

Filed April 10, 1959

SEALANT GUN

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July 3, 1962

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3,042,268

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FIG. 4

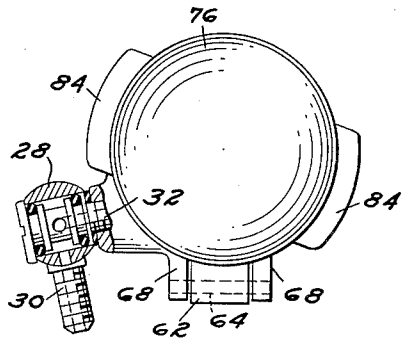


FIG. 6

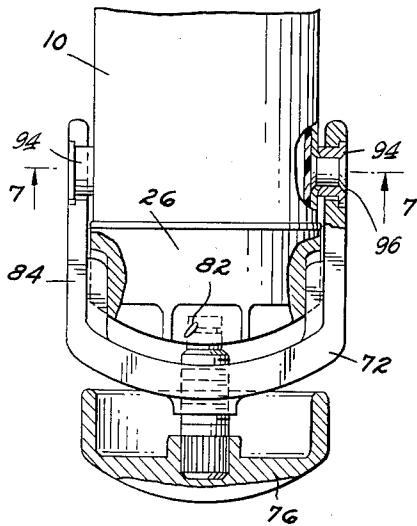


FIG. 5

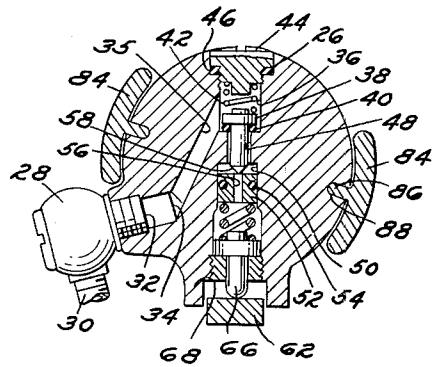
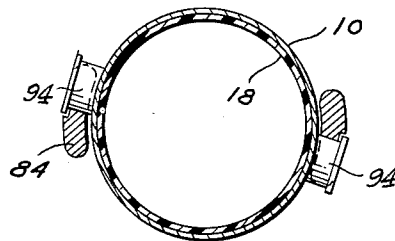


FIG. 7



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SEALANT GUN

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Filed Apr. 10, 1959, Ser. No. 805,466

6 Claims. (Cl. 222—327)

This invention relates to an improved sealant gun.

An object is the provision of a sealant gun adapted primarily to dispense a heavy, viscous sealant material such as used to seal the joints and component parts of aircraft and/or the like.

An object is the provision of such a gun which is simple, inexpensive, and built up of a minimum number of easily replaceable parts.

Another object is the provision of such a gun of the stylus type wherein the sealant material to be dispensed is adapted to be contained within replaceable cartridges which may be readily inserted within the barrel of the gun and withdrawn therefrom after the content material has been exhausted and replaced by another similar cartridge carrying content material and wherein the cartridge and the component parts of the gun are resistant to action of the content material, and wherein the construction is such that a tight seal is at all times formed between the cartridge and the cooperating parts of the sealant gun itself.

A further object is the provision of a gun of the character described having a generally cylindrical rigid metal barrel provided with an open rear end through which a cartridge may be inserted or withdrawn therefrom and provided with a reduced diameter forward end having an opening therethrough through which opening a spoutlike part of the cartridge may be received and wherein there is provided a valved closure cap adapted to be releasably secured to the open rear end of the barrel and which closure cap has associated therewith a valve mechanism and has mounted therein a saddle retainer adapted to connect the cap to the barrel and form a tight seal therebetween and wherein the cap is permitted limited axial movement within the container but held against rotation therein and wherein a valve actuating lever is swingably supported upon the cap to extend forwardly therefrom alongside the barrel to be manipulated by an operator holding the barrel in his hand.

A further object is the provision of a sealant gun of the character hereinabove set forth wherein the content-carrying replaceable cartridge is provided with a radial flange which overhangs the rear end of the barrel and is held tightly thereagainst by the closure cap and wherein such flange is of a beadlike character or O-ring contour in cross section so that a tight joint is formed at all times between the closure cap and the rear end of the cartridge.

A meritorious feature is the provision of a cartridge in a sealant gun as hereinabove described which cartridge has a linear external dimension sufficiently less than the corresponding internal linear dimension of the barrel within which the cartridge is received, that limited elongation of the cartridge may occur within the barrel under pressure of the cartridge contents without the forward end of the cartridge coming into engagement with the forward end of the barrel. An advantage of this feature is that the cartridge, even though elongated in use, will not wrinkle or buckle but is suspended from its rear end support between the end of the barrel and the closure cap. Furthermore, if there is any leakage of content material into the barrel which is not removed upon removal of a used cartridge and remains therein upon insertion of a succeeding cartridge, there is a limited space between the forward end of the barrel and the

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forward end face of the cartridge within which such material might remain without malfunction of the gun.

Another meritorious feature is that in a gun of the character hereinabove set forth wherein the cartridge has a reduced diameter forward end that terminates in a spoutlike prolongation which extends through the opening in the forward end of the barrel and which prolongation is adapted to receive a discharge nozzle, such discharge nozzle is engaged with the prolongation by being received thereover so that a build-up of pressure within the cartridge and the spoutlike prolongation tends to expand the spoutlike prolongation against the nozzle increasing the connection and seal between the nozzle and the prolongation.

Another meritorious feature is that in a gun of the character above described the spoutlike prolongation of the cartridge and the nozzle extend forward from the cartridge but are flexible so as to accommodate for lateral pressure against the nozzle such as would result from urging the nozzle laterally against a seam to be filled with content material. This flexibility of the nozzle and the spoutlike prolongation of the cartridge is facilitated by the fact that the spoutlike prolongation of the cartridge extends through an opening in the forward end of the barrel, which opening is oversize radially the spoutlike prolongation of the cartridge.

Another meritorious feature resides in the provision of a cartridge having a conical forward end wall which is of increasing thickness as it extends away from the barrel of the cartridge and also in using within such cartridge a cup-shaped piston which has a conical forward wall which also is of increasing thickness as it extends away from the skirt or side wall of the cup-shaped piston. Due to this increasing cross-sectional dimension of the forward conical wall of the piston and of the cartridge such portions of these elements are strengthened so as to withstand the stresses imposed thereon in the expressing of the contents of the cartridge during use of the gun.

Other objects, advantages and meritorious features will more fully appear from the following specification, attached claims and appended drawings, wherein:

FIG. 1 illustrates my stylus gun in longitudinal cross section;

FIG. 2 is a fragmentary transverse sectional view taken on the line 2—2 of FIG. 1, showing the connection of the saddle retainer screw with the valved closure cap;

FIG. 3 is an enlarged fragmentary section showing the connection of the radial flange on the rear end of the cartridge;

FIG. 4 is a rear end view of the gun partly in section;

FIG. 5 is a transverse sectional view taken on the line 5—5 of FIG. 1;

FIG. 6 is a fragmentary elevation partly in section of the rear end portion of the gun looking at the side of such assembly; and,

FIG. 7 is a transverse sectional view taken on the line 7—7 of FIG. 6.

In the sealant gun shown the barrel is indicated as 10. Such barrel may be formed of stainless steel or any other suitable material. It is a generally cylindrical tubular barrel having a rear open end and having a forward end portion provided with a conical wall 12 which is characterized as having an opening 14 therethrough through which opening 14 a spoutlike prolongation 16 of a cartridge 18 may extend. The gun is of the replaceable cartridge type. It is also of the stylus type since it is not provided with a special handle portion.

The replaceable cartridge is preferably formed of some suitable plastic compound which is inert with respect to content compositions that are normally used in guns of this character. A suitable polyethylene plastic compound

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may be used. Such a cartridge is sufficiently inexpensive as to be dispensed with after one use or it may be refilled for reuse. It is relatively strong and self-supporting although capable of the required flexure when the cartridge is in use within the barrel. The cartridge is constrained and held by the side wall of the barrel in such a manner that it will not distend or rupture but provides a good cylinder liner for the travel of the ejector piston.

The rear end of the cartridge is provided with an integral outwardly radially projecting sealing flange 19. This sealing flange is of a beadlike shape, or contoured somewhat after the shape of an O-ring. This sealing flange overhangs the end of the barrel. It is held against the end of the barrel by a closure cap hereinafter described and because of the shape of the flange a peculiarly tight seal is formed between the closure cap and the flange of the cartridge.

The closure cap assembly has a forwardly projecting portion 21 which extends into the rear open end of the cartridge and it has a radially projecting shoulder portion 23 which overhangs the end of the cartridge and the barrel and bears against the beadlike flange 19, as shown particularly in FIG. 3. The end of the barrel engages the beadlike flange as shown in FIG. 3 so as to urge the same tightly against the shoulder 23 to provide an effective seal.

The piston is a cup-shaped piston having a side wall portion 20 and a forward conical wall portion 22. The side wall of the piston is sufficiently flexible so that it is capable of being expanded under fluid pressure such as air pressure within the cartridge rearwardly of the piston so that the side wall of the piston forms a tight seal with the inner wall of the cartridge. The side wall portion of the piston may be slightly flared as it extends rearwardly so that the trailing edge forms a tight seal with the inner face of the cartridge.

The forward wall of the cartridge is of a conical shape and is indicated by the numeral 24. Such forward wall is of increasing thickness as it extends away from the cartridge barrel as shown in FIG. 1. Such construction reinforces the forward end of the cartridge so that it will withstand all the pressure placed thereupon during use of the gun. The pressures which may be developed in these guns may be substantially high, rising up to 1000 pounds p.s.i.

The rear end of the barrel is closed by a valved closure cap or valve body indicated generally by the numeral 26. This valve body is shown particularly in FIGS. 1 and 5. This valve body may be formed of suitable metal or the like. It carries the valve mechanism which controls flow of fluid under pressure therethrough into the gun. Such valve body 26 is shown in FIG. 5 as provided with a fitting element 28 which is adapted as at 30 to be coupled with a fluid pressure line such as an air hose to receive fluid under pressure therefrom.

Such fitting 28 is threaded as at 32 into a passageway 34. This passageway 34 communicates through a passageway 35 with a valve-containing passageway or chamber 36 formed within the body 26. Within this passageway 36 is mounted a shiftable valve element 38. The valve element may be formed of nylon or any other suitable material. A sealing ring 40 is received underneath the head of this valve element. The valve element is held to its seat against the sealing ring by a spring 42, which spring is held in place by a screw plug 44. This plug 44 in turn seats upon a sealing ring 46, all as shown in FIG. 5. In FIG. 5 the valve is shown as closed an air which might flow through the fitting 28 into the passageway 34 and therefrom through passageway 35 into valve chamber 36 would be prevented by the sealing ring 40 from flowing through the passageway 48 leading from chamber 36 into a second valve chamber or passageway 50.

Within this chamber or passageway 50 there is a valve element 52 provided with a sealing ring 54 and also provided with an axial passageway 56 extending there-

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through. The tapered end 58 of the valve 48 is adapted to close this passageway 56 and prevent flow of air there-through when the valve 38 is held closed by the spring 42.

The valve chamber and passageway 50 is provided with an outlet at 60 as shown in FIG. 1 which leads through the forward face of the closure cap into the open end of the barrel. This valve chamber also has an outlet to the atmosphere through passageway 70 as shown in FIG. 1.

The closure cap has a valve actuating handle 62 swingably mounted thereon by pivot pin 64, as shown in FIG. 1. This handle extends forwardly of the closure cap overhanging the rear end of the barrel as shown in FIG. 1. This handle is adapted to be gripped by the hand of an operator using the gun. When the handle is elevated, as shown in FIG. 1, it lifts a plunger 66. This plunger has a head portion upon which rests a spring 68 which spring bears against the valve element 52 and lifts such element, which in turn lifts the valve 48 and at the same time closes the axial passageway 56 through valve 52, all as shown in FIG. 1. Such action as shown in FIG. 1 permits fluid under pressure to flow from the inlet connection 28 through passageway 34 and 35 into the valve chamber 36, and from such chamber 36 through the passageway 48, into chamber 50 and therefrom as shown in FIG. 1 through passageway 60 into the interior of the barrel.

To exhaust fluid from the barrel, when the handle 62 is released and swings down to the position shown in FIG. 5, fluid under pressure may flow out of the barrel through the passageway 60 into valve chamber 50 and through the axial passageway 56 of valve 52 and therefrom through the exhaust passageway 70 to the atmosphere.

This closure cap or valve body is held against the open end of the barrel by a U-shaped saddle element 72. It is held to the valve body itself by a screw 74, which carries a handle 76. This handle 76 is fixed on the serrated end 78 of the screw so as to rotate therewith as shown in FIGS. 1 and 6.

The main body of the screw is threaded through the interiorly threaded bight portion of the saddle element 72 as shown in FIGS. 1 and 6. The inner end of the screw element is provided with a circumferential groove 80 as shown in FIGS. 1 and 6 and a cotter pin 82. Cotter pin 82 extends through the valve body 26 and passes through the groove 80 so as to hold the screw to the valve body while permitting relative rotation thereof.

The forked portions 84 of the saddle element 72 are provided with linearly inwardly projecting lands 86 as shown in FIG. 5, which lands are disposed within grooves 88 formed within a periphery of valve body 26. These interlocking lands and grooves hold saddle element 72 and the valve body together against relative rotation while permitting rotation of the screw 74 relative to the saddle retainer 72 so as to advance and withdraw the valve body with respect to the end of the barrel 10.

The rear end of the barrel is provided on opposite sides with lugs or detents 94 which are adapted to be received within recesses or cutouts 96 formed in the arms 84 as shown in FIGS. 6 and 7. Through this method of interlocking engagement it will be seen that the ends of the arms 84 which project beyond the valve body 26 to overhang the end of the barrel may be projected over the end of the barrel and then rotated thereabout so as to bring the recesses 96 into interlocking engagement with the lugs 94 and securely lock the closure cap assembly, which includes the valve body and saddle element to the end of the barrel. Rotation of the handle 76 through rotation of the screw 74 forces the valve body tightly against the end of the barrel gripping the flange 19 of the cartridge thereagainst so as to form a tight seal as hereinabove described.

The forward end of the cartridge has a spout-like portion 16 which projects through the opening 14 in the forward end of the barrel as shown in FIG. 1. This forward

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end of the cartridge is of less diameter than the opening 14 in the forward end of the barrel so that a certain amount of play or flexure therein is permissible. This spout portion 16 is externally threaded so as to receive the rear end of the nozzle 90. This rear end portion of the nozzle is indicated as 92 and is internally threaded to be threadably received over the spout 16. Inasmuch as the cartridge and its spout are formed of plastic material with a certain amount of flexibility, pressure within the cartridge which tends to exert an internal pressure on the inner wall of the spout increases the sealing threaded connection between the spout and the rear end portion of the nozzle.

In operation in one common application, a lateral pressure may be exerted on the nozzle by urging the same against a seam in a wall or floor section to dispense material into the seam. This lateral pressure may bend the nozzle. The nozzle is flexible so as to permit the limited bending. The threaded engagement of the nozzle with the spout, however, is of such character that notwithstanding lateral bending of the nozzle a tight joint is maintained between the nozzle and the spout.

In the operation of the device the closure cap assembly may be removed from the rear end of the barrel by withdrawing the pressure of the screw 74 so that the entire cap assembly, which includes the valve body, the set screw 74 with its handle 76, and the saddle retainer 72, may be rotated relative to the barrel to remove the saddle retainer from interlocked engagement with the lugs 94 of the barrel. Upon removal of this closure cap assembly, a cartridge may be inserted into the barrel or withdrawn therefrom. The closure cap assembly may then be replaced upon the barrel and if a new full cartridge has been inserted, the gun is ready for use. The gun is a stylus type of gun and therefore it may be held in the hand in the manner of a stylus. The valve control handle is conveniently disposed so that it may be readily manipulated by an operator using the gun.

What I claim is:

1. A sealant gun comprising, in combination, a rigid cylindrical barrel open at both ends, a cylindrical plastic cartridge removably receivable within the barrel and having a spout-like prolongation at its forward end adapted to project through the open forward end of the barrel and having a radially projecting circumferential flange overhanging the rear end of the barrel, a plunger in the cartridge for urging contents in the cartridge toward said prolongation, said cartridge having an external linear dimension sufficiently less than the corresponding internal linear dimension of the barrel whereby the forward external end face of the cartridge is spaced inwardly of the forward internal end face of the barrel and the cartridge is linearly suspended within the barrel when the cartridge flange overhangs and is seated against the rear end of the barrel, said cartridge being capable of limited linear elongation within the barrel under internal pressure within the cartridge of its contents without having the forward end face of the cartridge engage the forward internal end of the barrel, and a valved closure cap assembly releasably coupled with the rear end of the barrel closing the rear end of the cartridge and holding the cartridge flange against the rear end of the barrel, said closure cap having associated therewith a self-relieving fluid pressure regulator mechanism operable to control the flow of fluid under pressure therethrough into the cartridge.

2. A sealant gun comprising, in combination: a barrel assembly having a discharge outlet at one end and a removable closure cap at its opposite end; a saddle retainer mounted upon the cap and projecting forwardly thereof and over the adjacent end of the barrel and removably interconnected with the barrel holding the cap to the barrel; said retainer coupled with the cap to permit relative movement of the cap axially with respect thereto while holding the cap against rotation therein; pressure regulating valve mechanism within the cap controlling

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fluid pressure communication therethrough with the interior of the barrel; said valve mechanism including a valve element shiftable to admit fluid under pressure to the interior of the barrel, a plunger projecting from said cap and coupled with said element for shifting the same progressively from a fully closed to a fully open position to govern the flow of fluid under pressure, and spring-biasing means interposed between said valve element and said plunger and responsive to the increase of fluid pressure within said barrel to shift said element toward its closed position restricting the flow of fluid into the barrel and responsive to the decrease of fluid pressure in the barrel to shift said element toward its open position increasing the flow of fluid into the barrel; and a valve operating handle shiftable mounted on the cap and coupled with said plunger to actuate the valve mechanism upon manipulation of the handle, said plunger responsive to resistance offered by said spring biasing means and fluid pressure upon said valve to progressively increase resistance to manipulation of the handle to progressive opening of the valve upon increase of fluid pressure within the barrel.

3. In a sealant gun, a barrel closed at its rear end by a removable valve closure cap extending across such end of the barrel, a U-shaped retainer embracing the cap and rear end of the barrel and having a bight portion extending across the cap opposite the barrel and having arms extending forwardly along the cap and barrel for releasable engagement with the barrel, a screw threaded member threadably received through and carried by said bight portion, one end of such member bearing against the cap to urge it forwardly toward the barrel upon rotation of the screw member in one direction, means retentively connecting said cap to the screw member to pull the cap away from the barrel within the retainer upon rotation of the screw member in the opposite direction and prevent unintended displacement of the cap within the retainer upon removal of the barrel from the retainer, handle means on the screw threaded member rearwardly of the retainer for rotating the member as aforesaid, valve mechanism in the cap for controlling the admission of fluid pressure to the barrel, and a handle pivotally mounted directly on the cap independently of the retainer and extending forwardly along the barrel and operatively connected to said valve mechanism to control the same.

4. The invention as defined in claim 3 characterized in that said arms of the retainer and said cap are provided with interengageable ribs and grooves whereby rotation between the cap and retainer is prevented.

5. A sealant gun comprising, in combination: a rigid cylindrical barrel open at the rear end and having a reduced diameter forward end wall with a cartridge nozzle opening therethrough, a cylindrical plastic cartridge removably receivable within the barrel and having at its rear end a radially projecting circumferential flange and having at its forward end an integral conical wall of greater thickness than the cylindrical wall of the cartridge and of increasing wall thickness forwardly from its connection with the cylindrical wall of the cartridge and terminating in a spout-like prolongation at its forward end adapted to project through the open forward end wall of the barrel, said cartridge having an external linear dimension sufficiently less than the corresponding internal linear dimension of the barrel whereby the forward conical wall of the cartridge is spaced inwardly of the forward end wall of the barrel and the cartridge is linearly suspended within the barrel when the cartridge flange overhangs and is seated against the rear end of the barrel, said cartridge being capable of limited linear elongation within the barrel under internal pressure within the cartridge of its contents without having the forward wall of the cartridge engage the forward end wall of the barrel, a nozzle having a forward discharge end and a rear end receivable over said spout-like prolongation to be disengageably connected therewith, said spout-like prolongation having an

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integral externally encircling rib projection and said rear end of the nozzle having an internal encircling groove receivable in interlocking engagement over said rib projection of the spout-like prolongation of the cartridge, said spout-like prolongation being capable of limited radial expansion within the nozzle under such internal pressurization of the cartridge to urge the said rib projection into tighter interlocking engagement with the said groove in the nozzle to augment the connection of the nozzle and cartridge, such forward end of the cartridge of increased wall thickness adapted to resist lateral deflection of the cartridge and nozzle.

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6. The invention as defined in claim 5 characterized in that said flange of the cartridge is bead-shaped.

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