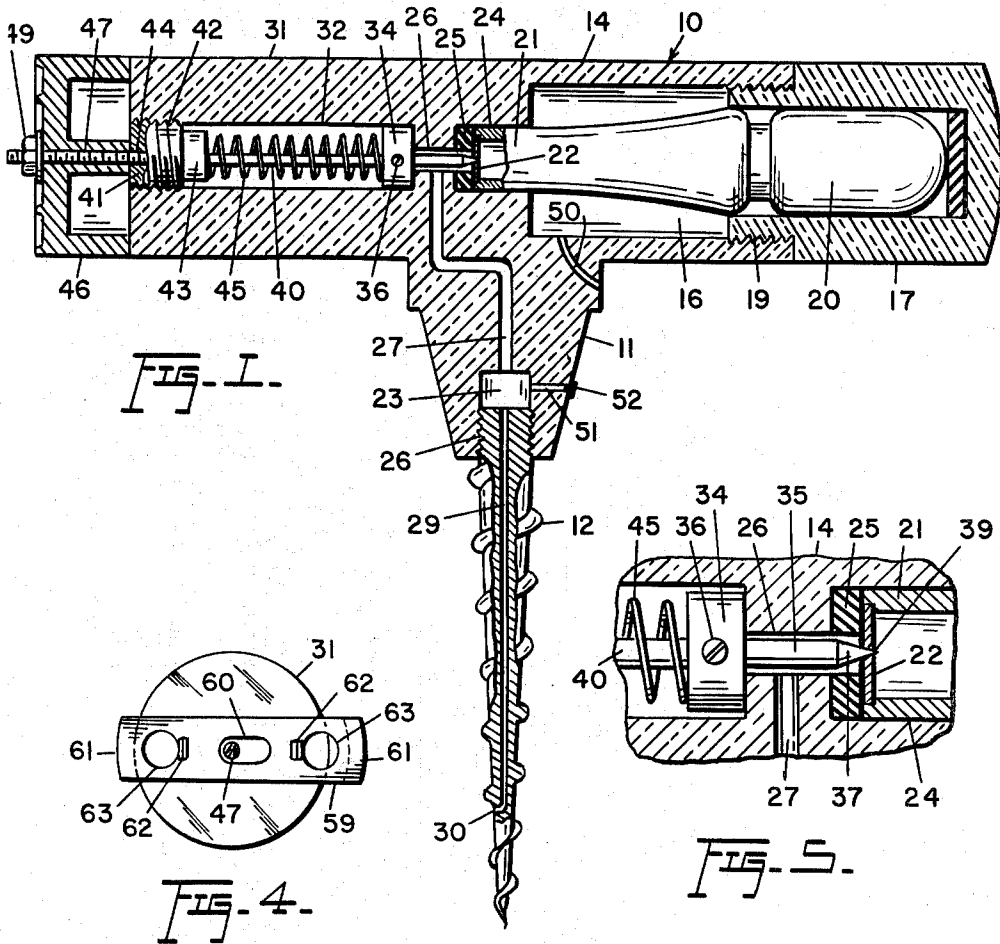
D. FARANDATOS

3,227,310

FLUID DISPENSER

Filed July 30, 1963

2 Sheets-Sheet 1



INVENTOR:

DENIS FARANDATOS

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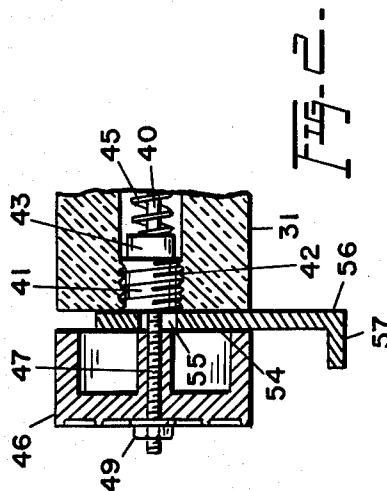
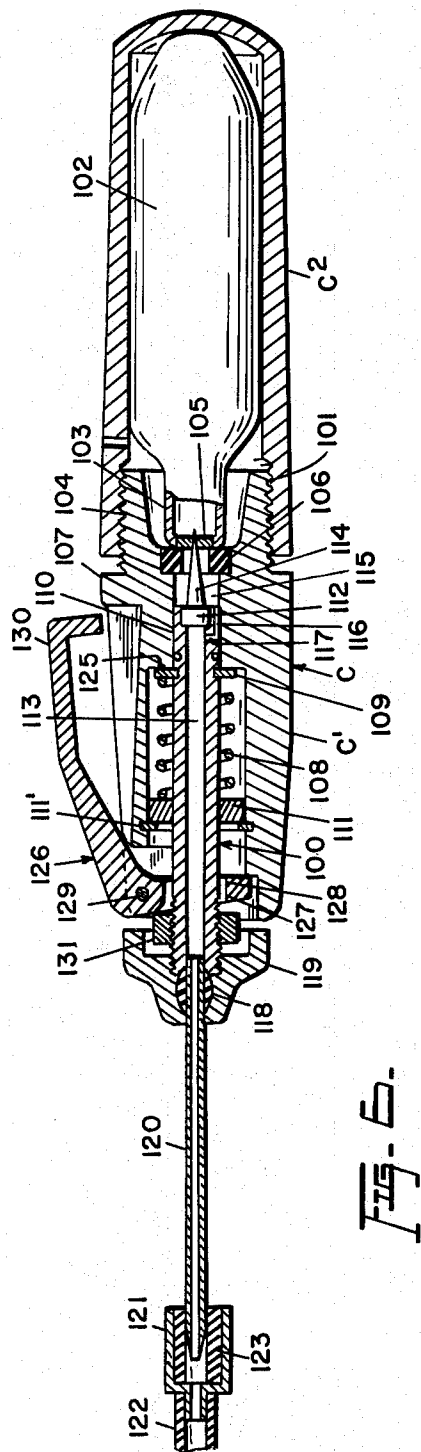
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FLUID DISPENSER

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18 Claims. (Cl. 222-5)

The invention relates to fluid dispensing means and particularly to an apparatus for dispensing compressed fluid in measured quantities from a cylinder containing compressed fluid.

The present application is a continuation-in-part of my application Serial No. 149,276, filed November 1, 1961, which in turn is a continuation of my earlier application Serial No. 778,335, filed December 5, 1958, both now abandoned. The present application is also a continuation-in-part of my application Serial No. 17,550, filed March 25, 1960, now abandoned.

The invention has among its objects the provision of a novel, simple and economical fluid dispenser.

Another object of the invention lies in the provision of a fluid dispenser which is simply operated to open an initially sealed supply of fluid under pressure and is simply controlled thereafter so as selectively to dispense predetermined quantities of fluid. Another object is to dispense fluid from high pressure cylinders safely and to provide pressure reducing means acting as a safety valve.

Another object of the invention resides in the provision of a fluid dispenser of the above indicated character which is compact, easily portable, safe and durable.

Another object is to remove corks from bottles, to supply oxygen as needed where needed, and to administer medicine by osmosis.

It is known to compress gases within small metal cylinders and to penetrate these cylinders to release the gases into other chambers for use. Examples of this practice are the impregnating of water with carbon dioxide to make the charged water called club soda and, as discussed in my prior Patent No. 2,729,124, dated January 3, 1956, to remove corks from bottles without disrupting the cork.

It is an object of this invention to improve upon my own prior apparatus for dispensing compressed fluids in selected quantities from cylinders containing fluids under pressure.

Another object is to provide fluid dispensing apparatus which is readily dismantled and is composed of readily replaceable parts.

Another object of the invention is to utilize pressure fluid cylinders to atomize liquids. For example, when it is desired to spray a room with an insecticide or a disinfectant the standard method is to use an atomizer actuated by a squeeze bulb, a method imperfect in itself because it does not produce a continuous and even atomization, and which is ineffective when the space to be filled is large.

Another example of the novel use is in the operation of garden sprays. A standard method now used is to partly fill a large can with the liquid spray, then manually pump up the remaining spaces with air under pressure, then dispense the spray as long as the pressure lasts. This is intermittent and relatively unsatisfactory.

The invention is applicable to all such uses and provides improved operation in each of them, delivering gas in whatever quantities are needed, as needed and always under the control of the operator.

The above and further objects and novel features of the invention will more fully appear from the following description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention.

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More specifically my invention relates to a device for dispensing fluids under pressure comprising a high pressure fluid containing cartridge having a puncturable sealing diaphragm, an axially reciprocable needle valve member having a pointed end adapted to pierce the diaphragm without disrupting it and to form therewith a seal against the escape of fluid through the aperture thus made, means biasing the needle valve member toward the diaphragm with force sufficient to hold the needle in sealing position in the aperture in the sealing diaphragm, and releasable means to retract the needle valve member in opposition to the biasing means to permit controlled quantities of fluid to flow outwardly from said cartridge through the aperture.

In the drawings, wherein like reference characters refer to like parts throughout the several views:

FIG. 1 is a view in vertical axial section through a corkscrew with which the fluid dispenser of the invention is associated, certain of the parts of the apparatus being shown in elevation;

FIG. 2 is a fragmentary view in vertical axial section through a portion of another embodiment of gas dispenser made in accordance with the invention, certain of the parts being shown in elevation;

FIG. 3 is a fragmentary view in axial section through a portion of a third embodiment of gas dispenser made in accordance with the invention, certain of the parts being shown in elevation;

FIG. 4 is a view in transverse section through the dispenser of FIG. 3, the section being taken generally along the line A—A of FIG. 3;

FIG. 5 is an enlarged fragmentary view in axial section showing the neck and diaphragm of a gas-containing cylinder and the tapered end of a diaphragm-piercing member cooperating therewith in accordance with the invention; and

FIG. 6 is a longitudinal section through another form of the invention, including cooperating fittings for attachment to an atomizer (not shown).

The gas dispenser of the invention is shown in FIG. 1 of the drawing associated with a corkscrew with which it may be employed to remove corks from bottles in the manner disclosed in my U.S. Patent No. 2,729,124. The gas dispenser may be used to advantage, as will appear hereinafter, in many other applications such as inflating automobile tires, footballs, and other inflatable articles such as life rafts and the like, and for attachment to atomizers and the like.

The gas dispenser shown, generally designated 10, is in the form of an elongated generally cylindrical member or cartridge generally centrally connected to a transverse member 11 which serves as the supporting and driving means for a corkscrew 12. Gas dispenser 10 is in the form of a housing 14, the right hand end of which has a longitudinally extending cavity 16 therein. A removable cap 17 is connected to such end of the housing by screw threads 19, the cap and the end of the housing receiving therewithin a cylinder 20 containing a gas such as CO₂ under relatively high pressure.

Cylinder 20 as sold has a centrally disposed neck 21 which is sealed by a soft metal diaphragm 22 which extends across the mouth of the neck. The metal seal 22 is malleable and not frangible, and because it is malleable it forms a tight joint with the circumference of the means which the invention provides to penetrate it. Housing 14 of the gas dispenser has a short axially extending recess 24 which is open to cavity 16 to receive the neck of the gas cylinder therewithin. At the inner end of recess 24 there is positioned an annular resilient sealing means 25 made, for example, of rubber. When the cap 17 is tightly screwed onto the housing a resilient pad 18 within the

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outer end of the cap forcibly engages the outer end of gas cylinder 20 to thrust the outer rim portion of its neck 21 into sealing engagement with the annular sealing means 25.

Beyond sealing means 25 housing 14 is provided with an axial gas-receiving passage 26, which is aligned with the central opening through sealing means 25. A second gas-receiving passage 27 in housing 14 and in body 11, leads from passage 26 to an enlarged bore 23 in the bottom of body 11. The cockscrew 12 is connected to body 11 by a threaded connection 28 between it and the outer end of bore 23. The cockscrew is hollow throughout a major portion of its length, having a central passage 29 therethrough. The bottom of passage 29 has a laterally extending opening 30 whereby, when the cockscrew has been inserted in the cork in a bottle, gas under pressure may be introduced to the interior of the bottle through the passages 26, 27 and 29 and opening 30 in the manner to be described.

The left hand end of housing 14, generally designated 31, contains and supports mechanism whereby the diaphragm 22 of the gas cylinder 20 may be pierced to open the gas cylinder, and the pierced aperture 39 in diaphragm 22 is selectively sealed and opened to dispense gas from cylinder 20 as required. Housing part 31 is provided with a central axially extending bore 32 within which a relatively loosely fitting plunger head 34 is axially reciprocable. In the embodiment shown, the plunger includes the aforesaid head 34 and a reciprocable plunger rod 40 secured to head 34 by a set screw 36. The forward or inner end 35 of rod 40, inwardly of head 14, extends within passage 26. Such forward portion of rod 40 is made of somewhat smaller diameter than passage 26, whereby to provide an annular gas-receiving space between them. The forward or inner end of portion 35 of rod 40 is of sharp needle shape as indicated at 37 to function as a diaphragm-piercing member and, after an aperture 39 has been pierced in the diaphragm, as an imperforate needle valve element. Although the forward end 35 of rod 40 carrying the pointed piercing head 37 has been shown as integral with the remainder of the rod, it will be understood that, if desired, the piercing member may be made separately from the remainder of the plunger rod and suitably connected to plunger head 34. Because the sealing plug 22 of the cylinder is malleable the penetrating needle makes its own valve seat as it penetrates the plug, and the needle itself can be used as the valve to control the flow of the gases from the cylinder.

At the outer end of bore 32, housing part 31 is provided with a plug-like member 41 which is secured thereto by a threaded connection 42. Member 41, which has a central bore 44 therethrough, serves to guide the outer end of plunger rod 40, and also functions as an abutment for the outer end of a coil compression spring 45 which is disposed about rod 40 with its inner engaging plunger head 34. In the embodiment shown there is employed an annular spacer member 43 between the outer end of spring 45 and plug 41.

The outer end of plunger rod 40 is threaded as shown at 47, so as threadedly to receive a plunger-manipulating knob 46 disposed beyond the outer end of housing part 31. By suitably turning knob 46 with respect to plunger rod 40, the knob may be adjusted longitudinally of the rod to function as a stop means for the plunger. The knob 46 may be held in adjusted position by the lock nut 49 positioned outwardly of the knob.

The embodiment of the gas dispenser above described functions as follows: A charged gas cylinder 20 is mounted within the right hand end of the housing 14 as shown, the cap 17 being tightened to effect a seal between the outer rim of the neck 21 of the gas cylinder and sealing means 25. During this operation the plunger 40 will move a short distance to the left against the thrust of spring 45 to allow such sealing of the gas cylinder. The force exerted on plunger 34 by spring 45 is

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insufficient to cause the pointed end 37 of the rod 40 to pierce diaphragm 22. When it is desired initially to use the gas dispenser, the knob 46 connected to the plunger 40 is drawn back to the left a considerable distance, and is then released so that spring 45 thrusts the plunger to the right with considerable speed. This causes the point 37 of the plunger to pierce the diaphragm 22 and to make the aperture 39 therein. Spring 45 has sufficient terminal thrust to maintain the tapered or conical end of the plunger in sealing contact with the thus formed aperture 39 in the diaphragm. When it is now desired to dispense gas from cylinder 20, the plunger 40 is moved a short distance to the left against the action of spring 45 by means of knob 46, the plunger being released again to seal aperture 39 when sufficient gas has been released. Because the release of gas takes place for short periods, most of the gas flowing through passage 26 passes into passage 27 and to passage 29; only an insignificant quantity of gas escapes past the plunger head 34. Thus the plunger head 34 adjustably secured to the plunger rod 40 and snugly fitting within the bore 32 of the housing portion 31, together with the screw threaded plug 41 which closes the end of the bore adjacent the plunger manipulating knob 46, serves to seal the bore or passageway so that substantially all the fluid passing the needle valve 35 from the cartridge 20 will pass outwardly through passages 26, 27 to the point of use rather than through the bore 32, whereby the effectiveness of the fluid would be lost.

To safeguard the operation of the device there is provided a passage 50 through the wall of the housing to connect cavity 16 thereof to the atmosphere. This allows the gas to be safely discharged to the atmosphere if the neck of the cylinder should not form a seal with means 25. Further, there is provided a passage 51 connecting with bore 23 in body 11, the passage 51 being covered by a frangible seal 52 which is adapted to rupture, for example, at a pressure well below that which a wine or champagne bottle will safely stand but at a pressure greater than that required for cork-removing operations.

The embodiment of gas dispenser shown in FIG. 2 is generally the same as that shown in FIG. 1 with the exception that it incorporates an added means for moving the plunger so as accurately to control the dispensing of the desired amount of gas. Parts in FIG. 2 which are the same as those shown in FIG. 1 are designated by the same reference characters. In the device of FIG. 2 an elongated washer-like member 54 having a plunger-receiving slot 55 therethrough is disposed between the outer end of housing part 31 and the inner end of plunger knob 46. A substantial length of member 54 projects laterally outwardly beyond housing part 31 as shown at 56, there preferably being an axially outwardly directed terminal piece 57 thereon. The parts of the apparatus are adjusted so that knob 46 and member 54 together function, with the outer end of housing part 31, as a stop means for the plunger 40. When it is desired to dispense predetermined quantities of gas from cylinder 20 it is necessary only to engage members 56 and 57 with the finger and to pull them, like a trigger, toward the right in FIG. 2. After the desired amount of gas has been released, members 56 and 57 are released by the finger. Member 54 then returns to its full line position, thereby allowing the valve constituted by the diaphragm and the pointed end of the plunger to close.

In FIGS. 3 and 4 there is shown still another embodiment of gas dispenser. Such dispenser is similar to those shown in FIG. 2, but differs therefrom in the character of the means for moving plunger 40 to open and close the gas releasing valve as required. Parts in FIGS. 3 and 4 which are similar to those in FIGS. 1 and 2 are designated by the same reference characters.

Between the outer end of housing part 31 and the inner end of knob 46' connected to plunger 40 there is posi-

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tioned a reciprocable washer-like member 59. Member 59 has a slot 60 therein receiving the outer end of plunger rod 40. Member 59 has a length somewhat greater than the diameter of housing part 31, and has terminal wing members 61 thereon lying laterally outwardly of the housing and so disposed so as to be engageable by the fingers and thumb of the operator. The axially outer surface of the broad extent of member 59 has two aligned generally laterally symmetrical cam-like rises 62 thereon, there being an opening 63 through member 59 transversely outwardly of each rise 62. The axially inner end of knob 46' has a circular ridge 64 thereon and an annular recess 66 outwardly of such ridge. Rises 62 and annular ridge 64 are so arranged that rises 62 function as cams and diametrically opposed portions of ridge 64 function as cam followers.

When the member 59 is in either of the two terminal positions thereof shown in FIG. 3 the diametrically opposed active portions of the annular ridge 64 lie at one side of the rises 62. The axially inner annular rim of knob 46', under such conditions, functions with the broad extent of member 59 and the outer end of housing part 31 to stop the plunger rod 40 in its inner, aperture-sealing position. Thus the valve constituted by rod end 37 and the aperture 39 in diaphragm 22 is closed. Adjacent the mid point of each stroke of member 59 from one terminal position thereof to the other, plunger 40 will be moved upwardly (FIG. 3) thereby to retract end 37 of rod 40 from aperture 39, thus to open such valve to dispense gas from the cylinder. The total quantity of gas dispensed will depend upon the number of strokes and the speed of reciprocation of member 59. It will be seen, therefore, that the device of FIGS. 3 and 4 provides means whereby the quantity of gas dispensed is under the complete and accurate control of the operator. It will be observed by study of the drawings that the penetrating pin makes a very small orifice through the seal of the gas cylinder, an orifice which is so small that it acts as a reduction valve which delivers the compressed gas beyond the hole in the seal at a materially reduced pressure. This makes it possible to control high pressures within the compressed gas cylinders with comparatively small forces on the outside, and this in turn makes it possible to remove corks safely, to distribute oxygen through face masks, and to inflate relatively weak objects without danger, without special skill, and in controlled amounts.

The valve is of the self-closing type, the spring biasing the valve to closed position being strong enough to drive the penetrating pin into sealing position as soon as the lever is released. The pressure operating against the valve point in closed position is very small because of the small area presented to the internal pressure of the cylinder and this makes control by a spring of small power possible. This invention retains the gases in the cylinder until they are used and releases them as needed.

A slightly different form of fluid dispenser is disclosed in FIG. 6, wherein the axially reciprocable needle valve member includes a hollow stem or conduit portion extending axially through the dispenser housing and adapted to discharge fluid under pressure to any suitable receiver intended to utilize such fluid under pressure, which fluid may be used for any suitable purpose as previously set forth herein, as, for example, for removing corks from bottles, for inflating tires, footballs or the like, and as herein illustrated is provided with an adapter which leads to an atomizer, life preserver or other suitable receiver.

The embodiment of the invention shown in FIG. 6 of the present application corresponds to FIG. 2 of my application Serial No. 17,550, filed March 25, 1960, and now abandoned, whereas FIGS. 1-5 correspond to the disclosure of my application Serial No. 149,276, filed November 1, 1961, now abandoned.

In common with the disclosure of FIG. 5, the embodiment of my fluid dispensing device shown in FIG. 6 includes an elongated casing generally designated C, in-

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cluding a body or valve housing portion or member C' adapted to receive and house an axially reciprocable needle valve member generally designated by the reference numeral 100, and a cap portion C² axially adjustable with reference to the valve housing member C' by reason of the threaded connection 101 between the two casing members C' and C². As shown the cap portion C² serves to house a major portion of a tubular member 102 containing fluid under pressure, which fluid is adapted to be released in controlled quantities by means of the needle valve member 100. The member 102 is preferably a conventional cartridge containing CO₂ under pressure similar to the cartridge 20 of the embodiment of FIGS. 1-5. As shown, the cartridge 102 is provided with a head portion 103 adapted to fit into a socket portion 104 herein shown as projecting axially beyond the main body of the housing member C'. The cartridge 102 is provided with the usual puncturable end wall or diaphragm 105, which preferably seats against a suitable sealing gasket 106 seated in the socket member 104. A suitable outer ring or sealing gasket 106 is preferably provided between the ends of the casing members C' and C². A suitable external flange or collar 107 provides an abutment which limits the movement of the cap member C² in one direction.

The reciprocable needle valve member 100 is mounted within the casing member C' for axial reciprocation therein toward and from the cartridge member 102. The needle valve member is normally biased toward the cartridge by any suitable means, herein shown as a spring 108, one end of which engages a flange 109, herein shown as a ring mounted in a groove in a stem portion 110 of the valve member 100, while the other end of the spring engages an inwardly projecting abutment 111 held in place by a retainer ring 111' carried by the casing member C'. The stem portion 110 of the needle valve member is shown as hollow throughout the major portion of its length, while the end adjacent the cartridge 102 is shown as provided with a plug 112 secured to the stem portion, which plug closes the end of the passage 113 extending through the hollow stem, such plug being provided with a tapered and sharpened needle valve portion or pin 114 constituting the valve proper, which serves to initially penetrate the diaphragm 105 of the cartridge 102, and thereafter serves as a valve to control the flow of fluid under pressure from the cartridge as previously described in connection with the embodiment shown in FIGS. 1-5 of the drawings.

Fluid passing through the opening formed in the diaphragm around the needle valve 114 when said valve is retracted in whole or in part passes first into a chamber 115 in the casing member C' to the left of the sealing gasket 106, and thence passes through a passage 116, bypassing the plug 112, and through an opening 117 in the hollow stem 110 into the axial passage 113 extending through the stem and connected through an olive shaped sealing gasket 118 formed in a head member or nut 119 threadedly mounted on and movable with the stem 110, to a hollow needle member 120 similar in structure and function to the needle member 40 of FIG. 1 of my application Serial No. 17,550, now abandoned. The needle member 120 may be used to perforate the cork of a bottle or the like in a cork removing device, as in my Patent No. 2,729,124 and as in my application Serial No. 149,276, filed November 1, 1961, now abandoned, but as herein shown the pointed end thereof may be inserted in a suitable adapter 121 connected to a hose or the like 122, which in turn may be connected to an atomizer, life preserver, or other apparatus designed to use fluid under pressure received from the cartridge 102. As shown the adapter is provided with a rubber insert 123 having a passage extending therethrough and connected at one end with the hose passage and at its other end adapted to snugly receive the pointed end of the hollow needle or connector 119 which is connected

to and communicates with the needle valve member 102 through the olive shaped gasket 117.

As previously set forth, the needle valve member 100, including the pointed portion or pin 114, which constitutes the needle valve proper, is normally biased toward the diaphragm 105 of the cartridge 102 by any suitable means such as the spring 108 which reacts between the retainer ring member 109 carried by the stem 110 of the valve member and the abutment or flange 111 extending inwardly from the wall of the casing, and prevented from rearward movement by the retainer ring 111' carried by the casing. Forward movement of the needle valve member toward the cartridge is limited by engagement of the ring member 109 carried by the hollow stem 110 of the needle valve member with an internal abutment 125 carried by the casing member C'.

As will be apparent from the drawing, when the retainer ring 109 is in contact with the abutment 125 the needle valve member 100 is in its extreme forward position with the point of the needle 114 projecting beyond the sealing gasket 106 and into and through the sealing diaphragm 105 of the cartridge 102. Perforation of the sealing diaphragm 105 may be initially effected by inserting the cartridge in the cap member C' while such cap is separated from the body member C', then assembling the parts with the cartridge contained in the cap member and screwing the cap member upon the body member until the projecting point of the pin 114 pierces the diaphragm 105 of the cartridge, the biasing spring 108 being of sufficient strength to bias the pin forwardly during the piercing operation.

As long as the pin 114 remains in its forward position under the biasing action of the spring 108 no fluid can flow out of the cartridge, but as soon as the pin point 114 is retracted from its forward position in opposition to the biasing spring, accurately controlled quantities of fluid under pressure may pass through the opening in the diaphragm and thence through passage 116 and aperture 117 into the axial passage 113 extending through the hollow stem 110 of the reciprocable needle valve member 100, and thence through the passage and hollow extension member 120 to a suitable place of use.

Suitable means generally designated by reference numeral 126 are provided for retracting the needle valve member 100, including the needle point or valve proper 114, a controlled distance against the force of the biasing means 108, which biasing means, however, constantly urges the valve member toward the cartridge, so that as soon as the retracting means is released to any extent the valve member 100 and all parts connected thereto immediately tend to move forward toward the cartridge 102 to the degree permitted by the relaxing or release of the retracting means 126.

As shown, the retracting means 126 comprises a curved cam member 127 having an opening 128 therein through which the needle valve member 100 freely passes, said cam member being pivoted at 129 to the wall of the casing C' and being provided with an operating handle 130 extending longitudinally of the casing C from the curved cam portion toward the cartridge housing portion C². When the operating handle 130 is depressed, i.e. moved toward the casing, the curved cam portion or member 127 engages a nut 131 adjustably mounted on the stem 110 of the valve member 100, thus forcing the nut 131 and the valve member 100, including the pin pointed valve portion 114, axially rearwardly, that is, in a direction away from the cartridge, against the action of the biasing spring 108, which, however, constantly tends to move the valve member forwardly, that is, toward the closed position of the valve, as soon as the retracting means is released or relaxed in whole or in part, the biasing means being of sufficient strength to completely close the needle valve 114 when the operating handle is completely released.

Although only a limited number of embodiments of

the invention have been illustrated in the accompanying drawings and described in the foregoing specification, it is to be expressly understood that various changes, such as in the relative dimensions in the parts, materials used, and the like, as well as the suggested manner of use of the apparatus of the invention, may be made therein without departing from the spirit and scope of the invention as will now be apparent to those skilled in the art.

What is claimed is:

1. A fluid dispenser comprising a high pressure fluid containing cartridge having a puncturable sealing diaphragm, an axially reciprocable needle valve member having a pointed end adapted to pierce the diaphragm without disrupting it and to form therewith a seal against the escape of fluid through the aperture thus made, means normally biasing the needle valve member against the diaphragm with force sufficient to hold the needle in sealing position in the aperture in the sealing diaphragm, and releasable means including a member rigidly connected to the needle valve member to retract the needle valve member in opposition to the biasing means to permit controlled quantities of the fluid to flow outwardly from said cartridge through the aperture, while the needle valve member is retracted and permitting said needle valve member to close said aperture when the retracting means is released, said fluid dispenser comprising an elongated housing supporting said needle valve member and said cartridge in axially aligned position with the pointed end of the needle aimed at the sealing diaphragm of the cartridge, wherein the needle valve member is mounted in one end of the housing and the cartridge in the other, and a portion of the needle valve retracting means projects outwardly from the housing adjacent the needle valve end thereof and is accessible to the fingers of an operator.

2. A fluid dispenser as set forth in claim 1, including fine adjustment trigger means controlling the position of the point of the needle valve member relative to the aperture in the sealing diaphragm.

3. A fluid dispenser comprising an axially reciprocating needle valve member, a fluid dispensing cartridge having a perforable portion, means for mounting said cartridge with said perforable portion in alignment with the needle valve member, pressure means initially biasing said needle valve member into engagement with said perforable portion of the cartridge, but with insufficient pressure to puncture said portion, and releasable manual operating means including a member rigidly connected to the needle valve member for retracting said needle valve member axially away from said perforable portion in opposition to said biasing means, whereby the force of the biasing means is increased sufficiently so that the needle will pierce said perforable portion on release of the operating means, said manual operating means serving also to withdraw the needle means from the perforable portion of the cartridge after initial perforation to permit release of fluid from said cartridge therethrough.

4. A fluid dispenser comprising a fluid dispensing cartridge having a sealing diaphragm, reciprocable needle means having an end adapted to pierce the diaphragm without disrupting it and to form therewith a seal against the escape of fluid through the aperture thus made, spring means normally biasing the needle means against said diaphragm with insufficient force to initially perforate the diaphragm but with force sufficient to hold the needle in sealing position in the aperture in the diaphragm after initial perforation thereof, and releasable manually operable means including a member rigidly connected to said needle valve means for retracting said needle means from the diaphragm, to compress the spring sufficiently to enable it to force the needle means through the diaphragm on release of the manual means, said manual means also serving to withdraw the needle means from the apertured diaphragm to valve the fluid through the aperture.

5. Apparatus for controlling the release of fluid from a high pressure cylinder having a sealing diaphragm which

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comprises means to hold the cylinder, penetrating means including a needle aimed at the diaphragm of the cylinder, spring biasing means initially urging the needle against said diaphragm with insufficient force to perforate the same, and releasable needle retracting means including a member rigidly connected to said needle for moving said needle axially away from said diaphragm in opposition to the biasing means whereby the force of said biasing means is increased sufficiently to cause the needle to perforate said diaphragm on release of said retracting means, said retracting means also serving to withdraw the needle from the perforated diaphragm to permit fluid to discharge from said cylinder through the perforation in said diaphragm.

6. A fluid dispenser comprising a housing means to hold a penetrable fluid cylinder which has a sealing diaphragm, and having a passage aligned with said cylinder, a reciprocable needle member having a needle-like piercing end adapted to pierce the sealing diaphragm of the cylinder and hermetically seal the aperture thus made, pressure means initially biasing the reciprocable needle member against said diaphragm but with insufficient force to penetrate the diaphragm, and releasable retracting means operable to withdraw the needle member against the opposition of the biasing force to initially increase the biasing force sufficiently to cause the piercing end of the needle to penetrate said diaphragm and form an aperture therein, said retracting means serving also to withdraw the needle from the aperture to permit the escape of fluid therefrom into the passage.

7. A fluid dispenser comprising a high pressure fluid containing cartridge having a sealing diaphragm, a needle valve member having a pointed end adapted to pierce said diaphragm, means mounting said needle valve member for axial reciprocation with respect to said diaphragm, including needle retracting means rigidly connected to said needle valve member, means operatively connected to said needle valve member normally biasing said needle valve member with sufficient force to maintain the point thereof in contact with said diaphragm without puncturing it, said needle valve member being movable by said needle retracting means away from said diaphragm against said biasing force thereby storing in said biasing means additional force operative, whereby, upon subsequent release of said retracting means, to cause said needle valve member to pierce said diaphragm without disrupting it, and means limiting the movement of said needle valve member in the direction of said diaphragm, said normal biasing force being sufficient to maintain the needle in sealing contact with the aperture thus formed and to permit subsequent movement of said needle valve member away from said contact to dispense said fluid through said aperture.

8. A device for dispensing fluid under pressure from a cartridge having a penetrable sealing diaphragm at one end thereof, said device comprising a housing including a valve housing portion and a cartridge housing portion, the latter adapted to receive a cartridge therein with its puncturable end directed toward the valve housing portion, a needle valve member axially reciprocable in said valve housing portion toward and from said cartridge, said needle valve member having a tapered pointed end portion adapted to pierce said puncturable end of the cartridge and to form therewith a seal against the escape of fluid through the aperture thus made while the tapered portion remains in said opening, means normally biasing the needle valve member against said diaphragm with sufficient force to hold the tapered needle portion in sealing position in said aperture, and means for retracting said needle valve member in opposition to said biasing means to permit controlled quantities of the fluid to flow outwardly from the cartridge as the needle valve is retracted.

9. An apparatus for dispensing fluid under controlled

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pressure from a high pressure fluid containing cartridge having a puncturable sealing diaphragm, said apparatus comprising a tubular housing, a needle valve member mounted for axial reciprocation in said housing, and means for mounting a fluid containing cartridge axially in said housing with its puncturable sealing diaphragm in alignment with the needle valve member, said needle valve member having a pointed end adapted to pierce the diaphragm and to form therewith a seal against the escape of fluid through the aperture thus made while the pointed end remains in said aperture, means normally biasing the needle valve member toward the diaphragm with sufficient force to hold the needle in sealing position in the sealing diaphragm, and releasable means to retract the needle valve member in opposition to the biasing means to permit controlled quantities of fluid to flow outwardly from said cartridge through the aperture.

10. An apparatus as set forth in claim 9, wherein a portion of said needle valve member is hollow and provides an axial passage for the flow of fluid from said apparatus.

11. A device for controllably releasing a compressed gas from a container having a malleable puncturable wall area, said device comprising a body component adapted to receive the container so that the malleable puncturable wall area of the latter faces one end of a discharge passage in the body component, a pointed piercing and sealing member movably disposed within the passage with its pointed end facing said wall area, resilient means urging the pointed end of said member towards said wall area, and means for applying a force to said member to overcome said resilient means and move the pointed end of said member away from said wall area, the arrangement being such that said member is operable to pierce with its pointed end an outlet hole in said wall area and form its own seating in the hole, said resilient means holding the pointed end of said seating to seal the outlet until said force-applying means is actuated to withdraw the pointed end from its seating and thus release gas from the container into the passage.

12. A device according to claim 11, wherein said resilient means is a spring and the pointed piercing and sealing member is operable by snap action of that spring to pierce and seal said outlet hole in said wall area, the bias of the spring being insufficient, in the absence of snap action, to cause piercing but sufficient to cause sealing once piercing has been effected.

13. A device according to claim 12, wherein the spring is a coil compression spring loosely mounted on the piercing and sealing member, one end of the spring engaging a plunger head carried by said member and the other end of the spring engaging with a fixed abutment within the body component, the plunger head being disposed intermediate the fixed abutment and the pointed end of said member.

14. A device according to claim 11, wherein the end of the piercing and sealing member remote from the pointed end is extended to project outwardly beyond one end of said body component.

15. A device according to claim 14, wherein the projecting extension of said member carries a knob-like element, the position of said knob-like element on the extension being adjustable axially of the latter.

16. A device according to claim 15, wherein said projecting extension is externally screw-threaded and said knob-like element is formed with a central bore whereof the surface is similarly screw-threaded.

17. A device according to claim 15, wherein a lever is engaged between said one end of the body component and an adjacent end of the knob-like element, said lever being operable to move the knob-like element away from the body component and thus to move the pointed end of the piercing and sealing member away from the malleable puncturable wall area of the container.

18. A device according to claim 15, comprising a re-

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reciprocable cam mounted between said one end of the body component and an adjacent end of the knob-like element, and also comprising a cam follower formed on said adjacent end, the construction and mutual arrangement of the cam and cam follower being such that movement of the cam in either direction first causes the knob-like element to move away from the body component, and thus causes the pointed end of the piercing and sealing member to move away from the malleable puncturable wall

area of the container, and then allows the knob-like element to move back towards the body component.

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