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⑤④ **A device for purging a plural component mixing and dispensing gun and a gun incorporating it.**

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US-A-2 884 203
US-A-3 030 666
US-A-4 133 483

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Description

This invention relates to guns for mixing and dispensing plural component plastic material, for example, polyurethane foam, and particularly to an improved device for purging residue from the mixing chamber.

The purging device of this invention relates to plural component plastic application equipment or guns of the general type described and claimed in US—A—3,366,337 and US—A—4,133,483 wherein two coreactive streams of chemicals are intimately mixed within the gun and dispensed as a fluent stream or spray. The present invention will be described in connection with plural component foam producing chemicals, but is understood to be generally applicable to mixing guns of the general character irrespective of the particular chemicals used.

One problem which arises in prior art foam guns is that, between operations, the residual material in the mixing chamber and/or outlet nozzle tends to harden and jam the outlet thereby making further mixing and dispensing impossible until the chamber and nozzle are purged of the hardened residue. Purging is accomplished, for example, in the aforementioned US—A—3,366,337, by manually opening a needle valve to admit a flow of solvent and/or air through the chamber and nozzle to remove the residue.

This purging procedure had several disadvantages. First, the basic operation required the use of two hands because the needle was opened and closed by a threaded knob. Second, the use of solvent added unnecessary expense to the foam process. Further, the solvent, because of being ejected under pressure, was dispersed into the surrounding air and created a potential safety and health problem. Still further, the blast of solvent and/or air, while forcefully ejecting the hardened foam, scattered the residue haphazardly. Overall, this cleaning arrangement was inefficient.

Other prior art arrangements, such as for example US—A—3,263,928 and US—A—2,890,836, in an attempt to overcome the mentioned difficulties, utilize a rod to eject excess material between spraying operations. In these devices, the rod purports to purge the mixing chamber and outlet nozzle on a single stroke each time the gun is shut off. However, such rods were designed to scrape the walls of the chamber, were utilized as the valving mechanism to open and close the infeed orifices and, for this reason, could be utilized for only one purging stroke for each dispensing operation. In practice, it was found that on the return stroke the rod tended to pull back some of the residue. If the gun was then left unused for a period of time, the residue hardened and bonded causing the gun to jam. For this reason, such guns utilized a solvent bath giving rise to the same problems mentioned heretofore relative to other prior art foam guns.

In the aforementioned US—A—4,133,483, purging is accomplished through a purging rod operable separate from an independently of the foam

mixing and dispensing means of the gun. The purging rod is not utilized to open and close the inlet ports for the chemicals which form the foam. Thus the gun may be used several times without using the purging device.

US—A—2884203 discloses scraping members for cleaning a tubular compartment, and US—A—3030666 discloses a separate member introduced into a chamber between a piston and plastic moulding material to prevent such material from adhering to the piston.

The present invention provides a plural component mixing and dispensing gun comprising a head secured to a body, the head having a mixing chamber with a discharge outlet at its forward end; inlet orifices communicating with the mixing chamber, means for intermittently feeding streams of reactant liquids through the inlet orifices into the mixing chamber so that the liquids form a reactive mixture which is discharged through said outlet, the reactive mixture being one which solidifies rapidly after said liquids react in the mixing chamber; the head also including passageway and a bore which are axially aligned with the mixing chamber and disposed rearwardly thereof and a purging rod which has an end and which is selectively movable through the bore between retracted and extended positions, characterized in that there are further provided means to insert a separate scraping member into the passageway at an angle to the longitudinal axis of the passageway and at a position between the end of the purging rod and the inlet orifices so that the purging rod is effectively sealed from contact with the liquids introduced into the mixing chamber; the scraping member being moved through the passageway and the mixing chamber and out through the discharge outlet, when the purging rod is moved between the extended and retracted positions, to purge the mixing chamber of residual reactant mixture and any reactant mixture which has solidified.

The present invention overcomes the difficulties and drawbacks of prior art plural component dispensing guns by eliminating the need to use a solvent bath or solution. Elimination of the bath lowers the cost of operation and provides an added safety measure as a source of combustible material and noxious fumes, e.g. solvent, is not required.

Preferably the scraping member is a compressible sphere of a plastic material which is forced by air under pressure to seat in a position rearwardly of the foam component inlet orifices and mixing chamber. The purging rod is selectively actuable independently of the foam mixing and dispensing operation to force the sphere through the mixing chamber thereby to scrape the walls of the chamber to remove foam residue without requiring a separate solvent bath.

A gun incorporating a purging device according to the present invention will now be described with reference to the accompanying drawings in which:

Fig. 1 is a side elevational view of the gun, partly in vertical longitudinal section; and

Fig. 2 is a fragmentary longitudinal section, taken substantially on line 2—2 of Fig. 1, of the spray head of the gun.

Referring to the drawings, a dual component dispensing gun 10 is shown having a gun head 12, modified in accordance with the present invention, secured thereto.

The valving details, controls, chemical component supply sources and the like, have been omitted for brevity because, in this preferred embodiment, they are identical to those described in the aforementioned US—A—3,366,337.

Briefly, the liquid chemical reactant components are supplied through inlet orifices 14 and 16 to chambers 18 and 20. The chambers 18 and 20 communicate with opposed crossbores or ducts 22 and 24 and the flow of each liquid chemical is controlled by valve means, fragmentarily indicated by reference numeral 26.

As is known in the art, the two valve means 26 are normally closed but are opened substantially simultaneously when dispensing is desired by movement of a gun trigger 28 by the operator of the device. When valves 26 are opened, the chemical reactants flow into ducts 22—24 and through impingement orifices 30 and 32 into a cylindrically shaped mixing chamber 34 where they are thoroughly mixed. The mixture then being ejected from a discharge outlet 36 formed in cylindrical extension 38 at the exit end of the mixing chamber 34.

The gun head 12 is also provided with a passageway 39 and a bore 40 each axially aligned with mixing chamber 34, the bore being threaded for a portion of its length to receive the threaded portion 42 of a sleeve 44, the main body of which is snugly and sealingly received in the bore 40. The sleeve 44 is preferably formed of Teflon or other low friction material.

A bore 46 is provided in gun head 12 to intersect the passageway 39 at a point spaced rearwardly from the location of the impingement orifices 30 and 32. Bore 46 is threaded, as at 48, to threadably receive one end 50 of a tube 52. Tube 52 is preferably a flexible plastic material having its other end 54 connected to a container 56 holding a supply of compressible plastic spheres 58. Air under pressure supplied from a pressure source 60 passes through container 56 to direct spheres 58 through tube 52.

Each sphere 58 has a diameter slightly larger than the diameter of the passageway 39 and the mixing chamber 34 and, under pressure from air source 60, one sphere enters passageway 39 and is seated in a spherical depression 62 formed on the surface of passageway 39 opposite bore 46. The sphere so seated has its lowermost segment, as viewed in Fig. 1, disposed within the opening 64 formed by the intersection of bore 46 and passageway 39 to preclude further movement of spheres 58 into the chamber and to seal the opening as well as to preclude any flow of air from pressure source 60 into the gun.

The sleeve 44 is provided with axial bore 66 in which a purging rod 68 is slidingly and sealingly received. Purging rod 68 is coaxial with and preferably of a smaller diameter than the passageway 39 so that the rod does not scrape on the inner wall of the mixing chamber 34. The end 70 of purging rod 68 in its retracted position, as shown in the drawings, is positioned rearwardly of the inlet orifices 28 and 30 and rearwardly of a sphere 58 seated in passageway 39.

An important feature of the present invention is that rod 68 and a sphere 58 are utilized only for purging the mixing chamber and outlet and has nothing whatsoever to do with the starting and stopping of the mixing or dispensing operations. In other words, the gun may be operated several consecutive times without using the purging rod and, conversely, the purging rod may be moved through any number of consecutive purging strokes without utilizing the mixing or dispensing mechanisms. This is extremely advantageous because it is at times difficult to adequately purge the mixing chamber and outlet nozzle of the gun with a single stroke.

The purging rod, in the preferred embodiment, is operated by a double acting air cylinder, designated generally in Fig. 1 by the numeral 72.

The cylinder body 74 has a forward portion 76 which is removably fitted within an opening 78 in the rearward surface of the gun body 10 coaxial with the mixing chamber 34. A piston 80, which is secured to the purging rod for movement therewith, divides the cylinder bore into an advance chamber 82 and return chamber 84.

Piston 80 is provided with an axial bore 86 in which is slidably received a valving rod 88 having its rearward end projecting outwardly of the cylinder body and provided with a push button 90. A spring 92 biases the valving rod to an outward or retracted position.

Air under pressure is fed from a suitable source into inlet opening 94, through axial port 96 in rod 88, the forward portion of bore 86, and into return chamber 84, thereby normally holding all of the cylinder elements and the purging rod 68 in a retracted position as shown in the drawings.

When the foam gun operator at any time desires to operate the purging rod to purge excess or residual material from the mixing chamber 34, he merely depresses the push button 90, moving the valving rod 88 forwardly in the piston 80. This movement causes the port 96 to become aligned with an air outlet or exhaust opening 98 and permits the air in return chamber 84 to escape through exhaust opening 98. Simultaneously, air is admitted through a second port 100 in the valving rod 88 and through a passage 102 into advance chamber 82, pushing the piston 80 and purging rod 68 forward. Release of the push button reverses the foregoing procedure so that the piston and purging rod are returned to the position shown in the drawings.

When it is desired to purge the gun of residual foam material, push button 90 is depressed to extend purging rod 68. End 70 of the purging rod 68

contacts the sphere 58 seated in passageway 39 and the force of rod 68 pushes the sphere into passageway 39 compressing it slightly. Sphere 58 completely fills passageway 39 and, as rod 68 continues to extend, the sphere moves down the bore scraping any residual foam material and pushing it along ahead of the sphere. The stroke of piston 80 is sufficiently long to drive the purging rod 68 through the mixing chamber 34 to expel the sphere 58 out the discharge outlet 36.

During the purging stroke purging rod 68 is disposed above the sphere inlet opening 64 precluding entry of the next sphere into passageway 39. Upon retraction of rod 68 to its initial position air pressure from source 60 forces the next sphere into passageway 39 where it seals opening 42 as noted above.

It is apparent from the above description that the purging rod may be selectively utilized for any desired number of purging strokes completely independently of any foam mixing or operations. This is critical to adequate and complete purging because it is virtually impossible to perform adequate purging with a single stroke of a rod without the messy, hazardous use of cleaning fluids. Such cleaning fluids are entirely eliminated with this invention.

Also, the purging rod and its actuating air cylinder are readily removable by hand from the gun for maintenance by simply unscrewing or sliding the air cylinder out of the gun body and retracting the purging rod rearwardly through the head and body of the gun.

It will be obvious to those skilled in the art that the purging arrangement of the present invention may be utilized in many types of foam guns and is not limited to use with the preferred gun illustrated herein by way of example.

It will also be obvious that variations may be made in the two way valve system without departing from the invention. As one example, the push button control may comprise a remote control switch mounted on the gun body below the two way cylinder and therefore be considered even more conveniently accessible to the operator of the device.

Claims

1. A plural component mixing and dispensing gun (10) comprising a head (12) secured to a body, the head (12) having a mixing chamber (34) with a discharge outlet (36) at its forward end (38); inlet orifices (30, 32) communicating with the mixing chamber (34); means (26, 28) for intermittently feeding streams of reactant liquids through the inlet orifices (30, 32) into the mixing chamber (34) so that the liquids form a reactive mixture which is discharged through said outlet (36), the reactive mixture being one which solidifies rapidly after said liquids react in the mixing chamber (34); the head (12) also including passageway (39) and a bore (40) which are axially aligned with the mixing chamber (34) and disposed rearwardly thereof and a purging rod (68) which has an end

(70) and which is selectively movable through the bore (40) between retracted and extended positions, characterised in that there are further provided means (52) to insert a separate scraping member (58) into the passageway (39) at an angle to the longitudinal axis of the passageway (39) and at a position between the end (70) of the purging rod (68) and the inlet orifices (30, 32) so that the purging rod (68) is effectively sealed from contact with the liquids introduced into the mixing chamber (34); the scraping member (58) being moved through the passageway (39) and the mixing chamber (34) and out through the discharge outlet (36), when the purging rod (68) is moved between the extended and retracted positions, to purge the mixing chamber (34) of residual reactant mixture and any reactant mixture which has solidified.

2. A gun according to claim 1, characterised in that said scraping member (58) comprises a spherical member of compressible plastic material having a diameter slightly greater than the diameter of said passageway (39) and said mixing chamber (34) whereby movement of said spherical member through said passageway (39) and said mixing chamber (34) scrapes any residual mixture to purge said gun (10) of such residual mixture.

3. A gun according to claim 2, characterised in that said means (52) to insert a scraping member (58) into said passageway (39) is operative to feed sequentially each one of said scraping members (58) into said passageway (39).

4. A gun according to claim 3, characterised in that said means (52) to insert a scraping member (58) into the passageway (39) comprises a tube (52) connected to storage means (56) containing a plurality of said scraping members (58), and a storage (60) of air under pressure connected to said storage means (56) for driving the scraping members (58) through the tube (52).

5. A gun according to any one of claims 2—4, characterised in that receiving means (64) are provided to hold and to retain one of the scraping members (58) in sealing relationship in said passageway (39) to preclude feeding of additional scraping members (58) into said passageway (39).

Patentansprüche

1. Mehrkomponenten-Misch- und Spritzpistole (10) mit einem an einem Körper befestigten Vorderteil (12), der eine Mischkammer (34) mit einem Entleerungsauslaß (36) an ihrem vorderen Ende (38) aufweist; Einlaßöffnungen (30, 32), die mit der Mischkammer (34) in Verbindung stehen; einer Einrichtung (26, 28) für die intermittierende Zuführung von Strömen von Reaktionsmittelflüssigkeiten durch die Einlaßöffnungen (30, 32) in die Mischkammer (34), so daß die Flüssigkeiten ein Reaktionsgemisch bilden, das durch den Auslaß (36) entleert wird und ein solches Reaktionsgemisch ist, das rasch fest wird, nachdem die Flüssigkeiten in der Mischkammer (34) reagieren; wobei der Vorderteil (12) auch einen Durchlaß

(39) und eine Bohrung (40), die axial mit der Mischkammer (34) ausgerichtet sind und hinter dieser angeordnet sind, und einen Reinigungstab (68) umfaßt, der ein Ende (70) besitzt und durch die Bohrung (40) zwischen zurückgezogenen und ausgezogenen Positionen selektiv bewegbar ist, dadurch gekennzeichnet, daß weitere Einrichtungen (52) zum Einführen eines separaten Schabelementes (58) in den Durchlaß (39) in einem Winkel zur Längsachse des Durchlasses (39) und an einer Stelle zwischen dem Ende (70) des Reinigungstabes (68) und den Einlaßöffnungen (30, 32) vorgesehen sind, so daß der Reinigungstab (68) wirksam gegen Kontakt mit den in die Mischkammer (34) eingeführten Flüssigkeiten abgedichtet ist; wobei das Schabelement (58) durch den Durchlaß (39) und die Mischkammer (34) und heraus durch den Entleerungsauslaß (36) bewegt wird, wenn der Reinigungstab (68) zwischen den ausgezogenen und zurückgezogenen Positionen bewegt wird, um die Mischkammer (34) von restlichem Reaktionsgemisch und jeglichem Reaktionsgemisch zu reinigen, das fest geworden ist.

2. Pistole nach Anspruch 1, dadurch gekennzeichnet, daß das Schabelement (58) ein kugelförmiges Element aus kompressiblem Kunststoffmaterial umfaßt, das einen Durchmesser besitzt, der geringfügig größer als der Durchmesser des Durchlasses (39) und der Mischkammer (34) ist, wodurch die Bewegung des kugelförmigen Elementes durch den Durchlaß (39) und die Mischkammer (34) jegliches restliches Gemisch abschabt, um die Pistole (10) von solchem restlichem Gemisch zu reinigen.

3. Pistole nach Anspruch 2, dadurch gekennzeichnet, daß die Einrichtung (52) für die Einführung eines Schabelementes (58) in den Durchlaß (39) wirkt, um sequentiell jedes der Schabelemente (58) in den Durchlaß (39) einzuführen.

4. Pistole nach Anspruch 3, dadurch gekennzeichnet, daß die Einrichtung (52) für die Einführung eines Schabelementes (58) in den Durchlaß (39) ein Rohr (52), das mit einer Anzahl der Schabelemente (58) enthaltenden Speichereinrichtung (56) verbunden ist, und eine Quelle (60) von unter Druck stehender Luft umfaßt, die mit der Speichereinrichtung (56) verbunden ist, um die Schabelemente (58) durch das Rohr zu treiben.

5. Pistole nach einem der Ansprüche 2 bis 4, dadurch gekennzeichnet, daß Aufnahmeeinrichtungen (64) vorgesehen sind, um eines der Schabelemente (58) in abdichtender Beziehung im Durchlaß (39) zu halten und zurückzuhalten, um die Zuführung zusätzlicher Schabelemente (58) in den Durchlaß (39) zu verhindern.

Revendications

1. Un pistolet (10) pour distribuer et mélanger plusieurs constituants, comportant une tête (12) fixée à un corps, la tête (12) présentant une chambre de mélange (34) avec une sortie d'évacuation (36) à son extrémité avant (38); des orifices d'entrée (30, 32) communiquant avec la

chambre de mélange (34); des moyens (26, 28) pour alimenter de façon intermittente des courants de liquide réactif à travers les orifices d'entrée (30, 32) dans la chambre de mélange (34) de sorte que les liquides forment un mélange réactif qui est évacué à travers ladite sortie (36), le mélange réactif étant un mélange qui se solidifie rapidement après que lesdits liquides ont réagi dans la chambre de mélange (34); la tête (12) comportant également un passage (39) et un alésage (40) qui sont alignés axialement avec la chambre de mélange (34) et disposés en arrière de cette dernière, et une tige de purge (68) qui présente une extrémité (70) et est mobile sélectivement à travers l'alésage (40) entre des positions rétractée et étendue, caractérisé en ce que sont en outre prévus des moyens (52) pour insérer un élément de raclage séparé (58) dans le passage (39) selon un angle par rapport à l'axe longitudinal du passage (39) et prendre une position entre l'extrémité (70) de la tige de purge (68) et les orifices d'entrée (30, 32) telle que la tige de purge (68) est étanchéifiée de façon efficace d'un contact avec les liquides introduits dans la chambre de mélange (34); l'élément de raclage (58) étant déplacé à travers le passage (39) et la chambre de mélange (34) et sorti à travers la sortie d'évacuation (36), lorsque la tige (68) est déplacée entre les positions étendue et rétractée, afin de purger la chambre de mélange (34) du mélange réactionnel résiduel et de n'importe quel mélange réactionnel qui s'est solidifié.

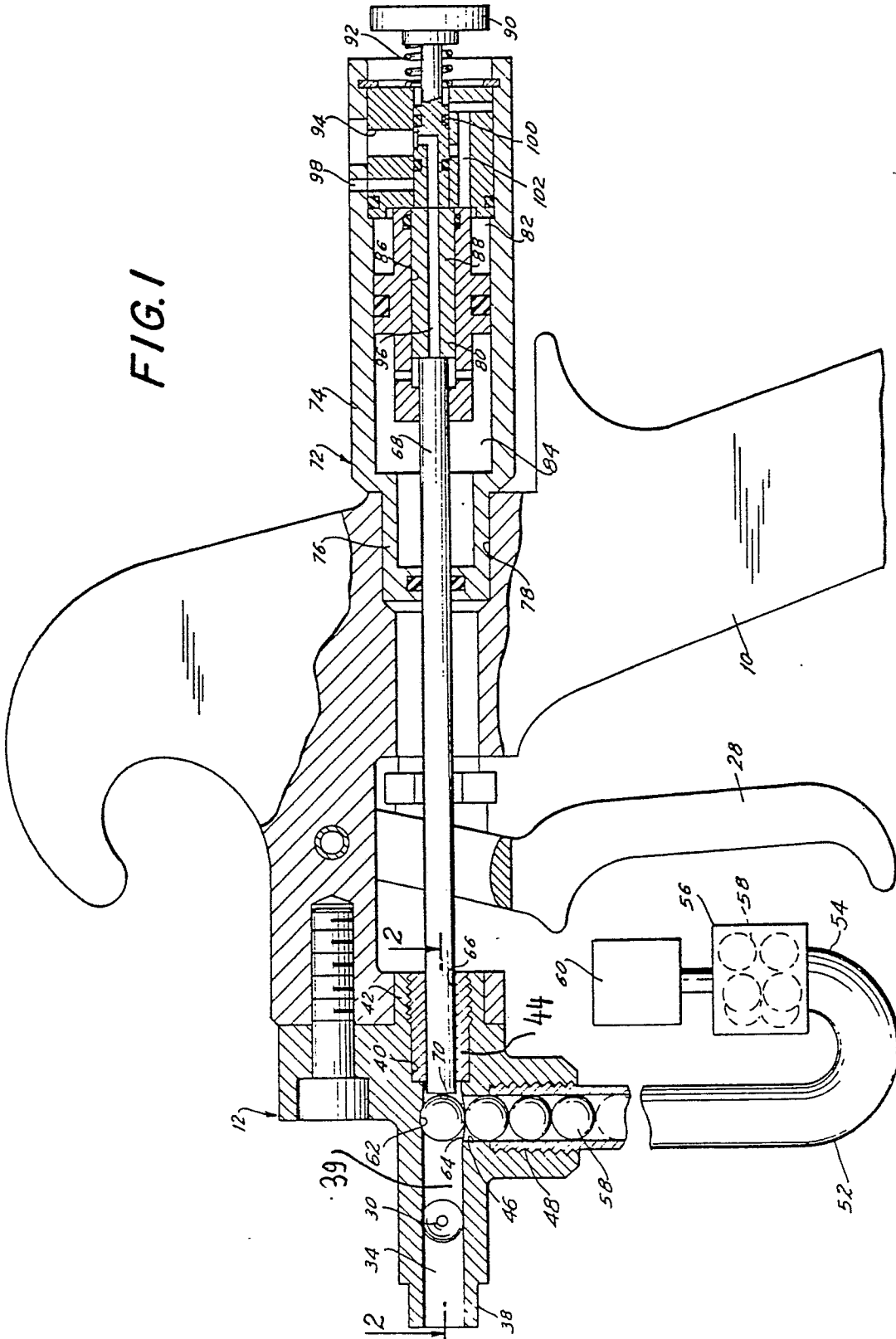
2. Un pistolet selon la revendication 1, caractérisé en ce que ledit élément de raclage (58) comporte un élément sphérique en matière plastique compressible présentant un diamètre légèrement plus élevé que le diamètre dudit passage (39) et ladite chambre de mélange (34), ce qui fait que le mouvement dudit élément sphérique à travers ledit passage (39) et ladite chambre de mélange (34) racle le mélange résiduel quelconque afin de purger le pistolet (10) d'un tel mélange résiduel.

3. Un pistolet selon la revendication 2, caractérisé en ce que lesdits moyens (52) pour insérer un élément de raclage (58) dans ledit passage (39) est destiné à fonctionner pour introduire de façon séquentielle chacun desdits éléments de raclage (58) dans ledit passage (39).

4. Un pistolet selon la revendication 3, caractérisé en ce que lesdits moyens (52) pour insérer un élément de raclage (58) dans le passage (39) comporte un tube (52) relié à des moyens de stockage (56) renfermant une pluralité desdits éléments de raclage (58), et une source (60) d'air sous pression reliée auxdits moyens de stockage (56) pour actionner les éléments de raclage (58) à travers le tube (52).

5. Un pistolet selon l'une quelconque des revendications 2 à 4, caractérisé en ce que des moyens récepteurs (64) sont prévus pour maintenir et pour retenir l'un des éléments de raclage (58) en relation d'étanchéité dans ledit passage (39) pour éviter d'introduire des éléments de raclage additionnels (58) dans ledit passage (39).

FIG. 1



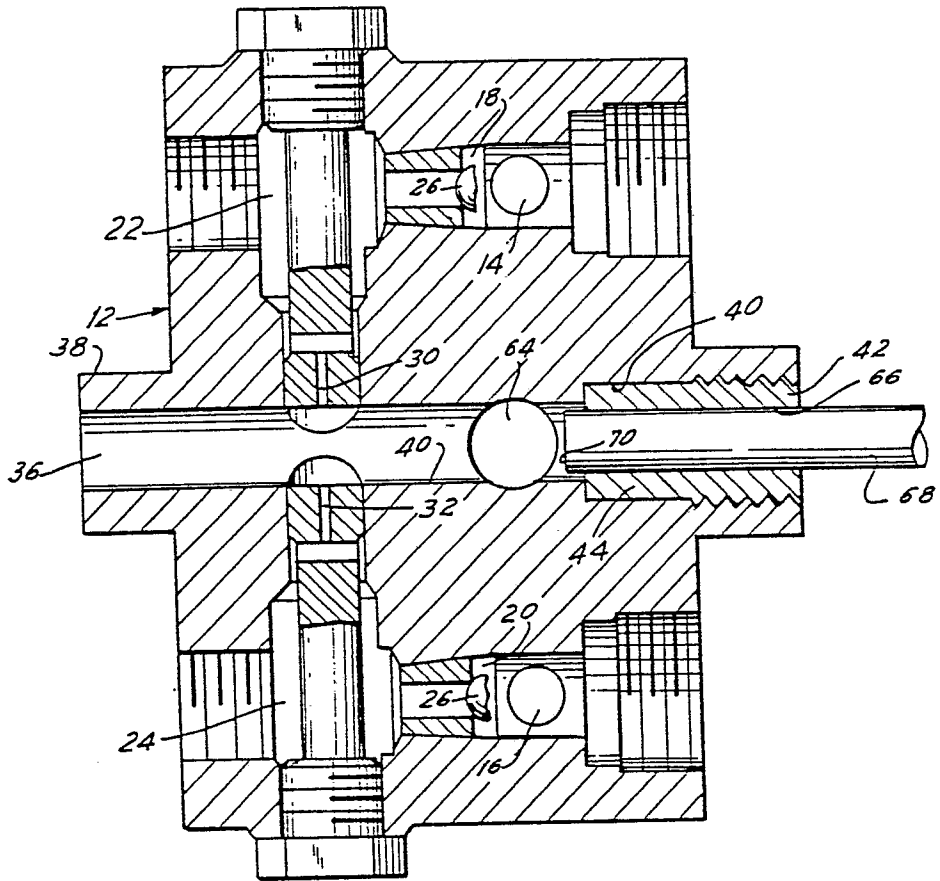


FIG. 2