United States Patent [19]

Malec

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[54] **AIRLESS SPRAY GUN**

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[52] **U.S. Cl.** **239/526,** 239/583, 251/98, 251/111

[51] **Int. Cl.** **B05b 1/30**

[58] **Field of Search** 251/111, 98; 239/526-528, 412, 583, 414

[56] **References Cited**

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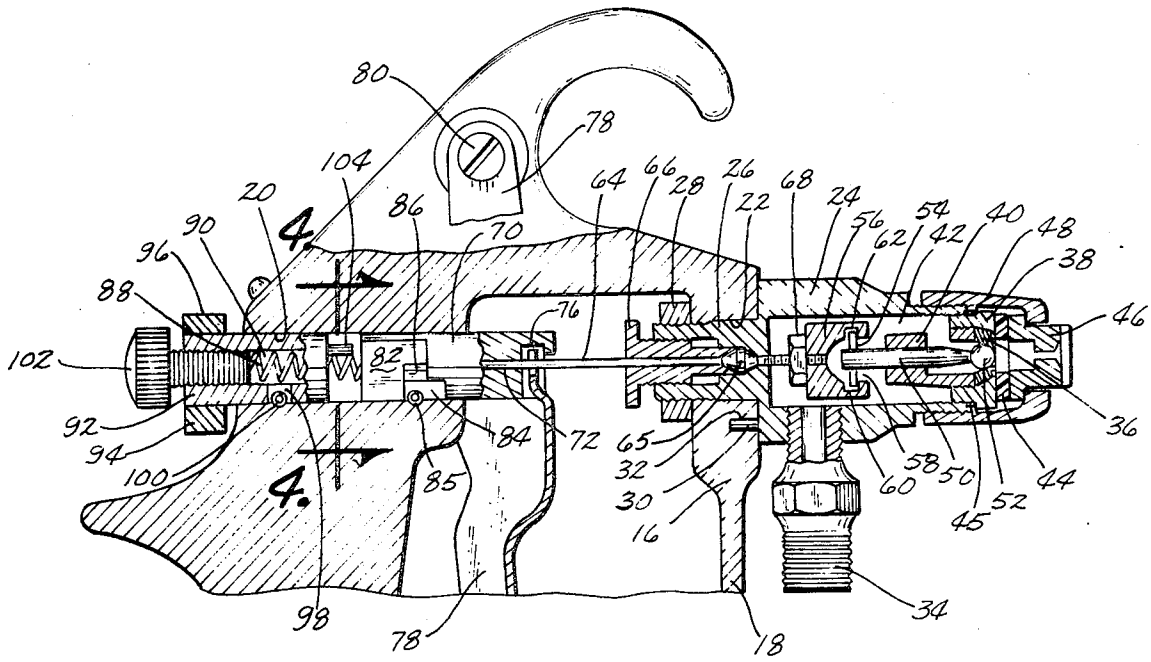
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Assistant Examiner—John J. Love
Attorney—Zarley, McKee & Thomte

[57] **ABSTRACT**

An airless spray gun is disclosed herein which has a substantially reduced number of component parts. The gun includes a trigger locking assembly for preventing the actuation of the spray gun as desired. The airless spray gun also includes a novel valve rod and means for detachably mounting the same in the gun which permits rapid assembly and disassembly of the gun. An improved valve seat is also disclosed which substantially reduces the cost of manufacturing the same.

6 Claims, 8 Drawing Figures



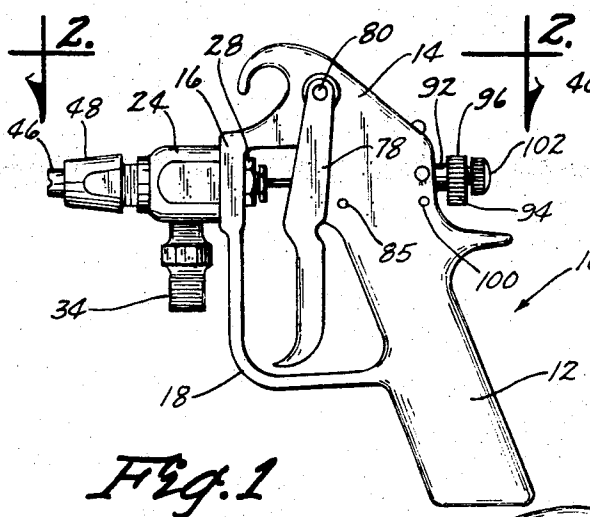


Fig. 1

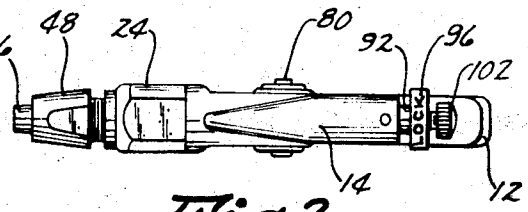


Fig. 2

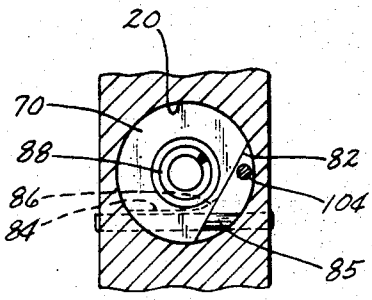


Fig. 4

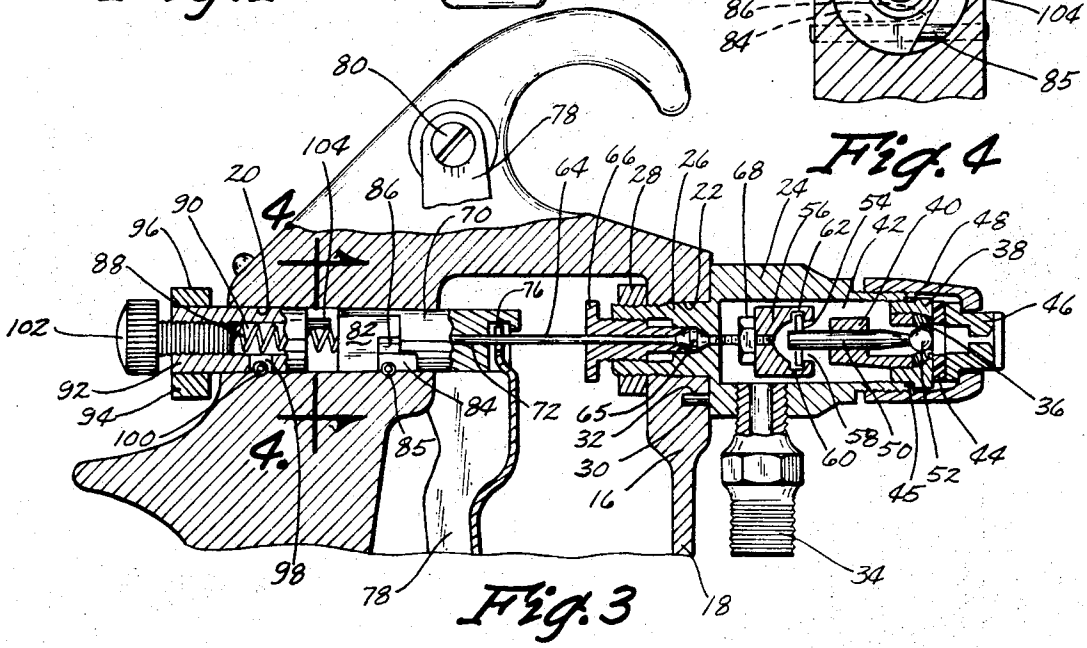


Fig. 3

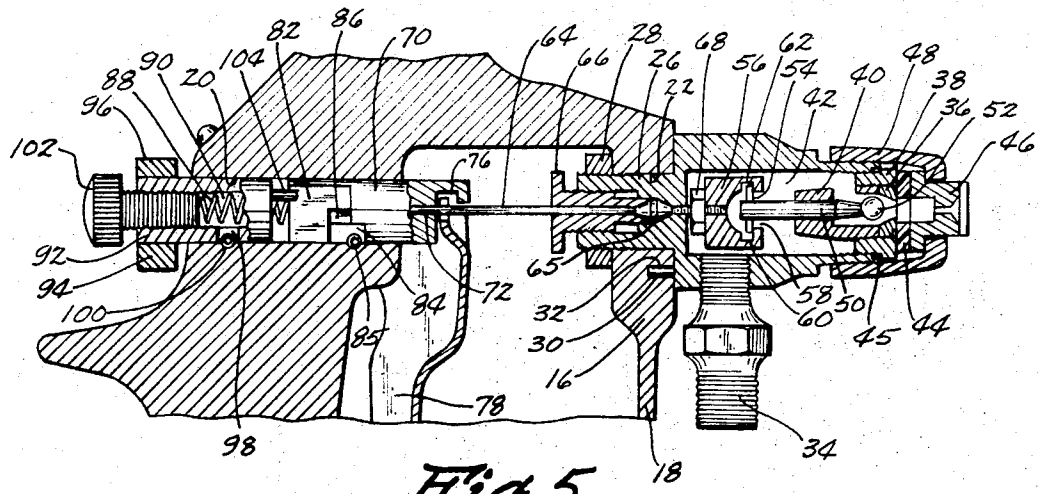


Fig. 5

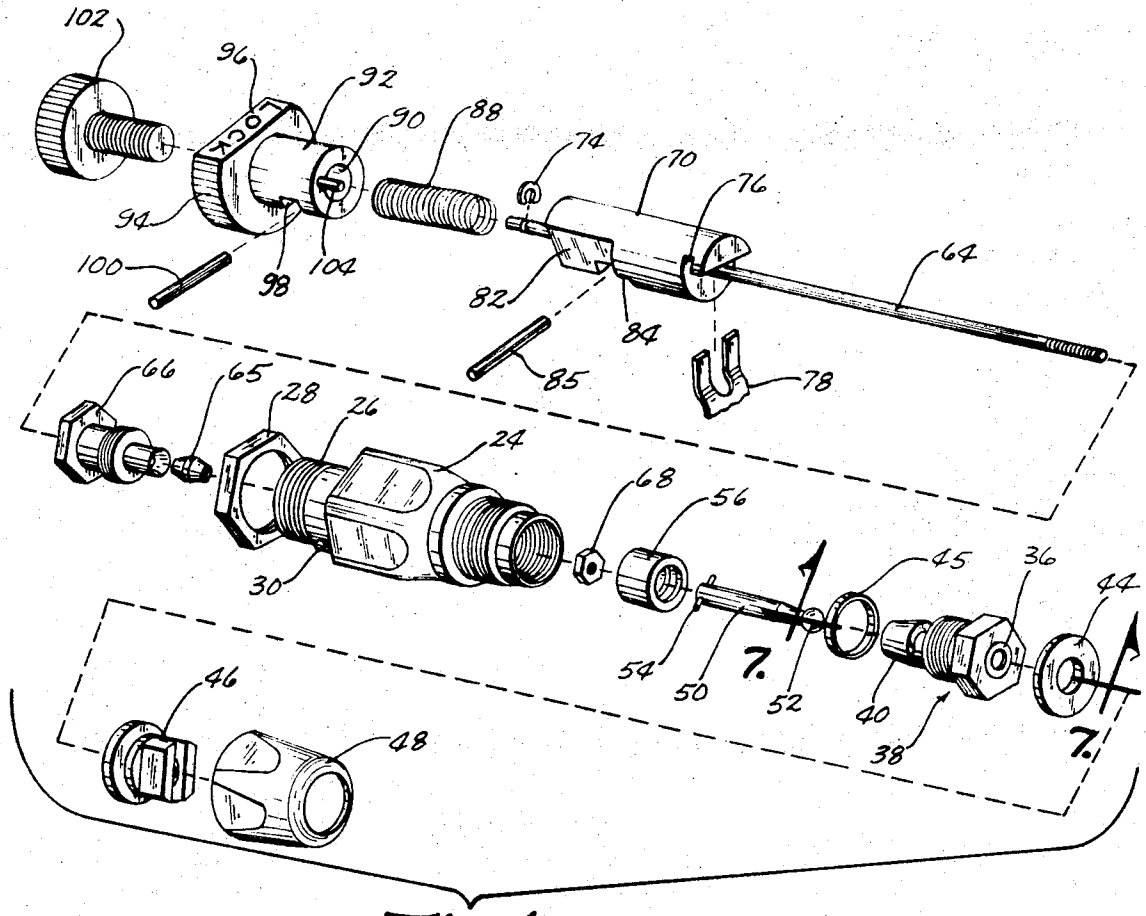


Fig. 6

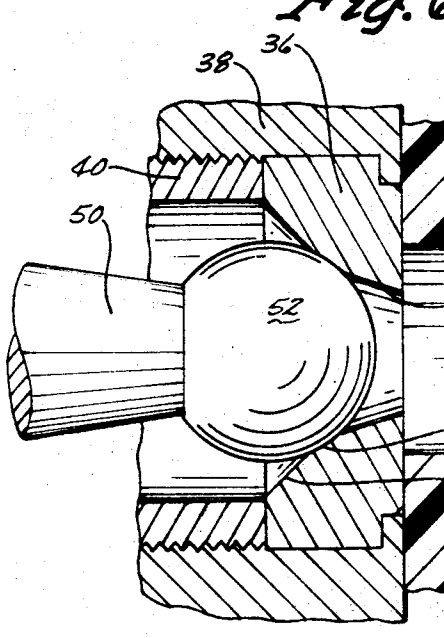


Fig. 7

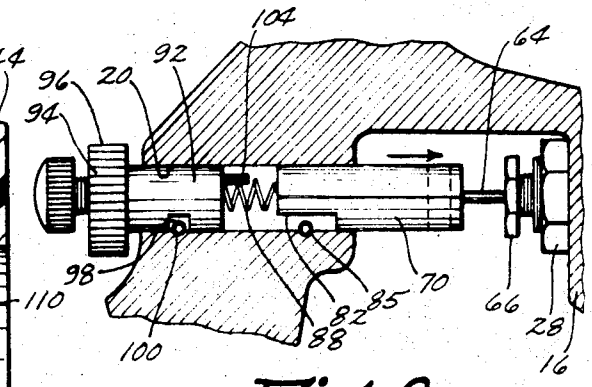


Fig. 8

AIRLESS SPRAY GUN

Conventional airless spray guns have an extremely large number of component parts which greatly adds to the cost of manufacturing the same. Conventional airless spray guns are not easily assembled and disassembled due to the means for mounting the valve rods in the gun. The assembly and disassembly of the conventional airless spray guns is also difficult and time consuming due to the construction of the trigger locking assemblies. The present means for manufacturing the valve seats of the conventional airless spray guns is also time consuming and expensive.

Therefore, it is a principal object of this invention to provide an improved airless spray gun.

A further object of this invention is to provide an airless spray gun having a substantially reduced number of component parts.

A further object of this invention is to provide an airless spray gun which is easily manufactured.

A further object of this invention is to provide an airless spray gun including novel means for mounting the valve rod therein.

A further object of this invention is to provide an airless spray gun which is quickly and easily assembled and disassembled.

A further object of this invention is to provide an airless spray gun having a novel valve seat provided therein.

A further object of this invention is to provide an airless spray gun which is efficient in operation, durable in use and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a side view of the gun of this invention.

FIG. 2 is a top view of the gun as seen along lines 2—2 of FIG. 1.

FIG. 3 is a partial sectional view of the gun.

FIG. 4 is an enlarged sectional view as seen along lines 4—4 of FIG. 3.

FIG. 5 is a sectional view similar to FIG. 3 except that the trigger is shown in its depressed position.

FIG. 6 is an exploded perspective view of the nozzle assembly, manifold assembly and trigger locking assembly.

FIG. 7 is an enlarged sectional view as seen along lines 7—7 of FIG. 6; and

FIG. 8 is a side view of the trigger sleeve as it would appear after being rotated to permit its removal from the gun.

The airless spray gun of this invention is referred to generally by the reference numeral **10** and includes a handle **12** which extends downwardly from gun body **14.** For purposes of description, the numeral **16** designates a wall member which extends downwardly from the forward end of body **14** and thence defines a trigger guard **18.** Bore **20** extends through body **14** and is aligned with a bore **22** extending through wall member **16.** The bores **20** and **22** may be drilled in the gun in one operation due to their aligned relationship and due to the fact that they have the same diameters which substantially reduces the cost of manufacturing the gun.

Manifold **24** has a cylindrical portion **26** which is received by the bore **22** as seen in FIG. **3** and which is maintained therein by means of manifold retainer nut **28** threadably secured to the rearward end thereof. Manifold **24** is prevented from rotational movement with respect to the gun body by means of manifold pin **30** extending rearwardly from the manifold **24** into the bore **32** formed in wall member **16.** Manifold connector **34** extends downwardly from manifold **24** for connection to a source of spray material.

The numeral **36** refers to a carbide valve seat positioned in valve tip **38** and maintained therein by valve sleeve **40** which is threadably received by valve tip **38** as illustrated in FIG. **3.** Valve tip **38** is threadably received by the forward end of manifold **24** so that valve sleeve **40** is positioned in bore **42** of manifold **24.** A nylon valve seal **44** is positioned forwardly of tip **38** with spray nozzle **46** being positioned forwardly of seal **44.** Valve gasket **45** is positioned between the forward end of manifold **24** and the head of the valve tip **38.** Nozzle **46** and seal **44** are maintained in position by the spray nozzle retainer **48** which is threadably mounted on manifold **42** as seen in FIG. **3.**

Valve rod **50** is longitudinally movably received by valve sleeve **40** and has a valve ball **52** mounted on the forward end thereof adapted to seat upon the valve seat **36.** Valve rod **50** has a transversely extending valve pin **54** at its forward end which is detachably received by connecting rod connector **56.** Connector **56** is provided with a circular bore **58** extending inwardly thereinto from its forward end. A pair of oppositely disposed grooves **60** and **62** are formed in connector **56** which communicate with bore **58** as seen in the drawings. The grooves **60** and **62** are adapted to removably receive the opposite ends of the valve pin **54** so that longitudinal movement of connector **56** will cause longitudinal movement of rod **50.**

Connector rod **64** is threadably secured to the rearward end of connector **56** and extends rearwardly therefrom through a Teflon packing **65** and through a manifold packing nut **66** threadably mounted in manifold **24.** Lock nut **68** prevents rod **64** from becoming accidentally disconnected from connector **56.**

Trigger sleeve **70** is slidably mounted in bore **20** and has a bore **72** extending therethrough which receives the connecting rod **64.** The rearward end of bore **72** is provided with an enlarged diameter portion to receive the snap-ring **74** which is detachably secured to the rod **64.** Thus, rearward movement of sleeve **70** causes rod **64** and the components secured thereto to be moved rearwardly. Sleeve **70** has a vertical groove **76** at its forward end which is adapted to receive the upper end of trigger **78.** Trigger **78** is pivoted at its upper end by means of trigger screw **80.**

Sleeve **70** is provided with a milled "flat" **82** which extends forwardly from the rearward end thereof. Sleeve **70** is also provided with a channel **84** which is formed therein forwardly of the rearward end thereof and which extends transversely with respect to the longitudinal axis of the sleeve and which communicates with the forward end of the "flat" **82.** A "flat" **86** is formed at the intersection of "flat" **82** and channel **84.** Locating pin **85** extends through the body **14** and through the channel **84** of sleeve **70** to limit the rear-

ward and forward movement of the sleeve and to maintain the sleeve 70 within the bore 20.

The forward end of trigger spring 88 is received in the rearward end of the enlarged diameter portion of the bore 72. The rearward end of spring 88 is received by bore 90 in sleeve lock 92. Sleeve lock 92 has a channel 98 formed therein which is transversely disposed with respect to the longitudinal axis thereof which is adapted to receive the locator pin 100 extending through body 14. Channel 98 has a sufficient vertical height to permit the sleeve lock 92 to be selectively sufficiently rotated to permit the locking of the trigger as will be explained hereinafter.

Tension cap 102 is adjustably threadably mounted in sleeve lock 92 as seen in FIG. 3 to permit the selective tension adjustment of spring 88 since the forward end of cap 102 engages the rearward end of the spring 88. Lock pin 104 extends forwardly from the forward end of sleeve lock 92 and terminates rearwardly of the rearward end of trigger sleeve 70 when the trigger is in its normal position (FIG. 3).

The normal method of operation is as follows. Assuming that the gun is in its assembled condition and that the trigger is in its normal position as illustrated in FIG. 3, the spray fluid will not bypass the valve ball 52 since the spring 88 urges the valve ball 52 into seating engagement with the valve seat 36. It can be seen that the rearward ends of the grooves 60 and 62 bear against the rearward ends of the valve pin 54 to urge the valve rod 50 towards the valve seat 36. With the lock knob 94 in its unlocked position as seen in FIGS. 3 and 5, pivotal movement of the trigger 78 causes the trigger sleeve 70 to be slidably moved rearwardly in the bore 20. Rearward slidable movement of the trigger sleeve 70 causes the connecting rod 64 to pull the valve rod 50 rearwardly from the valve seat 36. Rearward slidable movement of the trigger sleeve 70 is permitted since the lock pin 104 will be received by the "flat" 82. The trigger may be locked by simply rotated the lock knob 94 which causes the sleeve lock 92 to be rotated. Rotation of the sleeve lock 92 to its locked position causes the lock pin 104 to be moved with respect to the "flat" 82 so that the lock pin 104 will be closely adjacent the rearward end of the trigger sleeve 70. When the lock knob is in its locked position, the pin 104 prevents the trigger sleeve 70 from slidably moving rearwardly since the pin 104 will no longer be received by the "flat" 82 but will engage the rearward end of the trigger sleeve 70.

The construction of the gun permits the valve rod 50 to be removed therefrom without disassembling the entire gun as is the case with most conventional guns. The valve rod 50 is removed by simply removing the spray nozzle retainer 48 and the valve seal 44 from the forward end of the manifold. The valve tip 38 is then threadably removed from the manifold 24 which exposes the forward end of the valve rod 50. The valve rod 50 is then grasped and pivoted or moved with respect to the connecting rod connector 56 so that one of the pins of the valve pin 54 can be disengaged from its respective groove which then permits the valve rod 50 to be removed from the connecting rod connector 56. The relationship of the diameters of the valve rod 50, opening 58 and the width of the grooves 60 and 62 is such that the valve rod 50 may be sufficiently pivoted or moved to cause the disengagement of the valve pin elements from the grooves 60 and 62. Thus, the value rod 50 can be removed from the manifold without removing the connecting rod connector 56 or any of the components rearwardly thereof.

If it is desired to further disassemble the gun, the manifold packing nut 66 and the manifold retainer nut 28 are also removed from the rearward end of the manifold 24. The trigger screw 80 is then removed to permit the trigger to be moved downwardly so that the trigger may be disengaged from the vertical groove 76 of trigger sleeve 70. The trigger sleeve 70 is then manually rotated with respect to the locating pin 85 so that the trigger sleeve 70 may be removed from the bore 20 in a forwardly direction therefrom. This is made possible by the "flat" 86 which permits the rotation of the sleeve 70 so that the "flat" 82 will be positioned over the locating pin 85. When the "flat" 82 is so located, the sleeve 70 may be slidably moved forwardly from the bore 20 without removing the locator pin 85. The snap ring 74 may then be removed from the connecting rod 64 which permits substantially complete disassembly of the gun. The lock mechanism may be removed from the gun by removing the locator pin 100.

FIG. 7 illustrates the configuration of the valve seat 36 in somewhat greater detail. The seat 36 is formed by casting the same from carbide. The opening 110 would be formed during the casting and would have the angularly disposed surfaces 112 and 113. The opening 110 is then ground and lapped at the intersection of the surfaces 112 and 113 so that a surface 114 is formed which is tangent to valve ball 52. It is easier to grind a tangent on the carbide where the two surfaces 112 and 113 intersect then to grind an entire single angle cone. The intersection of the surfaces 112 and 113 requires very little grinding and lapping as compared to a normal seat of a single angle which must be ground over its entire internal surface and substantially reduces grinding and overlapping time.

I claim:

1. An airless spray gun comprising,

a gun body,

a valve means on said gun body for controlling the flow of spray fluid,

a trigger pivotally secured to said gun body and being operatively connected to said valve means for controlling said valve means, said trigger being movable from a first position wherein said valve means is closed to a second position wherein said valve means is open,

and a lock means on said gun body, said lock means comprising a first member operatively connected to said trigger for movement therewith and being slidably mounted in said gun body, a second member rotatably mounted in said gun body having one end thereof adjacent one end of said first member, said second member being fixed against axial movement, and cooperating means on the adjacent ends of said first and second members which permits said first member to be slidably moved so that said trigger can be moved to its second position when said second member has been rotated to a first predetermined position with respect to said gun body and said first member, said cooperating means preventing the slidable movement of said first member to prevent the movement of said trigger to said second position when said second member has been rotated to a second predetermined position,

said cooperating means comprising a stop element extending from said one end of said second member towards said one end of said first member, said first member having a portion of its said one end cut-away so that said stop element may be received thereby when said second element has been rotated to its said first position,

said stop element being an elongated pin means which is adapted to engage the said one end of said first member to limit the slidable movement of said first member towards said second member when said second member is in said second position.

2. An airless spray gun comprising,

a gun body,

a valve means on said gun body for controlling the flow of spray fluid,

a trigger pivotally secured to said gun body and being operatively connected to said valve means for controlling said valve means, said trigger being movable from a first position wherein said valve means is closed to a second position wherein said valve means is open,

and a lock means on said gun body, said lock means comprising a first member operatively connected to said trigger for movement therewith and being slidably mounted in said gun body, a second member rotatably mounted in said gun body having one end thereof adjacent one end of said first member, said second member being fixed against axial movement, and cooperating means on the adjacent ends of said first and second members which permits said first member to be slidably moved so that said trigger can be moved to its second position when said second member has been rotated to a first predetermined position with respect to said gun body and said first member, said cooperating means preventing the slidable movement of said first member to prevent the movement of said trigger to said second position when said second member has been rotated to a second predetermined position,

said cooperating means comprising a stop element extending from said one end of said second member towards said one end of said first member, said first member having a portion of its said one end cut-away so that said stop element may be received thereby when said second element has been rotated to its said first position,

said first member being a substantially cylindrical shaped member having a top and a bottom, and opposite sides, said cut-away portion extending forwardly into said one end of said first member, said first member having a substantially inverted U-shaped channel formed therein intermediate its length extending upwardly thereinto from said bottom, a locating pin means extending through said gun body and through said U-shaped channel to limit the longitudinal movement of said first member, said U-shaped channel communicating with said cut-away portion so that said first member may be selectively rotated a predetermined amount to permit said first member to be slidably moved forwardly, for removal from the gun body, without removing said locating pin from said gun body.

3. The airless spray gun of claim **2** wherein the intersection of said cut-away portion and said channel is "flat" to permit the said rotation of said first member.

4. An airless spray gun comprising,

a gun body,

a valve means on said gun body for controlling the flow of spray fluid,

valve trigger pivotally secured to said gun body and being operatively connected to said valve means for controlling said vlave means, said trigger being movable from a first position wherein said valve means is closed to a second position wherein said valve means is open,

and a lock means on said gun body, said lock means comprising a first member operatively connected to said trigger for movement therewith and being slidably mounted in said gun body, a second member rotatably mounted in said gun body having one end thereof adjacent one end of said first member, said second member being fixed against axial movement, and cooperating means on the adjacent ends of said first and second members which permits said first member to be slidably moved so that said trigger can be moved to its second position when said second member has been rotated to a first predetermined position with respect to said gun body and said first member, said cooperating means preventing the slidable movement of said first member to prevent the movement of said trigger to said second position when said second member has been rotated to a second predetermined position,

a tensioning spring extending between said first and second members which yieldably urges said trigger to its said first position.

5. The airless spray gun of claim **4** wherein said second member has a rearward end and wherein a tension cap means threadably extends into the rearward end of said second member for engagement with one end of said tensioning spring to permit the selective tensioning of said spring.

6. An airless spray gun comprising,

a gun body,

a valve means on said gun body for controlling the flow of spray fluid,

a trigger pivotally secured to said gun body and being operatively connected to said valve means for controlling said valve means, said trigger being movable from a first position wherein said valve means is closed to a second position wherein said valve means is open,

and a lock means on said gun body, said lock means comprising a first member operatively connected to said trigger for movement therewith and being slidably mounted in said gun body, a second member rotatably mounted in said gun body having one end thereof adjacent one end of said first member, said second member being fixed against axial movement, and cooperating means on the adjacent ends of said first and second members which permits said first member to be slidably moved so that said trigger can be moved to its second position when said second member has been rotated to a first predetermined position with respect to said gun body and said first member, said cooperating means preventing the slidable movement of said first member to prevent the movement of said trigger to said second position when said second member has been rotated to a second predetermined position,

first and second aligned bores formed therein, said lock means being positioned in said first bore, said valve means being mounted in a manifold means having one end thereof positioned in said second bore, said trigger being positioned between said first and second bores.

* * * * *