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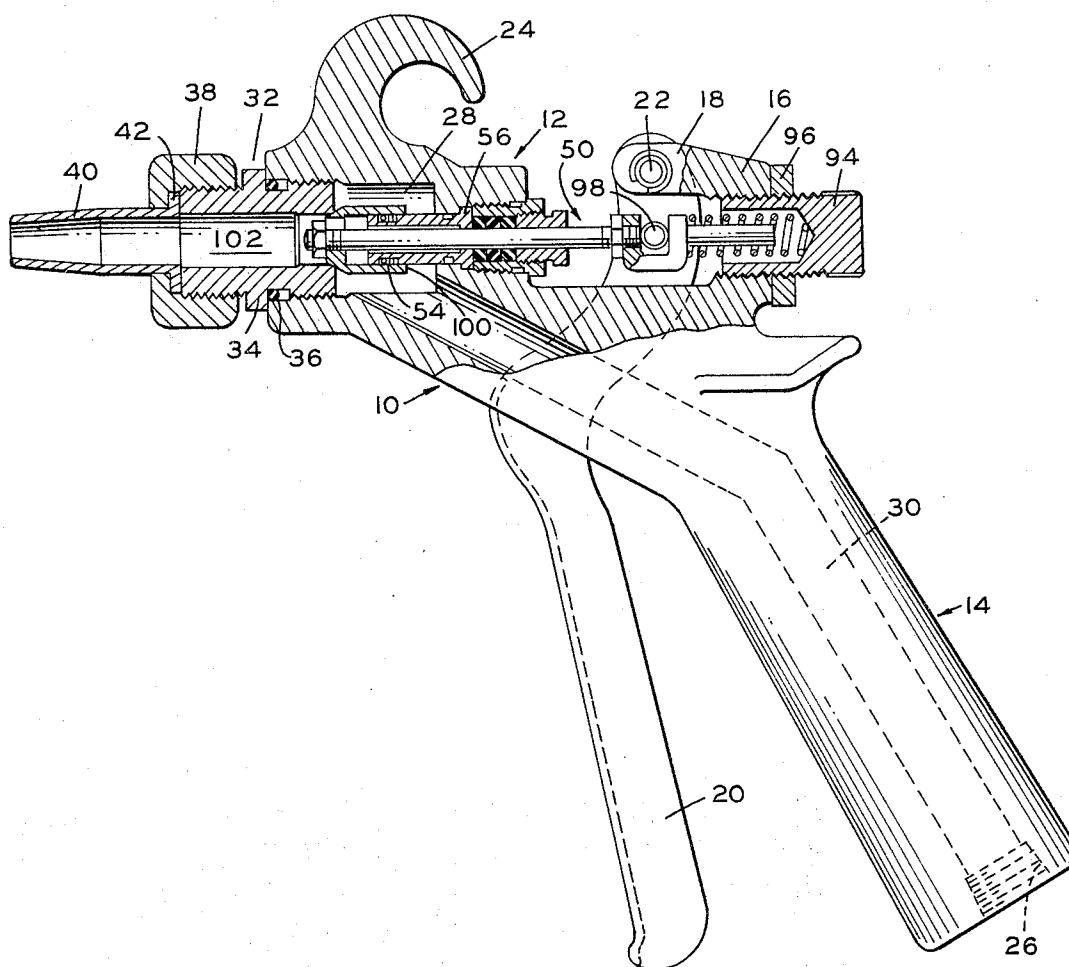
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FLOW GUN

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2 Sheets-Sheet 1

FIG. 1



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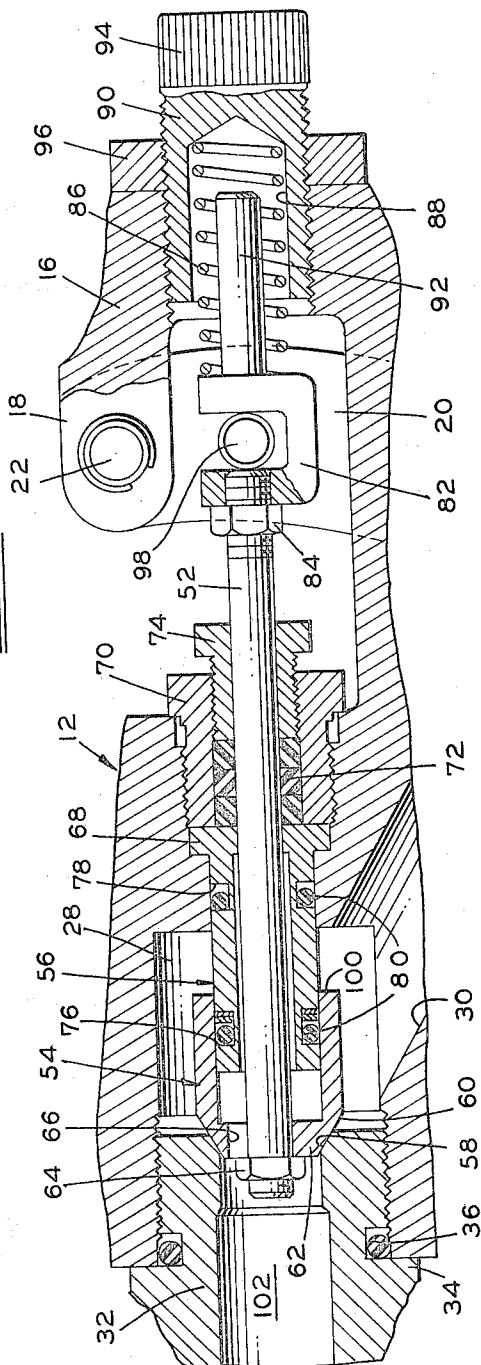
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FIG. 2



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FLOW GUN

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2 Claims. (Cl. 251-239)

This invention relates to a device for dispensing fluid material under pressure, and in particular to a flow gun for applying viscous fluids delivered to the gun under high pressures.

Guns of the character hereindisclosed are generally of the pistol type having a hand grip and a movable trigger associated with valve means operable to open and close the material outlet of the gun and thus control the flow of material emanating from a nozzle or the like communicating with the outlet. In conventional guns the valve is spring-loaded closed, and thereby under low pressure conditions, such as are encountered in paint spraying for example, release of the valve actuating trigger causes valve closure by pressure of the spring thereagainst. When handling viscous materials under high pressure, however, a problem is encountered once the valve is opened, because the material pressure, which is appreciable, acts against the valve in a direction tending to urge the valve to a progressively more open position. Unless a very strong, heavy spring is employed biasing the valve, release of the trigger will not operate to close the valve, and the trigger must be forcibly shifted to its position shutting off the flow of material from the gun. Utilization of the heavy spring, on the other hand, materially increases the trigger pressure which the operator must exert to open the valve. Neither of these conditions is acceptable for efficient gun operation.

It is therefore an object of the present invention to provide a flow gun for applying viscous materials under high pressures, which gun is of simple manufacture and easily operated, and wherein the flow control valve on the gun is of a unique construction obviating the problems above referred to.

Another object is the provision of a flow gun of the character described including valve means having a piston-like closure member which is so constructed as to balance the material pressures acting thereagainst to thereby achieve a resultant force of negligible value against the valve in all positions of its travel.

A further object of the invention is the provision of a flow gun as above described including valve means operable to attain positive material shutoff upon release of the gun trigger irrespective of back pressure that may exist at the material outlet, and which will open under high material pressures with a relatively small force applied to the gun trigger.

One very important advantageous feature of the gun disclosed herein is that the valve is easily operable with small force on the trigger even under high material pressures, while at the same time there is provided positive shutoff under all operating conditions, even when appreciable back pressures exist in the dispensing nozzle.

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

FIG. 1 is a side elevation, partly in section, of a flow gun embodying the invention; and

FIG. 2 is an enlarged longitudinal section of the flow gun of FIG. 1 showing details of construction.

Referring more particularly to the drawings, there is shown a flow gun comprising a gun body 10 having a barrel portion 12 and a handle portion 14 extending generally downwardly and inclined rearwardly from the barrel 12. Upstanding from the handle 14 is an integral

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boss 16 provided with a forwardly projecting ear 18. An elongate trigger 20 is pivotally secured to the gun body by pin 22 extending through an aperture in ear 18. At its forward end the gun body barrel 12 exhibits an integral hook 24 for convenient suspension of the gun when it is not in used. Preferably the entire gun body is made in one piece, as by casting, and is of a lightweight yet strong material such as aluminum or the like.

The lower end of handle 14 is provided with a threaded inlet port 26 adapted to be connected through suitable coupling means with a hose or the like (not shown) for supplying material to the gun. The front end of gun barrel 14 is axially bored to provide a chamber 28 for the material, and a material flow passageway 30 establishes flow communication between the inlet 26 and the chamber 28. Forwardly of the chamber 28 the barrel 12 is internally threaded for reception of an externally threaded sleeve-like adaptor 32 having a peripheral shoulder 34 abutting the front face of the barrel and an annular groove within which is seated an O-ring seal 36. The outer end of adaptor 32 is also externally threaded for engagement with an internally threaded collar 38, the latter being apertured to accept a nozzle 40 exhibiting a peripheral flange 42 held gripped between adaptor 32 and collar 38 when assembled on the gun.

Mounted in the gun is a valve assembly indicated generally by numeral 50 in FIG. 1 and shown in enlarged cross section in FIG. 2. The valve assembly comprises an elongate rod 52, a sleeve-like piston 54 and a valve guide sleeve 56. Adaptor 32 is provided with a conical seat 58 while piston 54 exhibits a complementary conical surface 60 in its forward wall 62 adapted to sealingly engage the adaptor seat. Wall 62 of piston 54 is apertured for sliding engagement of valve rod 52 therein, and a stop nut 64 threadedly engaged on the forward end of rod 52 retains the piston 54 on the rod. There is also provided a small opening 66 in the piston wall 62, the purpose for which will become apparent hereinafter.

The forward end of valve guide sleeve 56 projects axially into chamber 28 and is slidably engaged in the open rear end of piston 54, while the rear end of guide 56 is provided with a shoulder 68 seated against a counter-bore in the gun body and held in fixed position by an externally threaded packing nut 70 threadedly engaged in the rear of the gun barrel 12. Disposed in nut 70 rearwardly of guide 56 is a sealing means 72 for preventing escape of material along rod 52, the seal being retained by an adjustment screw 74 in well known fashion. Guide 56 is provided with two annular recesses shown at 76 and 78 respectively within each of which there is disposed an O-ring seal 80 preventing material leakage.

The threaded rear end of valve rod 52 is threadedly received in one leg of a U-shaped yoke 82 and retained therein by locknut 84. Bearing against the opposite leg of yoke 82 is a coil spring 86 which projects into the axial recess 88 of spring retainer member 90 shown threadedly engaged in the boss 16. A spring-guide pin 92 secured to yoke 82 projects axially into the spring 86 to maintain the latter substantially in alignment with valve rod 52. As can be seen, spring 86 yieldably biases the rod 52 forwardly of the gun barrel 12 to a normally closed valve position. Retainer 90 has a knurled end portion 94 for manual adjustment of the retainer to vary the tension of coil spring 86 against yoke 82, and thus against valve rod 52. A locknut 96 is threaded on retainer 90 abutting the rear surface of boss 16 to lock the retainer in position.

As set forth thereinabove, trigger 20 is pivotally mounted on a pin 22. Spaced downwardly along the trigger 20 is another pin or post 98 projecting laterally from the trigger and embraced between the legs of yoke 82. Preferably pin 98 is provided with a hardened bear-

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ing surface to resist wear. Referring to FIG. 1 it can be seen that upon pivotal movement of trigger 20 in a counterclockwise direction about its pivot 22, pin 98 will move in an arcuate path about point 22. It is essential to efficient valve operation that rod 52 shift rectilinearly, and without sideloads acting thereagainst, which would cause the rod to bind in the members 56, 70 and 74 within which it shifts. The engagement of pin 98 in yoke 82 permits free movement of the pin in an arcuate path while insuring that the force transmitted to the valve rod is at all times strictly axial.

With material under pressure being delivered to the gun chamber 28 through inlet passage 30, the pressure of the material acts against the rear face 100 of piston 54, urging the piston forwardly into sealing engagement with seat 58 to block material flow through outlet passage 102. Because the small opening 66 in the piston forward wall 62, atmospheric pressure is admitted to both sides thereof, with the resultant force tending to shift the piston being zero, or infinitesimal. Material pressure in chamber 28 also acts with a rearwardly directed force component against that portion of piston surface 60 within the chamber, and it can therefore be determined that the resultant force tending to urge the piston to its forward or closed position is quite small, and consequently the force that is necessary to shift the trigger and open the valve is only slightly greater than the tension of the spring 86. Thus even with the high material pressures contemplated, the gun trigger is easily actuatable by the operator, eliminating fatigue.

Even though the force required to open the valve is comparatively small, the design provides for positive shut-off, or valve closure under all conditions. In many instances the dispensing nozzles used to apply the material have a constricted outlet orifice, that is the nozzle opening is of a cross-sectional area considerably less than the area of the outlet passage 102. With viscous materials, high pressures must be utilized to force the material out through the nozzle opening. Consequently, when the trigger 20 is released and piston 54 starts moving to its closed position, an appreciable back pressure may exist in the nozzle 40 and passage 102 tending to resist forward piston movement. With conventional valves, this back pressure frequently made it necessary for the operator to forcibly close the valve by pulling the trigger 20 clockwise back to its normal position in order to seat the piston. This undesirable result has been eliminated in the present gun. When the trigger is released, spring 86 tends to shift rod 52 forwardly, and back pressure in passage 102 causes material therein to flow through aperture 66 in piston wall 62, so that the forces on opposite sides of the piston forward wall 62 are substantially equalized, due also to the pressure of material in the chamber 28 acting against rear piston face 100. Therefore the spring 86 shifts the valve closed, even though the spring is relatively light and exerts only a small force against the rod 52. Of course the spring force may be varied for different operating conditions by adjusting the spring retainer 90 as above described.

What is claimed is:

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1. A gun for dispensing fluid materials under pressure comprising a body defining a material chamber having an inlet and an outlet and a material supply passage communicatively coupled with said inlet, valve means operable in the chamber to open and close said outlet and including a reciprocable rod projecting axially into the chamber having a U-shaped yoke at the rear end thereof and a hollow balanced closure piston mounted on the rod and adapted to sealingly seat within said outlet, a guide member fixedly mounted encircling said valve rod and projecting guidably into said piston, spring means operably coupled to said valve means yieldably urging the latter to a normally closed position, and trigger means pivotally mounted on said gun body having a laterally projecting pin fixed thereto embraced by said valve rod yoke whereby pivotal movement of said trigger imparting arcuate movement to said pin produces a substantially axial force on said valve rod to shift the valve to its open position, said piston exhibiting a relatively small effective area exposed to pressure of said material in the chamber to enable actuation of said valve means opening said outlet with a minimum force exerted on said trigger.

2. A gun for dispensing fluid materials under pressure, comprising: a gun body including integral handle and barrel portions with the barrel exhibiting a material chamber having an inlet and an outlet with the outlet opening axially forwardly of said chamber, and a material supply passage in the gun body communicatively coupled with said inlet; valve means in said chamber in flow controlling communication with said outlet, said valve means including an elongate rod projecting axially into said chamber through the rear end thereof and a sleeve-like piston slidably mounted on the rod having a transverse forward wall adapted to sealingly engage said outlet, said rod exhibiting a stop at its forward extremity retaining said piston; a valve rod and piston guide member fixedly mounted extending axially into said chamber through the rear wall thereof slidably encircling said valve rod and projecting sealingly through the rear end of said piston; a coil spring encircling the valve rod and bearing thereagainst biasing the valve to its position closing said outlet; and trigger means pivotally mounted on the gun body and having a pin projecting laterally therefrom and the valve rod having a U-shaped yoke portion with the legs of the yoke embracing said trigger pin whereby arcuate movement of the pin is translated into rectilinear movement of the valve rod; said piston provided with a material inlet aperture in its transverse forward wall to equalize material pressure on opposite sides of said wall when the chamber outlet is open.

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