

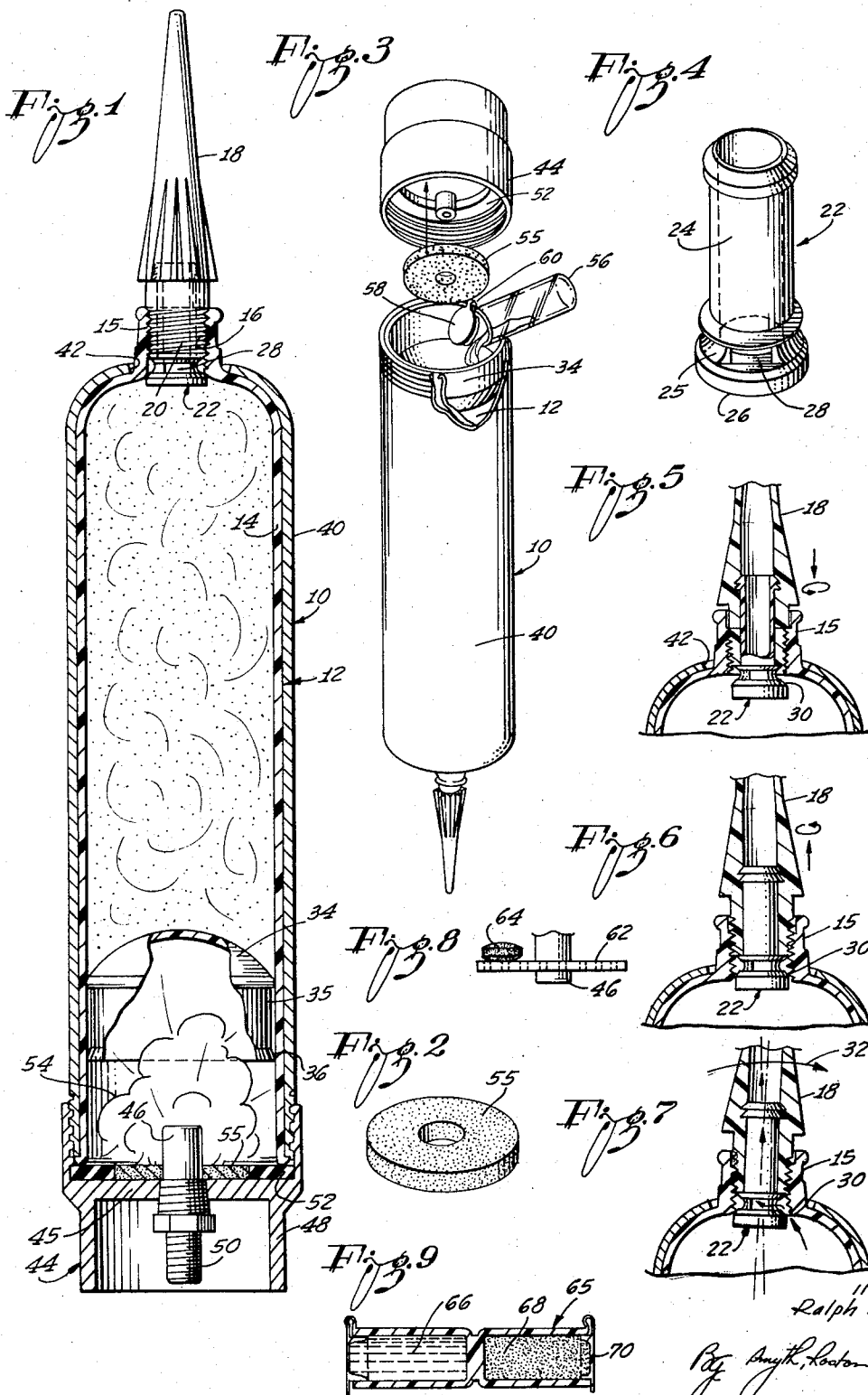
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GAS-GENERATING DISPENSER FOR VISCOUS MATERIALS

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3,367,545 GAS-GENERATING DISPENSER FOR VISCOUS MATERIALS

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ABSTRACT OF THE DISCLOSURE

A device for dispensing a fluent material has a movable piston separating a dispensing chamber from a pressure chamber. With the pressure chamber closed, two ingredients therein are brought together to generate a gaseous fluid for expansion against the piston to extrude the fluent material from the dispensing chamber.

This invention relates to a device for dispensing viscous materials such as sealants and adhesives wherein a contractible cartridge defining a dispensing chamber having a dispensing outlet is confined in a dispensing gun and pressurized gaseous fluid in the gun contracts the cartridge to discharge the viscous material.

A conventional dispensing gun of this type is connected to a compressor and is provided with a trigger-actuated air inlet valve for controlling the contraction of the cartridge. Such a dispensing gun is highly satisfactory for industrial use where compressors are available or where continuous use of the gun warrants investment in a compressor. In many instances, however, such a gun is needed for only occasional intermittent use. Home mechanics, for example, have heretofore been deprived of the convenience and efficiency of such a dispensing gun because such a gun is inoperative in the absence of an expensive compressor. The present invention corrects this situation by providing a completely self-sufficient fluid-pressure-actuated dispensing gun.

The herein described embodiment of the invention is a dispensing gun which incorporates what may be termed a pressure chamber adjacent the contractible cartridge, which chamber may be charged with a body of gaseous fluid sufficient for a short dispensing operation. For the purpose of carrying out this basic concept, the dispensing cartridge is provided with a normally closed manually operable dispensing valve. Thus control of the discharge of the viscous material is shifted from the dispensing gun itself to the dispensing cartridge that is operated by the gun.

Since the cartridge is disposable, the dispensing valve must be of economical construction. In the preferred practice of the invention the dispensing valve is made of plastic and is mounted in a plastic dispensing nozzle of the cartridge. The nozzle is threaded into the cartridge and the valve may be operated by merely slightly screwing or unscrewing the nozzle. A feature of the invention is that the valve may also be opened, if desired, by merely flexing the plastic nozzle.

A feature of the selected embodiment of the invention is the versatility of the gun in the sense that different procedures may be followed for charging the gun with gaseous fluid. One of the available procedures is simply to attach a hand-operated tire pump to an inlet of the gun that is equipped with a check valve. Another procedure that may be elected is to use the same valve-equipped inlet for charging the gun at an automobile service station.

A third procedure is to place in the pressure chamber two or more ingredients which react to produce a gaseous fluid. In the preferred practice of the invention a tablet is employed that contains an alkali and an acid both in dry form. With the tablet in the pressure chamber, water

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is added to activate the tablet for generating the gas. A feature of the invention in this respect is that if a home mechanic uses up his supply of gas-generating tablets, he may use with equal effectiveness effervescent tablets that are available at all drugstores.

Further features of the invention reside in certain provisions to make it possible to avoid wasting gas by delaying the generation of the gas until the gun is closed. One provision is that the gun is separable into two parts for easy access to the pressure chamber, the two parts being adapted to receive separate ingredients of the gas-generating mixture. One of the two parts encloses the cartridge and the cartridge has a piston-like rear wall which is displaced by fluid pressure to dispense the viscous material. In the preferred practice of the invention the piston-like rear wall is cup-shaped to serve as a receptacle for a quantity of water to activate the dry tablet. The other of the two separable parts of the gun is adapted to receive the dry tablet and preferably means is provided to retain the dry tablet therein in exposed state when the part is turned with its open side down. By virtue of this arrangement, with the water in one of the two separable parts and with the tablet in the other separable part, the gun may be assembled with the tablet held above the water and after the gun is assembled the gun may be manipulated to bring the water into contact with the tablet for generating the required gas.

The various features and advantages of the invention may be understood by reference to the following detailed description and the accompanying drawing.

In the drawing, which is to be regarded as merely illustrative:

FIG. 1 is a longitudinal sectional view of the assembled gun with a dispensing cartridge therein;

FIG. 2 is a perspective view of an annular tablet that may be activated by water to generate the required body of pressurized gas;

FIG. 3 is a perspective view of the gun with the pressure chamber opened by separation of the two parts of the gun, the view indicating how an annular gas-generating tablet may be placed in one of the two parts of the gun and how a measured quantity of water may be placed in the other part of the gun;

FIG. 4 is a perspective view on an enlarged scale of a valve member that is mounted in the dispensing nozzle of the cartridge of the gun;

FIG. 5 is a fragmentary sectional view showing how the nozzle may be screwed inward slightly to open the valve;

FIG. 6 is a similar view showing the valve member in its normal closed position;

FIG. 7 is a similar view showing how the nozzle may be flexed to open the valve;

FIG. 8 is a fragmentary view, partly in side elevation and partly in section, showing how a perforate disk may be employed to retain a gas-generating tablet in one of the two separable parts of the gun with the part turned with its open side downward; and

FIG. 9 is a sectional view of a dual compartment container having two separate ingredients that may be mixed to generate the gas.

The drawing illustrating the presently preferred embodiment of the invention shows how a dispensing gun, generally designated 10, is used with a dispensing cartridge that is generally designated 12. The dispensing cartridge 12 has a plastic shell 14 which is open at its rear end and which tapers to an outlet 15 at its other end. The outlet 15 has an internal screw thread 16 and a suitable plastic nozzle 18 having an external screw thread 20 is mounted in the outlet.

In this particular practice of the invention it is contemplated that the dispensing passage provided by the

nozzle 18 will be equipped with a valve member 22 of the construction shown in FIG. 4, the valve member being bonded securely inside the inner end of the nozzle passage. The valve member 22 has a tubular shank 24 which is connected by a neck 25 to a chamfered head 26, the neck having a pair of diametrically opposite ports 28. Normally the valve member 22 is in its closed position shown in FIGS. 1 and 6 at which position the chamfered head 26 fits snugly in a valve seat 30 that is formed by the cartridge.

The described valve of the dispensing cartridge may be opened when desired by simply screwing the nozzle 18 inwardly $\frac{1}{4}$ turn or more to unseat the valve head 26 as shown in FIG. 5. A feature of the invention is that the valve of the dispensing cartridge may also be opened by merely flexing the nozzle 18. FIG. 7 shows how when the nozzle is flexed to the right as indicated by the arrow 32, the valve head 26 is canted relative to the valve seat 30 to permit fluid flow into the nozzle.

The dispensing cartridge 12 is of a suitable construction for contraction in response to externally applied fluid pressure. In this instance the cartridge is provided with a piston-like movable wall 34 which is slidingly mounted in the shell 14. It is contemplated that the piston-like member 34 will be made of suitable plastic and will be cup-shaped in configuration. Thus the rear end wall 34 has a rearwardly extending cylindrical skirt 35 which is formed with an outward flare 36 at its rear end to provide a desirable tendency for the fluid pressure to expand the skirt against the surrounding cartridge.

The gun 10 has a cylindrical barrel 40 which at its forward end follows the curvature of the forward end of the cartridge 12 and is formed with a circular opening 42 to clear the cartridge outlet 15. The rear end of the barrel 40 is formed with an external screw thread to engage a complementary internal screw thread of a base member 44. In the construction shown the base member is formed with a transverse wall 45 in which is mounted an inlet valve 46 and the base member is further formed with a cylindrical skirt 48 to protect the inlet valve. The inlet valve 46 is of a type commonly used on automobile tires and incorporates a spring-loaded check valve (not shown) in a well known manner. The inlet valve has an externally threaded shank 50 for releasable connection with a hand pump or with a hose from an air compressor.

For the purpose of sealing the joint between the barrel 40 and the base member 44, a suitable annular elastomeric ring 52 is seated in the base member against which the rear end of the barrel 40 may be tightened by screw action. When the gun is closed in this manner with a cartridge 12 inside the gun, the gun provides what may be termed a pressure chamber 54 which is defined in part by the base member 44, in part by the shell 14 of the dispensing cartridge and in part by the interior of the cup-shaped rear end wall 34 of the cartridge.

In one practice of the invention the inlet valve 46 is employed to provide the required pressurized gaseous body by introducing air under pressure into the pressure chamber 54. For this purpose the inlet valve may be connected to a hand pump, such as a conventional tire pump, or the barrel may be connected to a compressed air hose at an automobile service station. When the pressure chamber 54 is charged with compressed air in this manner, contraction of the dispensing cartridge 12 is prevented because the valve member 22 is at its closed position. To use the device for dispensing the viscous material, the valve member 22 is moved to open position either by screwing the nozzle 18 inward as shown in FIG. 5 or by flexing the nozzle as shown in FIG. 7.

In another practice of the invention, the pressure chamber 54 is charged by chemically generating gas in the chamber. Any suitable substances that will react to form gas may be employed. For example, the required gas may be generated by adding water to a tablet 55 which contains an acid in dry form and an alkali in dry form. The

acid, for example, may be acetic acid and the alkali may be sodium bicarbonate. It is contemplated that the annular tablet 55 will be dimensioned to fit into the pressure chamber in the manner shown in FIG. 1 where the tablet surrounds the inlet valve 46 and fits into the inner circumference of the sealing ring 52, the tablet being resiliently gripped by the sealing ring. To make it convenient to measure out the amount of water required for activating the tablet 55, a suitable plastic measuring vial 56 may be provided, the vial having a plastic stopper attached thereto by a flexible web 60.

FIG. 3 illustrates a procedure that may be followed for placing the device in operation. With the gun barrel 40 turned with its open side uppermost as shown and with a dispensing cartridge 12 seated in the barrel, the measuring vial 56 is employed to pour the required quantity of water into the cup-shaped rear end wall 34 of the cartridge. A tablet 55 is then positioned inside the sealing ring 52 to be retained thereby in exposed state and then the base member in upside down position is screwed onto the upturned barrel 40. As long as the assembled gun remains in this vertical position the tablet 55 is isolated from the water. To activate the tablet for generating the required gas it is merely necessary to reverse the position of the gun to cause the water to drop onto the tablet.

Since a tablet that is activated by water generates gas over an appreciable period of time, it is possible to simply drop a tablet of any size or shape into the water in the cup-shaped member 34 and then to screw the base member 44 onto the barrel as quickly as possible to minimize loss of the generated gas. If a tablet 55 is not available when needed, a common type of effervescent tablet may be purchased at any drugstore.

FIG. 8 shows how a perforated disk 62 made of a suitable plastic or elastomeric may be used to retain a drugstore tablet 64 in the upside down base member 44. The perforated disk is centrally apertured to frictionally grip the inlet valve 46 and is of sufficient diameter to retain the tablet 64 when the base member is turned upside down.

Various other expedients may be employed for delayed action in intermixing gas generating ingredients in the pressure chamber 54. For example, FIG. 9 shows a two-compartment capsule 65 to contain two liquids 66 and 68 respectively which interact to generate a gas. The opposite ends of the two compartments are closed by thin plastic diaphragms 70.

To prepare the gun for operation the two diaphragms 70 are punctured for retarded release of the two liquids and then the gun is quickly closed to confine the resultant generated gas.

My description in specific detail of the selected embodiment of the invention will suggest various changes, substitutions and other departures from my disclosure within the spirit and scope of the appended claims.

I claim:

1. In a dispensing device of the character described having a forward nozzle and containing viscous material, said device being contractible to discharge the material in response to fluid pressure therein, the improvement comprising:

the device being dimensioned to provide a pressure chamber to receive ingredients capable of reacting for the generation of gas to charge the chamber with a body of compressed gaseous fluid for expansion of the gaseous body to expel the viscous material from the device;

said device being separable at the chamber into two parts having open ends whereby one of the parts with its open end up may contain a liquid ingredient;

resilient means included in the other of the two parts of the device to grip a body of a dry ingredient when said other of the two parts is in position with its open end down, the dry ingredient being capable of reacting with the liquid ingredient,

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whereby the liquid ingredient may be placed in the one part of the two parts with its open end up, the body of the dry ingredient may be retained in said other of the two parts with its open end down, the two parts may then be assembled together in said positions, and then the device may be manipulated to bring the liquid ingredient in contact with the body of the dry ingredient for generation of the gas.

2. A combination as set forth in claim 1 in which said resilient means is an elastomeric ring positioned to form a seal between the two parts.

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