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(54) **PAINT SPRAY GUN**

FARBSPRITZPISTOLE

PISTOLET DE PULVÉRISATION DE PEINTURE

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(73) Proprietor: **Wang, Hsing-Tzu**

Taichung City 40344 (TW)

(72) Inventor: **Wang, Hsing-Tzu**

Taichung City 40344 (TW)

(74) Representative: **Cohausz & Florack**

Patent- & Rechtsanwälte
Partnerschaftsgesellschaft mbB
Bleichstraße 14
40211 Düsseldorf (DE)

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Description

[0001] The disclosure relates to a spray gun, and more particularly to a paint spray gun.

[0002] A spray gun of prior art comprising a valve for compressed air and a needle valve for the control of the liquid to be sprayed, both valves being under the control of a single operating member, is for example disclosed in patent document GB 290 438.

[0003] Figures 1 and 2 illustrate a conventional paint spray gun, which includes a gun body 1, a nozzle 2 disposed on a front end of the gun body 1, a needle member 3 movably disposed in the gun body 1 and extending through the nozzle 2, an air valve assembly 4 disposed in the gun body 1 for providing high air pressure input, a paint cup 5 attached to the gun body 1, and a trigger 6 pivotally connected to the gun body 1. The gun body 1 has a main body 101, a valve tube 102 welded to the main body 101 in connection with the air valve assembly member 4, an air passageway member 103 welded between the main body 101 and the valve tube 102, a feed tube 104 welded to the main body 101, and a trigger connection member 105 welded to the main body 101. A bottom side of the main body 101 has an air feed hole 106. A front side of the valve tube 102 has an air valve hole 107. The air passageway member 103 is hollow and has a communication space 108 communicating with the air feed hole 106 and the air valve hole 107. The air valve assembly member 4 is connected to the valve tube 102. The trigger 6 is pivotally connected to the trigger connection member 105. The paint cup 5 is connected to the feed tube 104.

[0004] When the needle member 3 is actuated by the trigger 6 to open the nozzle 2 such that the air valve assembly member 4 is transitioned from a close state to an open state, high pressure air enters a front inner space of the main body 101 through the air valve assembly member 4, the air valve hole 107, the communication space 108 and the air feed hole 106. When the high pressure air is sprayed out of the nozzle 2, negative pressure around the nozzle 2 produces a suction force that draws paint from the paint cup 5 and atomizes it through the nozzle 2 onto an object (not shown) for being painted.

[0005] However, the conventional paint spray gun may encounter the following disadvantages during use or manufacture:

1. Because the main body 101, the valve tube 102, the air passageway member 103, the feed tube 104 and the trigger connection member 105 are welded together for forming the gun body 1, it is required to perform multiple welding steps which are troublesome and increase manufacture costs. In case of faulty welding operation, it can affect the appearance and quality of painted products.

2. If the valve tube 102 and the main body 101 are poorly welded to each other, or if the air passageway member 103, the main body 101 and the valve 102

are poorly welded together, poor welded joints can tend to leak. High pressure air input from the air valve assembly member 4 around the nozzle 2 can be unstable or insufficient, and the paint can be unevenly or insufficiently atomized. Uneven atomization can affect aesthetic appearance and integrity of painted products. In addition, leakage at poor weld joints can impose extra load on an air compressor (not shown) and waste energy.

3. If the feed tube 104 and the main body 101 is poorly welded to each other, paint may leak from poor weld joint of the feed tube 104 and the main body 101. In addition, external air can be mixed with the paint through the poor weld joint and form air bubbles therein. During a paint spraying operation, paint can be intermittently atomized, causing rough or incomplete atomization of the paint, which adversely affect aesthetic appearance of the painted products.

4. Generally, the gun body 1 is welded by using silver. Therefore, the gun body 1 has to be made from copper. Because an aluminum alloy cannot be used for manufacturing the gun body 1, the weight of the gun body is unable to be reduced.

[0006] Therefore, an object of the disclosure is to provide a paint spray gun that can alleviate at least one of the drawbacks of the prior art.

[0007] According to the invention, a paint spray gun according to claim 1 includes a gun unit, a spray unit, an air valve unit and an operation unit. Details of the components of this paint spray gun are recited in claim 1.

[0008] Other features and advantages of the disclosure will become apparent in the following detailed description of the embodiment with reference to the accompanying drawings, of which:

Figure 1 illustrates a conventional paint spray gun; Figure 2 is a partly exploded perspective view of the conventional paint spray gun;

Figure 3 is a perspective view illustrating an embodiment of a paint spray gun according to the invention; Figure 4 is an exploded perspective view of the embodiment;

Figure 5 is a perspective view of a gun body of the embodiment;

Figure 6 is a sectional view of the embodiment with a spray unit at a non-delivery position, an air valve unit at a close state, and a slide member at an initial position;

Figure 7 is an enlarged view of a region of the sectional view shown in Figure 6;

Figure 8 is an enlarged view of another region of the sectional view shown in Figure 6;

Figure 9 is a sectional view of the embodiment illustrating the spray unit at a non-delivery position, the air valve unit at an open state, and the slide member at a first operating position;

Figure 10 is a sectional view of the embodiment illustrating the spray unit at a delivery position, the air valve unit at the open state, and the slide member at a second operating position; and

Figure 11 is an enlarged fragmentary view of the sectional view shown in Figure 10.

Figures 3 to 4 illustrate an embodiment of a paint spray gun 100 according to the disclosure. The paint spray gun 100 includes a gun unit 10, a spray unit 20, an air valve unit 30, an operation unit 40 and a paint cup 70.

[0009] The gun unit 10 includes a gun body 11, a spray cap 12, a spring cap 121, a stop member 122, a tail cap 123, a needle cap 124 and a nozzle 13.

[0010] As shown in Figure 5, the gun body 11 is formed as a unitary one piece structure composed of a tubular body portion 14, a valve connection portion 15, an air passageway portion 16, a feed connection portion 17 and a trigger connection portion 18.

[0011] As shown in Figures 6 to 8, the spray cap 12 is removably disposed in a tubular front end of the tubular body portion 14 and has a cap opening 146. The tubular body portion 14 has an air chamber 141 that is disposed inside the tubular front end and covered by the spray cap 12 and that communicates with the cap opening 146, a feed passage 142 connected to a rear end of the air chamber 141, a feed tube 147 disposed in the air chamber 141 and the feed passage 142, a needle operating space 143 disposed rearwardly of the feed passage 142 and opening at a tubular rear end of the tubular body portion 14, and a gasket receiving passage 144 disposed between the feed passage 142 and the needle operating space 143. In this embodiment, a rear end of the feed tube 147 fluidly communicates the feed passage 142. The feed tube 147 fluidly disconnects the air chamber 141.

[0012] The valve connection portion 15 is integrally formed with and extends downwardly from a bottom side of the tubular body portion 14. The valve connection portion 15 has a valve connecting hole 151. In addition, the tubular body portion 14 further has a valve shaft passage 145 disposed between the needle operating space 143 and the valve connecting hole 151 of the valve connection portion 15, and a middle hole 148 disposed between the valve shaft passage 145 and the valve connecting hole 151. The middle hole 148 has a cross section larger than the valve shaft passage 145 and smaller than the valve connecting hole 151.

[0013] The air passageway portion 16 is integrally formed with and extends downwardly from the bottom side of the tubular body portion 14 and connects the valve connection portion 15, and has an air passageway 161 in fluid communication with the valve connecting hole 151 and the air chamber 141.

[0014] The feed connection portion 17 is integrally formed with and extends upwardly from the top side of the tubular body portion 14, and has a feed inlet hole 171

in communication with the feed passage 142.

[0015] The trigger connection portion 18 is integrally formed with and extends upwardly from the top side of the tubular body portion 14.

[0016] In this embodiment, the spring cap 121 is disposed in the tubular rear end of the tubular body portion 14 and extends into the needle operating space 143. The stop member 122 is disposed in the needle operating space 143 in front of the spring cap 121. The tail cap 123 is connected to the tubular rear end of the tubular body portion 14 and covers the spring cap 121. The needle cap 124 is removably connected to a front end of the spray cap 12.

[0017] The nozzle 13 is received in the spray cap 12 and a front end of the feed tube 147, and has a nozzle tip 131 extending into the cap opening 146. By virtue of the feed tube 147 disposed in the air chamber 141 and the feed passage 142, the nozzle 13 fluidly communicates the feed passage 142 and fluidly disconnects the air chamber 141. In this embodiment, the nozzle 13 further has a nozzle rear end that is opposite to the nozzle tip 131 and that fluidly connects a front end of the feed tube 147.

[0018] The spray unit 20 includes a spray needle 21, a needle sleeve 22 and a first resilient member 23. The spray needle 21 extends in the feed passage 142, the feed tube 147 and the nozzle tip 131. The needle sleeve 22 is sleeved on the spray needle 21, is movably disposed in the needle operating space 143, and extends rearwardly and outwardly of the spring cap 121. The first resilient member 23 is disposed in the spring cap 121 and around the spray needle 21, and abuts the needle sleeve 22.

[0019] The spray needle 21 is movable axially within the tubular body portion 14 between a non-delivery position (see Figures 6 and 7), where the spray needle 21 closes the nozzle tip 131, and a delivery position (see Figures 10 and 11), where the spray needle 21 opens the nozzle tip 131.

[0020] The first resilient member 23 provides a pushing force to move forwardly the needle sleeve 22, which brings the spray needle 21 to the non-delivery position. In this embodiment, the first resilient member 23 is a compression spring.

[0021] The air valve unit 30 includes a valve housing 31, a valve shaft 32, a stopper seal ring 33 and a valve spring 34. The valve housing 31 is connected to and inserted into the valve connecting hole 151 of the valve connection portion 15, and has an air supply valve passage 311. The valve shaft 32 extends movably through the air supply valve passage 311 of the valve housing 31 into the needle operating space 143 of the tubular body portion 14. The stopper seal ring 33 is sleeved around said valve shaft 32. The valve spring 34 is disposed in the air supply valve passage 311, and abuts the valve housing 31 and the valve shaft 32 to urge the valve shaft 32 to move into the needle operating space 143. In this embodiment, the valve housing 31 further has a valve

seat 36 formed around the valve shaft 32. The valve shaft 32 has a generally conical stopper portion 320 proximal to the valve seat 36. The stopper seal ring 33 is sleeved on the stopper portion 320.

[0022] The air valve unit 30 is transitionable between a closing state (see Figure 8) where the air valve unit 30 has no fluid communication with the valve connecting hole 151, and an opening state (see Figure 9) where the air valve unit 30 is in communication with the valve connecting hole 151. As shown in Figure 8, when the air valve unit 30 is in the closing state, the stopper seal ring 33 is seated on the valve seat 36, thereby interrupting an air flow passing through the air supply valve passage 311. As shown in Figure 9, when the air valve unit 30 is in the opening state, the stopper seal ring 33 moves away from the valve seat 36 and does not interrupt the air flow passing through the air supply valve passage 311.

[0023] As shown in Figures 4 and 8, the operation unit 40 is disposed on the gun body 11. The operation unit 40 includes a slide member 41, a trigger 42 and a second resilient member 43. The slide member 41 is sleeved around the spray needle 21 forwardly of the needle sleeve 22 and is slidable within the needle operating space 143. The trigger 42 is pivotally connected to the trigger connection portion 18 and is engageable with the slide member 41. The second resilient member 43 is disposed in abutment between the slide member 41 and the stop member 122. In addition, the slide member 41 has a valve-actuating push surface 411 and a rear push surface 412. The valve-actuating push surface 411 is in contact with an end of the valve shaft 32 and extends into the needle operating space 143. The rear push surface 412 faces the needle sleeve 22. The second resilient member 43 is a compression spring.

[0024] The slide member 41 is actuated by the trigger 42 to move to an initial position (see Figure 6), a first operating position (see Figure 9), or a second operating position (see Figure 10). The second resilient member 43 urges the slide member 41 to return to the initial position.

[0025] As shown in Figures 6 and 8, when the slide member 41 is at the initial position, the rear push surface 412 is spaced apart from the needle sleeve 22, the valve-actuating push surface 411 contacts with but does not push the valve shaft 32, the spray needle 21 is at the non-delivery position, and the air valve unit 30 is in the closing state.

[0026] As shown in Figure 9, when the slide member 41 is at the first operating position, the rear push surface 412 contacts with but does not push the needle sleeve 22, the spray needle 21 is at the non-delivery position, and the valve-actuating push surface 411 presses the valve shaft 32 such that the air valve unit 30 transitions from the closing state (see Figure 8) to the opening state (see Figure 9).

[0027] As shown in Figure 10 and 11, when the slide member 41 is at the second operating position, the valve-actuating push surface 411 presses the valve shaft 32

such that the air valve unit 30 is in the fully opening state, and the rear push surface 412 pushes the needle sleeve 22 to move the spray needle 21 from the non-delivery position (see Figure 6) to the delivery position (see Figure 10).

[0028] As shown in Figures 6 and 7, the gun unit 10 further includes a feed passage gasket 51 and a limiting ring 52. The feed passage gasket 51 is disposed within the gasket receiving passage 144 to seal the feed passage 142 from the needle operating space 143. The limit ring 52 is threadedly secured within the gasket receiving space 144 to position the feed passage gasket 51. The spray needle 21 extends through the limit ring 52 and the feed passage gasket 51 into the feed passage 142. The feed passage gasket 51 is a Teflon gasket and prevents external air from being drawn into the feed passage 142 and being mixed with a paint material fed into the feed passage 142. In addition, the feed passage gasket 51 prevents the paint material in the feed passage 142 from flowing into the needle operating space 143.

[0029] As shown in Figure 6, the paint cup 70 is removably connected to the feed inlet hole 171 of the paint connection portion 17 in communication with the feed passage 142.

[0030] As shown in Figure 8, the air valve unit 30 further includes a valve gasket 61, a packing plate 62 and a compression spring 63. The valve gasket 61 is disposed within the middle hole 148.

[0031] The packing plate 62 is disposed within the valve connecting hole 151 and abuts the valve gasket 61. The compression spring 63 is disposed in the valve connecting hole 151 and abuts the packing plate 62 and the valve housing 31. The valve shaft 32 extends through the compression spring 63, the packing plate 62, the valve gasket 61 and the valve shaft hole 145 from the air supply valve passage 311 into the needle operating space 143. In this embodiment, the valve gasket 61 prevents high pressure air input by the air valve unit 30 into the valve connecting hole 151 from flowing into the needle operating space 143 through the valve shaft passage 145. This ensures that the high pressure air sprayed out of the cap opening 146 has sufficient pressure (see Figure 7).

[0032] When the slide member 41 is actuated by the trigger 42 to move from the initial position (see Figure 6) to the first operation position (see Figure 9), the air valve unit 30 transitions to the opening state by the valve-actuating push surface 411 that pushes the valve shaft 32. Therefore, high pressure air input from an air pressure source, e.g. an air compressor (not shown), into the air supply valve passage 311 enters the air chamber 141 through the valve connecting hole 151 and the air passageway 161, flows externally around the nozzle 13, and is sprayed out of the cap opening 146 to remove dust on an object (not shown) for being painted. Because the spray needle 21 is at the non-delivery position, it prevents paint from being sprayed out of the nozzle tip 131.

[0033] When the slide member 41 is actuated by the

trigger 42 to move from the first operation position (see Figure 9) to the second operation position (see Figures 10 and 11), not only does the valve-actuating push surface 411 press the valve shaft 32 to place the air valve unit 30 in the fully opening state, but the rear push surface 412 pushes the needle sleeve 22 to move the spray needle 21 to the delivery position such that the spray needle 21 opens the nozzle tip 131. Because the high pressure air is sprayed out of the cap opening 146, pressure drops around the nozzle 13, and the paint in the paint cup 70 is drawn into the nozzle 13 through the feed passage 142 and is atomized from the nozzle tip 131 onto the object to be painted.

[0034] The paint spray gun 100 has the following advantages:

1. The gun body 11 is formed as a unitary one piece structure which may be made by forging and injection molding, followed by subsequent processes for forming internal spaces and passages. Compared with the prior art, because the gun body 11 does not require any welding operations, it can be easily manufactured to reduce manufacture costs, and also possesses good appearance.

2. Compared with the prior art, because the valve connection portion 15 is integrally formed with the tubular body portion 14, and because the air passageway portion 16 is integrally formed with the tubular body portion 14 and the valve connection portion 15, when the high pressure air is delivered to the air chamber 141 from the valve connecting hole 151 through the air passageway 161, leakage of high pressure air can be avoided. Therefore, the high pressure air input from the air valve unit 30 is ensured to be stable and sufficient around the nozzle 13, and the paint can be uniformly and sufficiently atomized for effectively enhancing aesthetic appearance and integrity of painted products. In addition, the gun body 11 prevents air leakages and avoids extra load on the air compressor to save energy.

3. Because the feed connection portion 17 is integrally formed with the tubular body portion 14, when paint flows from the paint cup 70 to the feed passage 142, leakage of the paint is prevented. In addition, the external air is effectively prevented from being mixed with the paint through a joint of the feed connection portion 17 and tubular body portion 14. During a spray paint operation, not only is the paint continuously sprayed, but rough or incomplete atomization of the paint is prevented, thereby effectively enhancing aesthetic appearance of the painted products.

4. Because the gun body 11 is formed as a unitary one piece structure without welded joints, selection of a material for manufacturing the gun body 11 is not limited to the welding operations. Aside from cooper, an aluminum alloy may be used to manufacture the gun body 11 to reduce weight.

[0035] In the description above, for the purposes of explanation, numerous specific details have been set forth in order to provide a thorough understanding of the embodiment. It will be apparent, however, to one skilled in the art, that one or more other embodiments may be practiced without some of these specific details. It should also be appreciated that reference throughout this specification to "one embodiment," "an embodiment," an embodiment with an indication of an ordinal number and so forth means that a particular feature, structure, or characteristic may be included in the practice of the disclosure. It should be further appreciated that in the description, various features are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of various inventive aspects, and that one or more features or specific details from one embodiment may be practiced together with one or more features or specific details from another embodiment in the practice of the disclosure, where appropriate and in as so far as the resulting entity falls within the scope of the claims.

Claims

1. A paint spray gun, including:

a gun unit (10) including a gun body (11), a spray cap (12) and a nozzle (13), said gun body (11) being formed as a unitary one piece structure composed of a tubular body portion (14), a valve connection portion (15), an air passageway portion (16) and a feed connection portion (17), said spray cap (12) disposed on a tubular front end of said tubular body portion (14) and having a cap opening (146), said tubular body portion (14) having an air chamber (141) that is disposed inside said tubular front end and covered by said spray cap (12) and that communicates with said cap opening (146), and a feed passage (142) connected to a rear end of said air chamber (141), said valve connection portion (15) being integrally formed with and extending downwardly from a bottom side of said tubular body portion (14), said valve connection portion (15) having a valve connecting hole (151), said air passageway portion (16) being integrally formed with and extending downwardly from said bottom side of said tubular body portion (14) and said valve connection portion (15), and having an air passageway (161) in fluid communication with said valve connecting hole (151) and said air chamber (141), said feed connection portion (17) being integrally formed with and extending upwardly from a top side of said tubular body portion (14), and having a feed inlet hole (171) in communication with said feed passage (142),

said nozzle (13) being received in said spray cap (12) and having a nozzle tip (131) extending into said cap opening (146), said nozzle (13) fluidly communicating said feed passage (142) and fluidly disconnecting said air chamber (141);
 a spray unit (20) including a spray needle (21) that extends in said feed passage (142) and said nozzle tip (131), said spray needle (21) being movable axially within said tubular body portion (14) between a non-delivery position, where said spray needle (21) closes said nozzle tip (131), and a delivery position where said spray needle (21) opens said nozzle tip (131);
 an air valve unit (30) connected to said valve connection portion (15), said air valve unit (30) being transitionable between a closing state where said air valve unit (30) has no fluid communication with said valve connecting hole (151), and an opening state where said air valve unit (30) is in communication with said valve connecting hole (151); and
 an operation unit (40) disposed on said gun body (11), said operation unit (40) driving said spray needle (21) to move between the non-delivery position and the delivery position, and actuating said air valve unit (30) to transition between the closing state and the opening state, wherein said gun unit (10) further includes a spring cap (121) disposed in a tubular rear end of said tubular body portion (14);
 said tubular body portion (14) further has a needle operating space (143) disposed rearwardly of said feed passage (142) and opening at said tubular rear end;
 said spray unit (20) further includes a needle sleeve (22) sleeved on said spray needle (21) and disposed in said needle operating space (143), and a first resilient member (23) that is disposed in said spring cap (121) and around said spray needle (21) and that abuts said needle sleeve (22);
 said first resilient member (23) provides a pushing force to move forwardly said needle sleeve (22) which brings said spray needle (21) to the non-delivery position;
 said gun unit (10) further includes a stop member (122) disposed in said needle operating space (143) in front of said spring cap (121);
 said gun body (11) further has a trigger connection portion (18) that is integrally formed with and extends upwardly from said top side of said tubular body portion (14);
 said operation unit (40) includes a slide member (41) that is sleeved around said spray needle (21) forwardly of said needle sleeve (22) and that is slidable within said needle operating space (143), a trigger (42) that is pivotally connected to said trigger connection portion (18)

and that is engageable with said slide member (41), and a second resilient member (43) disposed in abutment between said slide member (41) and said stop member (122);
 said air valve unit (30) includes

a valve housing (31) that is connected to said valve connecting hole (151) and that has an air supply valve passage (311),
 a valve shaft (32) that extends through said air supply valve passage (311) of said valve housing (31) into said needle operating space (143) of said tubular body portion (14),
 a stopper seal ring (33) sleeved around said valve shaft (32), and
 a valve spring (34) disposed in said air supply valve passage (311) and abutting said valve housing (31) and said valve shaft (32) to urge said valve shaft (32) to move into said needle operating space (143);

said tubular body portion (14) further has a valve shaft passage (145) disposed between said needle operating space (143) and said valve connecting hole (151) of said valve connection portion (15), and a middle hole (146) disposed between said valve shaft passage (145) and said valve connecting hole (151), said middle hole (146) having a cross section larger than said valve shaft passage (145) and smaller than said valve connecting hole (151);
 said air valve unit (30) further includes

a valve gasket (61) disposed within said middle hole (146),
 a packing plate (62) that is disposed within said valve connecting hole (151) and abuts said valve gasket (61), and
 a compression spring (63) that abuts said packing plate (62) and said valve housing (31);

said valve shaft (32) extends through said compression spring (63), said packing plate (62), said valve gasket (61) and said valve shaft passage (145) from said air supply valve passage (311) into said needle operating space (143);
 said slide member (41) has a valve-actuating push surface (411) in contact with an end of said valve shaft (32) extending into said needle operating space (143).

2. The paint spray gun as claimed in Claim 1, characterized in that:

said gun unit (10) further has a gasket receiving passage (144) disposed between said feed pas-

- sage (142) and said needle operating space (143), a feed passage gasket (51) disposed within said gasket receiving passage (144) to seal said feed passage (142) from said needle operating space (143), and a limit ring (52) that is secured within said gasket receiving space (144) to position said feed passage gasket (51); and
said spray needle (21) extends through said limit ring (52) and said feed passage gasket (51).
3. The paint spray gun as claimed in Claim 1, **characterized in that** said valve housing (31) further has a valve seat (36) formed around said valve shaft (32), said valve shaft (32) having a stopper portion (320) proximal to said valve seat, said stopper seal ring (33) being sleeved on said stopper portion (320).
 4. The paint spray gun as claimed in Claim 1, **characterized in that** each of said first resilient member (23) and said second resilient member (43) are compression springs.
 5. The paint spray gun as claimed in any one of Claims 1 to 4, further **characterized by** a paint cup (70) connected to said paint connection portion (17) of said gun body (11).
 6. The paint spray gun as claimed in any one of Claims 1 to 5, **characterized in that** said tubular body portion (14) further has a feed tube (147) that is disposed in said air chamber (141) and said feed passage (142), said nozzle (13) further having a nozzle rear end that is opposite to said nozzle tip (131) and that fluidly connects a front end of said feed tube (147), a rear end of said feed tube (147) fluidly communicating said feed passage (142), said feed tube (147) fluidly disconnecting said air chamber (141).
 7. The paint spray gun as claimed in any one of Claims 1 to 6, **characterized in that** said gun body (10) is made from an aluminum alloy.

Patentansprüche

1. Farbspritzpistole, umfassend:

eine Pistoleneinheit (10) mit einem Pistolenkörper (11), einer Sprühkappe (12) und einer Düse (13), wobei der Pistolenkörper (11) als eine einheitliche einteilige Struktur ausgebildet ist, die sich aus einem rohrförmigen Gehäuseabschnitt (14), einem Ventilverbindungsabschnitt (15), einem Luftdurchgangsabschnitt (16) und einem Einspeisungsverbindungsabschnitt (17) zusammensetzt, wobei die Sprühkappe (12) an einem rohrförmigen vorderen Ende des rohrförmigen

migen Gehäuseabschnitts (14) angeordnet ist und eine Kappenöffnung (146) aufweist, wobei der rohrförmige Gehäuseabschnitt (14) eine Luftkammer (141) aufweist, die innerhalb des rohrförmigen vorderen Endes angeordnet und von der Sprühkappe (12) bedeckt ist und die mit der Kappenöffnung (146) und mit einem mit einem hinteren Ende der Luftkammer (141) verbundenen Einspeisungsdurchgang (142) verbunden ist, wobei der Ventilverbindungsabschnitt (15) einstückig mit einer Unterseite des rohrförmigen Gehäuseabschnitts (14) ausgebildet ist und sich von dieser nach unten erstreckt, wobei der Ventilverbindungsabschnitt (15) ein Ventilverbindungsloch (151) aufweist, wobei der Luftdurchgangsabschnitt (16) einstückig mit der Unterseite des rohrförmigen Gehäuseabschnitts (14) und dem Ventilverbindungsabschnitt (15) ausgebildet ist und sich von diesen nach unten erstreckt, und einen in fluidischer Verbindung mit dem Ventilverbindungsloch (151) und der Luftkammer (141) stehenden Luftdurchgang (161) aufweist, wobei der Einspeisungsverbindungsabschnitt (17) einstückig mit einer Oberseite des rohrförmigen Gehäuseabschnitts (14) ausgebildet ist und sich von dieser nach oben erstreckt, und ein mit dem Einspeisungsdurchgang (142) in Verbindung stehendes Einspeisungseinlassloch (171) aufweist, wobei die Düse (13), die in der Sprühkappe (12) aufgenommen ist und eine Düsenspitze (131) aufweist, sich in die Kappenöffnung (146) hinein erstreckt, wobei die Düse (13) in fluidischer Verbindung mit dem Einspeisungsdurchgang (142) steht und die Luftkammer (141) fluidisch abtrennt;
eine Sprüheinheit (20) mit einer Sprühnadel (21), die sich in dem Einspeisungsdurchgang (142) und der Düsenspitze (131) erstreckt, wobei die Sprühnadel (21) axial innerhalb des rohrförmigen Gehäuseabschnitts (14) zwischen einer Nichtabgabeposition, in der die Sprühnadel (21) die Düsenspitze (131) verschließt, und einer Abgabeposition, in der die Sprühnadel (21) die Düsenspitze (131) öffnet, bewegbar ist;
eine Luftventileinheit (30), die mit dem Ventilverbindungsabschnitt (15) verbunden ist, wobei die Luftventileinheit (30) zwischen einem Schließzustand, in dem die Luftventileinheit (30) keine fluidische Verbindung mit dem Ventilverbindungsloch (151) aufweist, und einem Öffnungszustand, in dem die Luftventileinheit (30) in Verbindung mit dem Ventilverbindungsloch (151) steht, verstellbar ist;
eine Bedieneinheit (40), die an dem Pistolenkörper (11) angeordnet ist, wobei die Bedieneinheit (40) die Sprühnadel (21) betätigt, um sich zwischen der Nichtabgabeposition und der Abga-

beposition zu bewegen, und die Luftventileinheit (30) betätigt, um sich zwischen dem Schließzustand und dem Öffnungszustand zu verstellen, wobei

die Pistoleneinheit (10) ferner eine Federkappe (121) umfasst, die in einem rohrförmigen hinteren Ende des rohrförmigen Gehäuseabschnitts (14) angeordnet ist;

der rohrförmige Gehäuseabschnitt (14) ferner einen Nadelbetätigungsraum (143) aufweist, der hinterhalb des Einspeisungsdurchgangs (142) angeordnet ist und sich an dem rohrförmigen hinteren Ende öffnet;

die Sprüheinheit (20) ferner eine Nadelhülse (22), die die Sprühnadel (21) umgibt und in dem Nadelbetätigungsraum (143) angeordnet ist, und ein erstes Federelement (23), das in der Federkappe (121) und um die Sprühnadel (21) herum angeordnet ist und an der Nadelhülse (22) anliegt, umfasst;

das erste Federelement (23) eine Druckkraft bereitstellt, um die Nadelhülse (22) vorwärts zu bewegen, sodass die Sprühnadel (21) in die Nichtabgabeposition gebracht wird;

die Pistoleneinheit (10) ferner ein Anschlagelement (122) umfasst, das in dem Nadelbetätigungsraum (143) vor der Federkappe (121) angeordnet ist;

der Pistolenkörper (11) ferner einen Auslöserverbindungsabschnitt (18) aufweist, der einstückig mit der Oberseite des rohrförmigen Gehäuseabschnitts (14) ausgebildet ist und sich von dieser nach oben erstreckt;

die Bedieneinheit (40) ein Gleitelement (41), das die Sprühnadel (21) vorderhalb der Nadelhülse (22) umgibt und innerhalb des Nadelbetätigungsraums (143) verschiebbar ist, einen Auslöser (42), der schwenkbar mit dem Auslöserverbindungsabschnitt (18) verbunden ist und mit dem Gleitelement (41) in Eingriff gebracht werden kann, und ein zweites Federelement (43), das in Anlage zwischen dem Gleitelement (41) und dem Anschlagelement (122) angeordnet ist, umfasst;

die Luftventileinheit (30)

ein Ventilgehäuse (31), das mit dem Ventilverbindungsloch (151) verbunden ist und einen Luftzufuhrventil-Durchgang (311) aufweist,

einen Ventilschaft (32), der sich durch den Luftzufuhrventil-Durchgang (311) des Ventilgehäuses (31) in den Nadelbetätigungsraum (143) des rohrförmigen Gehäuseabschnitts (14) erstreckt,

einen Stopfendichtring (33), der den Ventilschaft (32) umgibt, und

eine Ventildichtung (34), die in dem Luftzufuhr-

ventil-Durchgang (311) angeordnet ist und an dem Ventilgehäuse (31) und dem Ventilschaft (32) anliegt, um den Ventilschaft (32) zu einer Bewegung in den Nadelbetätigungsraum (143) hinein zu drängen, umfasst;

der rohrförmige Gehäuseabschnitt (14) ferner einen Ventilschaftdurchgang (145), der zwischen dem Nadelbetätigungsraum (143) und dem Ventilverbindungsloch (151) des Ventilverbindungsabschnitts (15) angeordnet ist, und ein Mittelloch (146), das zwischen dem Ventilschaftdurchgang (145) und dem Ventilverbindungsloch (151) angeordnet ist und einen größeren Querschnitt als der Ventilschaftdurchgang (145) sowie einen kleineren Querschnitt als das Ventilverbindungsloch (151) besitzt, aufweist;

die Luftventileinheit (30) ferner

eine Ventildichtung (61), die innerhalb des Mittel Lochs (146) angeordnet ist,

eine Deckplatte (62), die innerhalb des Ventilverbindungs Lochs (151) angeordnet ist und an der Ventildichtung (61) anliegt, und eine Druckfeder (63), die an der Deckplatte (62) und dem Ventilgehäuse (31) anliegt, umfasst;

der Ventilschaft (32) sich durch die Druckfeder (63), die Deckplatte (62), die Ventildichtung (61) und den Ventilschaftdurchgang (145) hindurch von dem Luftzufuhrventil-Durchgang (311) in den Nadelbetätigungsraum (143) erstreckt;

das Gleitelement (41) eine Ventilbetätigungs-Stoßfläche (411) in Kontakt mit einem Ende des Ventilschafts (32), der sich in den Nadelbetätigungsraum (143) erstreckt, aufweist.

2. Farbspritzpistole nach Anspruch 1,

dadurch gekennzeichnet, dass

die Pistoleneinheit (10) ferner einen Dichtungsaufnahmedurchgang (144), der zwischen dem Einspeisungsdurchgang (142) und dem Nadelbetätigungsraum (143) angeordnet ist, eine Einspeisungsdurchgangsdichtung (51), die innerhalb des Dichtungsaufnahmedurchgangs (144) angeordnet ist, um den Einspeisungsdurchgang (142) gegenüber dem Nadelbetätigungsraum (143) abzudichten, und einen Begrenzungsring (52), der innerhalb des Dichtungsaufnahmedurchgangs (144) befestigt ist, um die Einspeisungsdurchgangsdichtung zu positionieren, aufweist; und

die Sprühnadel (21) sich durch den Begrenzungsring (52) und die Einspeisungsdurch-

gangsdichtung (51) erstreckt.

3. Farbspritzpistole nach Anspruch 1, **dadurch gekennzeichnet, dass** das Ventilgehäuse (31) ferner einen Ventilsitz (36) aufweist, der um den Ventilschaft (32) herum ausgebildet ist, wobei der Ventilschaft (32) einen Stopfenabschnitt (320) in der Nähe des Ventilsitzes aufweist, wobei der Stopfendichtring (33) den Stopfenabschnitt (320) umgibt. 5
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4. Farbspritzpistole nach Anspruch 1, **dadurch gekennzeichnet, dass** das erste Federelement (23) und das zweite Federelement (43) jeweils Druckfedern sind. 15
5. Farbspritzpistole nach einem der Ansprüche 1 bis 4, ferner **gekennzeichnet durch** einen Farbbecher (70), der mit dem Farbverbindungsabschnitt (17) des Pistolenkörpers (11) verbunden ist. 20
6. Farbspritzpistole nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** der rohrförmige Gehäuseabschnitt (14) ferner ein Einspeisungsrohr (147) aufweist, das in der Luftkammer (141) und dem Einspeisungsdurchgang (142) angeordnet ist, wobei die Düse (13) ferner ein hinteres Düsenende aufweist, das der Düsen Spitze (131) gegenüberliegt und ein vorderes Ende des Einspeisungsrohrs (147) fluidisch verbindet, wobei ein hinteres Ende des Einspeisungsrohrs (147) den Einspeisungsdurchgang (142) fluidisch verbindet, wobei das Einspeisungsrohr (147) die Luftkammer (141) fluidisch abtrennt. 25
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7. Farbspritzpistole nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** der Pistolenkörper (10) aus einer Aluminiumlegierung gefertigt ist. 40

Revendications

1. Un pistolet de pulvérisation de peinture, comprenant : 45
 une unité de pistolet (10) comprenant un corps de pistolet (11), un capuchon de pulvérisation (12) et une buse (13), ledit corps de pistolet (11) étant formé comme une structure unitaire d'une seule pièce composée d'une partie de corps tubulaire (14), d'une partie de connexion de soupape (15), d'une partie de passage d'air (16) et d'une partie de connexion d'alimentation (17), ledit capuchon de pulvérisation (12) étant disposé sur une extrémité avant tubulaire de ladite partie de corps tubulaire (14) et ayant une ouverture de capuchon (146), ladite partie de corps 50
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tubulaire (14) ayant une chambre d'air (141) qui est disposée à l'intérieur de ladite extrémité avant tubulaire et couverte par ledit capuchon de pulvérisation (12) et qui communique avec ladite ouverture de capuchon (146), et un passage d'alimentation (142) connecté à une extrémité arrière de ladite chambre d'air (141), ladite partie de connexion de soupape (15) étant intégralement formée avec et s'étendant vers le bas à partir d'un côté inférieur de ladite partie de corps tubulaire (14), ladite partie de connexion de soupape (15) ayant un trou de connexion de soupape (151), ladite partie de passage d'air (16) étant intégralement formée avec et s'étendant vers le bas à partir dudit côté inférieur de ladite partie de corps tubulaire (14) et de ladite partie de connexion de soupape (15), et ayant une voie de passage d'air (161) en communication fluïdique avec ledit trou de connexion de soupape (151) et ladite chambre d'air (141), ladite partie de connexion d'alimentation (17) étant intégralement formée avec et s'étendant vers le haut à partir d'un côté supérieur de ladite partie de corps tubulaire (14), et ayant un trou d'entrée d'alimentation (171) en communication avec ledit passage d'alimentation (142), ladite buse (13) étant reçue dans ledit capuchon de pulvérisation (12) et ayant une pointe de buse (131) s'étendant dans ladite ouverture de capuchon (146), ladite buse (13) communiquant fluïdiquement avec ledit passage d'alimentation (142) et déconnectant fluïdiquement ladite chambre d'air (141) ;
 une unité de pulvérisation (20) comprenant une aiguille de pulvérisation (21) qui s'étend dans ledit passage d'alimentation (142) et dans ladite pointe de buse (131), ladite aiguille de pulvérisation (21) étant déplaçable axialement à l'intérieur de ladite partie de corps tubulaire (14) entre une position de non-délivrance, dans laquelle ladite aiguille de pulvérisation (21) ferme ladite pointe de buse (131), et une position de délivrance, dans laquelle ladite aiguille de pulvérisation (21) ouvre ladite pointe de buse (131) ;
 une unité de soupape d'air (30) connectée à ladite partie de connexion de soupape (15), ladite unité de soupape d'air (30) pouvant faire une transition entre un état de fermeture, dans lequel ladite unité de soupape d'air (30) n'a pas de communication fluïdique avec ledit trou de connexion de soupape (151), et un état d'ouverture, dans lequel ladite unité de soupape d'air (30) est en communication avec ledit trou de connexion de soupape (151) ; et
 une unité de commande (40) disposée sur ledit corps de pistolet (11), ladite unité de commande (40) actionnant ladite aiguille de pulvérisation (21) pour se déplacer entre la position de non-

délivrance et la position de délivrance, et actionnant ladite unité de soupape d'air (30) pour faire une transition entre l'état de fermeture et l'état d'ouverture,

dans lequel 5

ladite unité de pistolet (10) comprend en outre un capuchon de ressort (121) disposé dans une extrémité arrière tubulaire de ladite partie de corps tubulaire (14) ;

ladite partie de corps tubulaire (14) a en outre 10

une espace d'actionnement d'aiguille (143) disposée à l'arrière dudit passage d'alimentation (142) et s'ouvrant à ladite extrémité arrière tubulaire ;

ladite unité de pulvérisation (20) comprend en 15

outre un manchon d'aiguille (22) manchonné sur ladite aiguille de pulvérisation (21) et disposé dans ledit espace d'actionnement d'aiguille (143), et un premier élément résilient (23) qui est disposé dans ledit capuchon de ressort (121) 20

et autour de ladite aiguille de pulvérisation (21) et qui vient en butée contre ledit manchon d'aiguille (22) ;

ledit premier élément résilient (23) fournit une 25

force de poussée pour déplacer ledit manchon d'aiguille (22) vers l'avant, ce qui amène ladite aiguille de pulvérisation (21) à la position de non-délivrance;

ladite unité de pistolet (10) comprend en outre 30

un élément d'arrêt (122) disposé dans ledit espace d'actionnement d'aiguille (143) devant ledit capuchon de ressort (121) ;

ledit corps de pistolet (11) a en outre une partie 35

de connexion de déclencheur (18) qui est intégralement formée avec et s'étend vers le haut à partir dudit côté supérieur de ladite partie de corps tubulaire (14) ;

ladite unité de commande (40) comprend un élé- 40

ment coulissant (41) qui est manchonné autour de ladite aiguille de pulvérisation (21) à l'avant dudit manchon d'aiguille (22) et qui peut coulisser à l'intérieur dudit espace d'actionnement d'aiguille (143), un déclencheur (42) qui est connecté de manière pivotante à ladite partie de 45

connexion de déclencheur (18) et qui peut s'engager avec ledit élément coulissant (41), et un deuxième élément résilient (43) disposé en butée entre ledit élément coulissant (41) et ledit élément d'arrêt (122) ;

ladite unité de soupape d'air (30) comprend 50

un boîtier de soupape (31) qui est connecté audit trou de connexion de soupape (151) et qui a un passage de soupape d'alimentation d'air (311),

un arbre de soupape (32) qui s'étend à tra- 55

vers ledit passage de soupape d'alimentation d'air (311) dudit boîtier de soupape (31)

dans ledit espace d'actionnement d'aiguille (143) de ladite partie de corps tubulaire (14), une bague d'étanchéité de bouchon (33) manchonnée autour dudit arbre de soupape (32), et

un ressort de soupape (34) disposé dans ledit passage de soupape d'alimentation d'air (311) et venant en butée contre ledit boîtier de soupape (31) et ledit arbre de soupape (32) pour pousser ledit arbre de soupape (32) pour se déplacer dans ladite espace d'actionnement d'aiguille (143) ;

ladite partie de corps tubulaire (14) a en outre un passage d'arbre de soupape (145) disposé entre ledit espace d'actionnement d'aiguille (143) et ledit trou de connexion de soupape (151) de ladite partie de connexion de soupape (15), et un trou intermédiaire (146) disposé entre ledit passage d'arbre de soupape (145) et ledit trou de connexion de soupape (151), ledit trou intermédiaire (146) ayant une section transversale plus grande que ledit passage d'arbre de soupape (145) et plus petite que ledit trou de connexion de soupape (151) ;

ladite unité de soupape d'air (30) comprend en outre

un joint de soupape (61) disposé à l'intérieur dudit trou intermédiaire (146),

une plaque de garniture (62) qui est dispo- sée à l'intérieur dudit trou de connexion de soupape (151) et vient en butée contre ledit joint de soupape (61), et

un ressort de compression (63) qui vient en butée contre ladite plaque de garniture (62) et ledit boîtier de soupape (31) ;

ledit arbre de soupape (32) s'étend à travers ledit ressort de compression (63), ladite plaque de garniture (62), ledit joint de soupape (61) et ledit passage d'arbre de soupape (145) à partir dudit passage de soupape d'alimentation d'air (311) dans ledit espace d'actionnement d'aiguille (143) ;

ledit élément coulissant (41) a une surface de poussée d'actionnement de soupape (411) en contact avec une extrémité dudit arbre de soupape (32) s'étendant dans ledit espace d'actionnement d'aiguille (143).

2. Le pistolet de pulvérisation de peinture selon la revendication 1, **caractérisé en ce que**

ladite unité de pistolet (10) a en outre un passage de réception de joint (144) disposé entre ledit passage d'alimentation (142) et ledit espace d'actionnement d'aiguille (143), un joint de pas-

- sage d'alimentation (51) disposé à l'intérieur dudit passage de réception de joint (144) pour rendre étanche ledit passage d'alimentation (142) par rapport audit espace d'actionnement d'aiguille (143), et une bague de limitation (52) qui est fixée à l'intérieur dudit espace de réception de joint (144) pour positionner ledit joint de passage d'alimentation (51) ; et ladite aiguille de pulvérisation (21) s'étend à travers ladite bague de limitation (52) et ledit joint de passage d'alimentation (51). 5
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3. Le pistolet de pulvérisation de peinture selon la revendication 1, **caractérisé en ce que** ledit boîtier de soupape (31) a en outre un siège de soupape (36) formé autour de ladite arbre de soupape (32), ledit arbre de soupape (32) ayant une partie de bouchon (320) proximale audit siège de soupape, ladite bague d'étanchéité de bouchon (33) étant manchonnée sur ladite partie de bouchon (320). 15
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4. Le pistolet de pulvérisation de peinture selon la revendication 1, **caractérisé en ce que** ledit premier élément résilient (23) et ledit deuxième élément résilient (43) sont chacun des ressorts de compression. 25
5. Le pistolet de pulvérisation de peinture selon l'une quelconque des revendications 1 à 4, **caractérisé en outre par** un gobelet de peinture (70) connecté à ladite partie de connexion de peinture (17) dudit corps de pistolet (11). 30
6. Le pistolet de pulvérisation de peinture selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** ladite partie de corps tubulaire (14) a en outre un tube d'alimentation (147) qui est disposé dans ladite chambre d'air (141) et ledit passage d'alimentation (142), ladite buse (13) ayant en outre une extrémité arrière de buse qui est opposée à ladite pointe de buse (131) et qui connecte fluidiquement une extrémité avant dudit tube d'alimentation (147), une extrémité arrière dudit tube d'alimentation (147) communiquant fluidiquement ledit passage d'alimentation (142), ledit tube d'alimentation (147) déconnectant fluidiquement ladite chambre d'air (141). 35
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7. Le pistolet de pulvérisation de peinture selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** ledit corps de pistolet (10) est fabriqué en un alliage d'aluminium. 50
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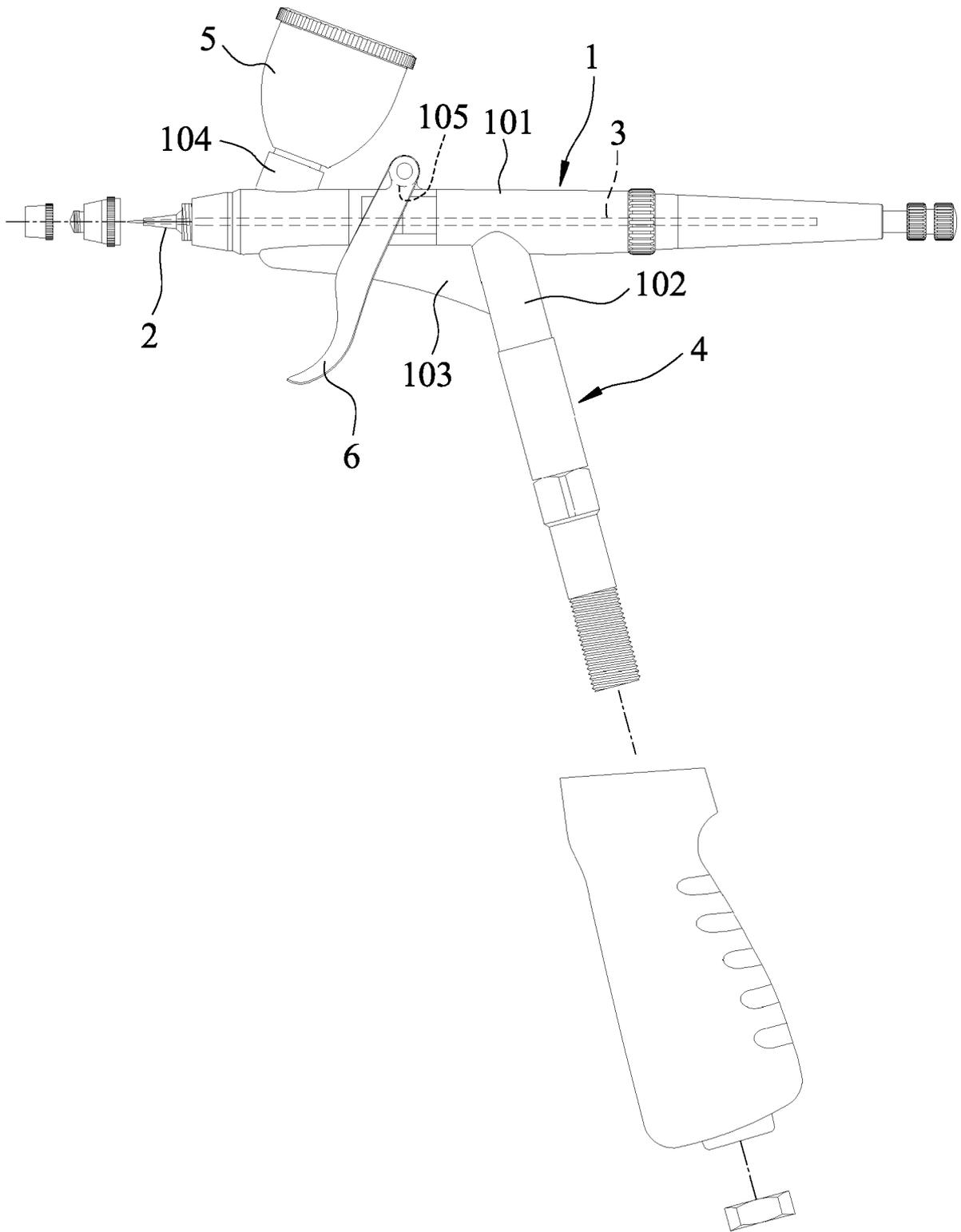


FIG.1
PRIOR ART

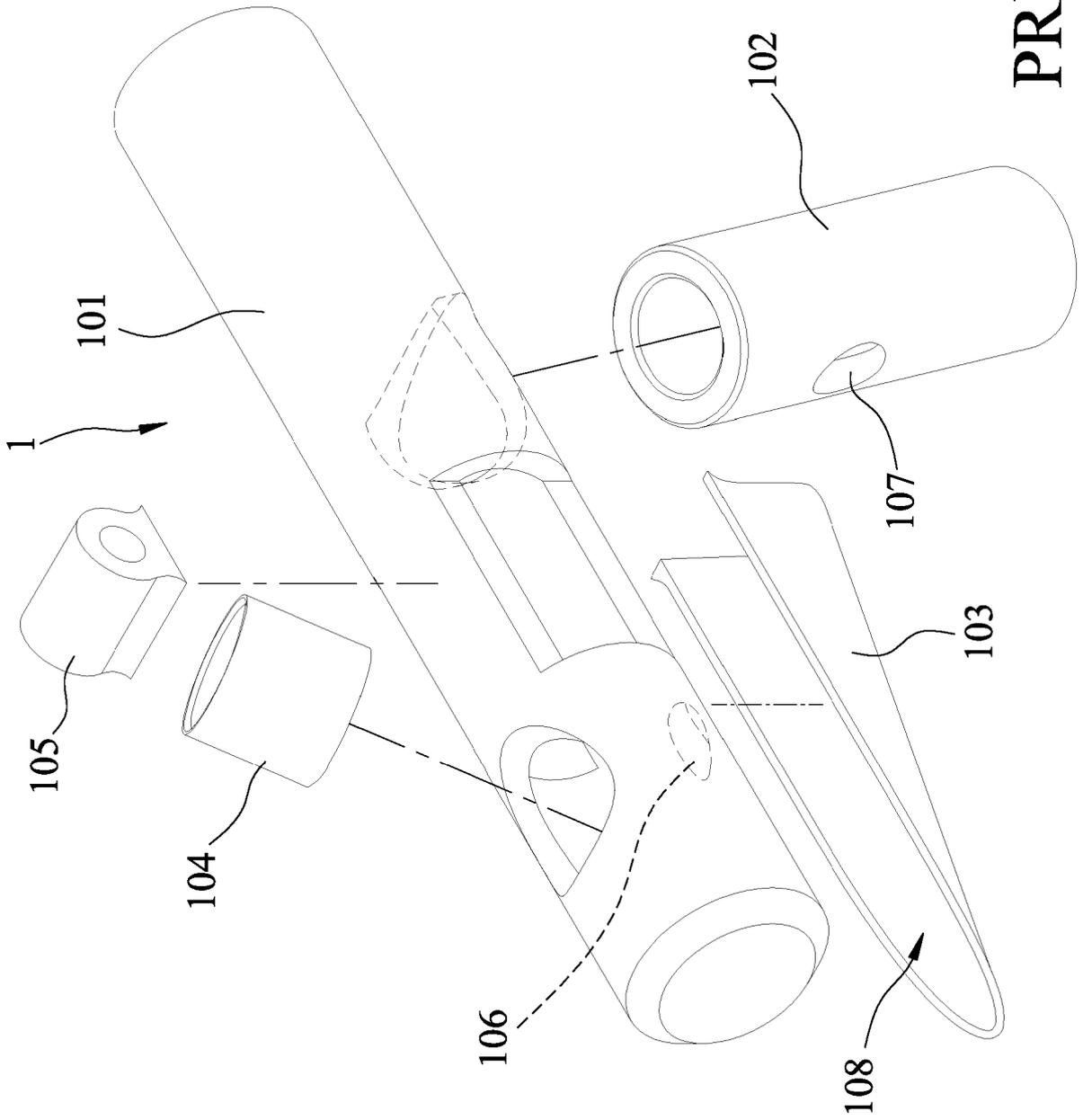


FIG.2
PRIOR ART

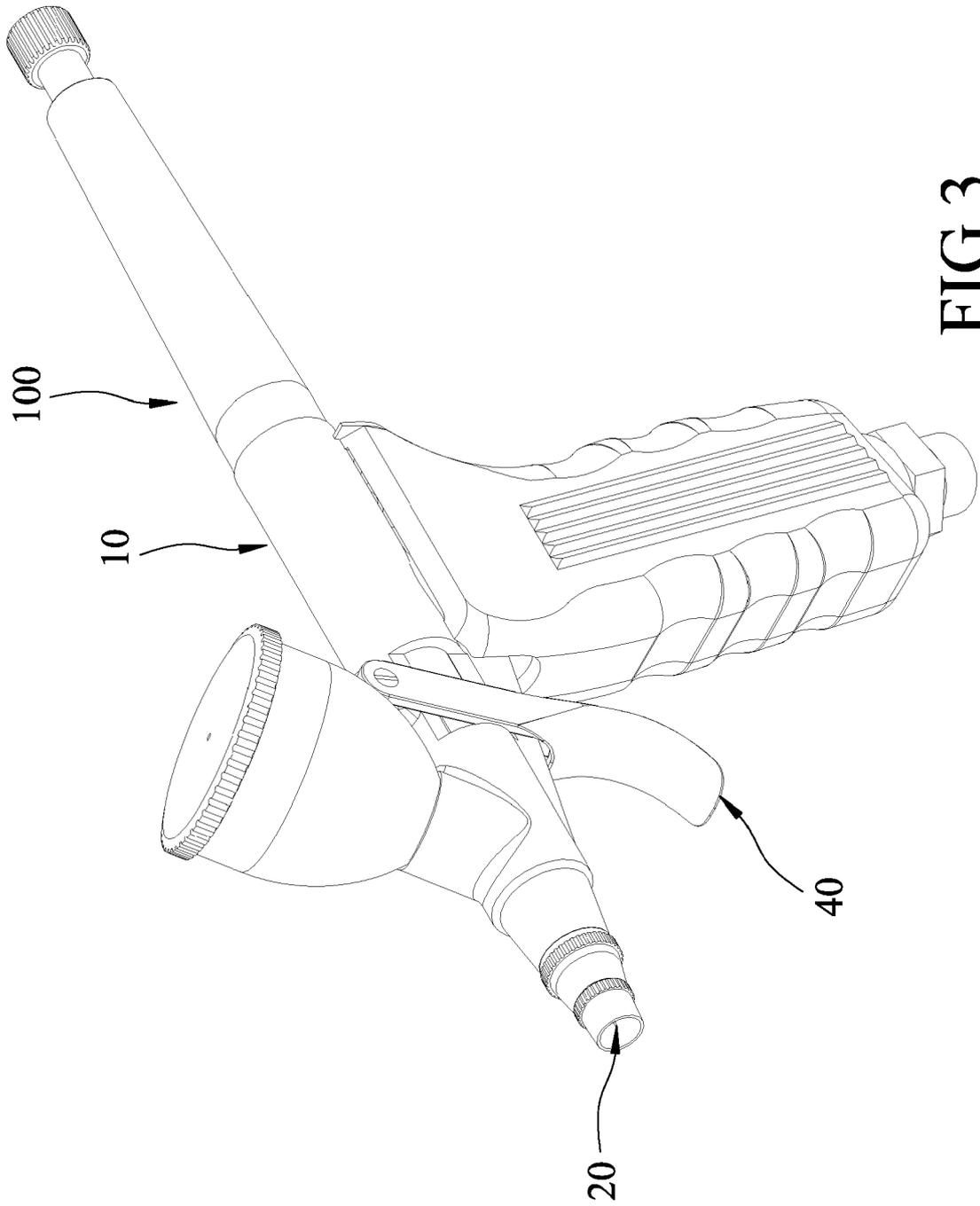


FIG.3

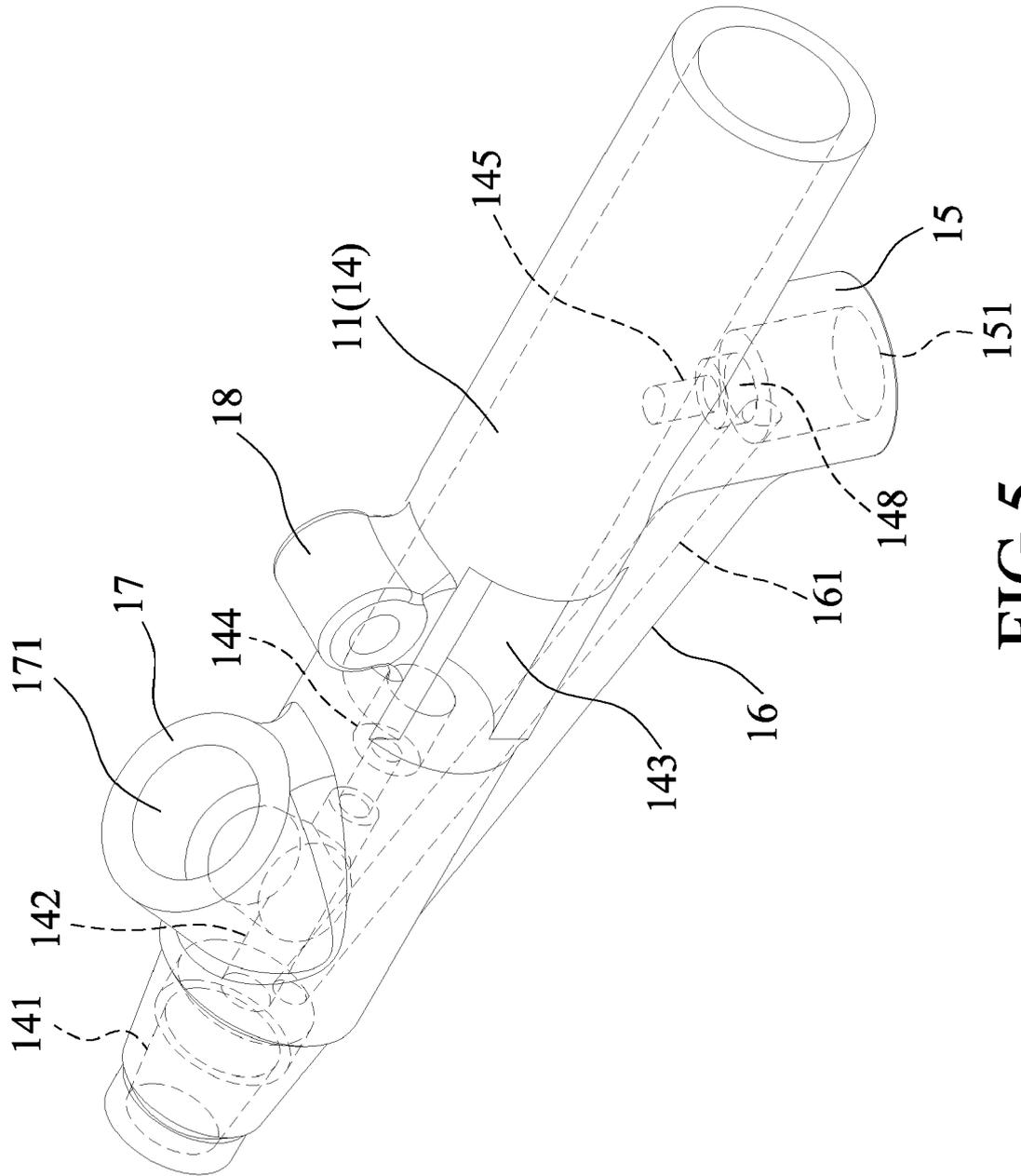


FIG.5

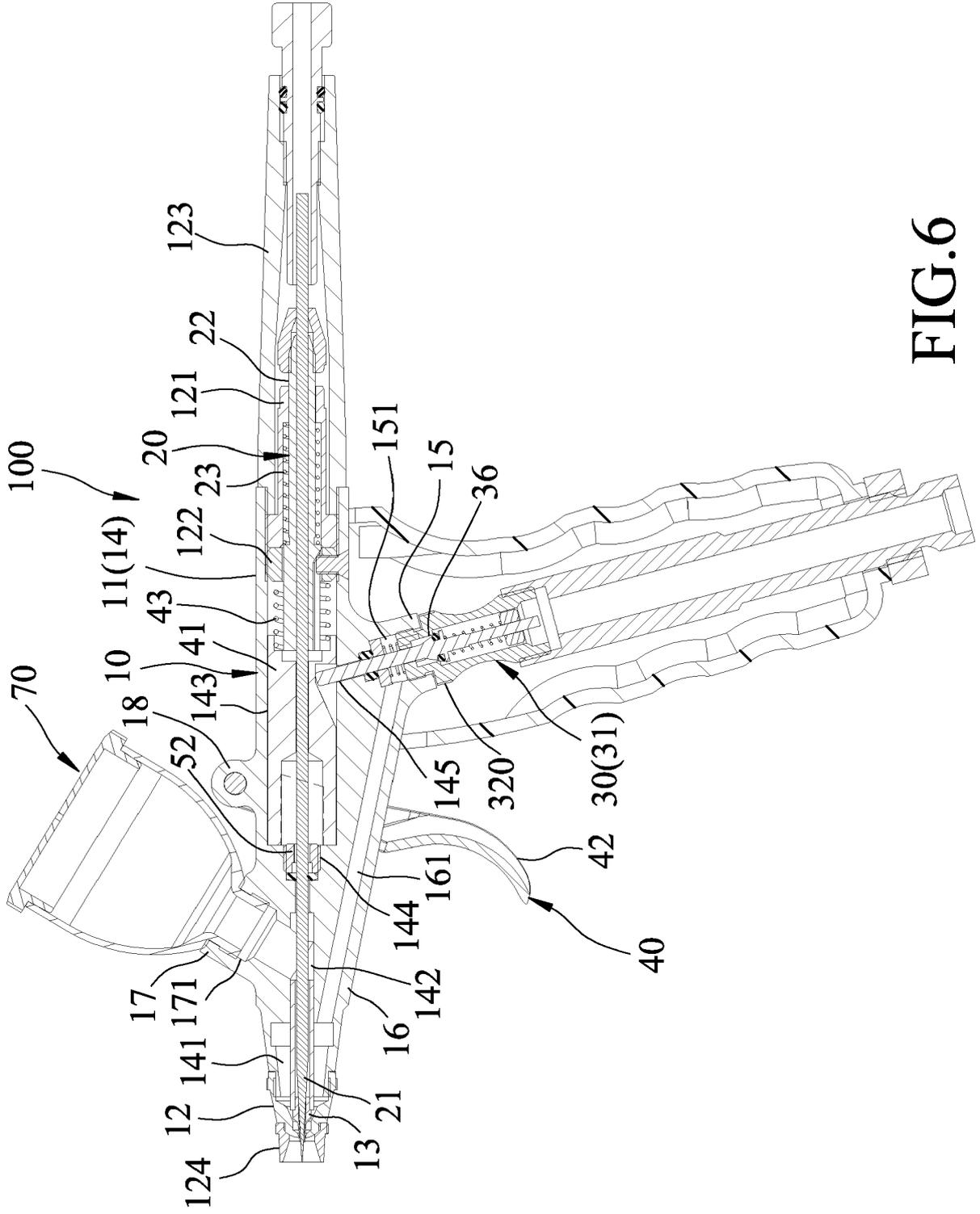


FIG. 6

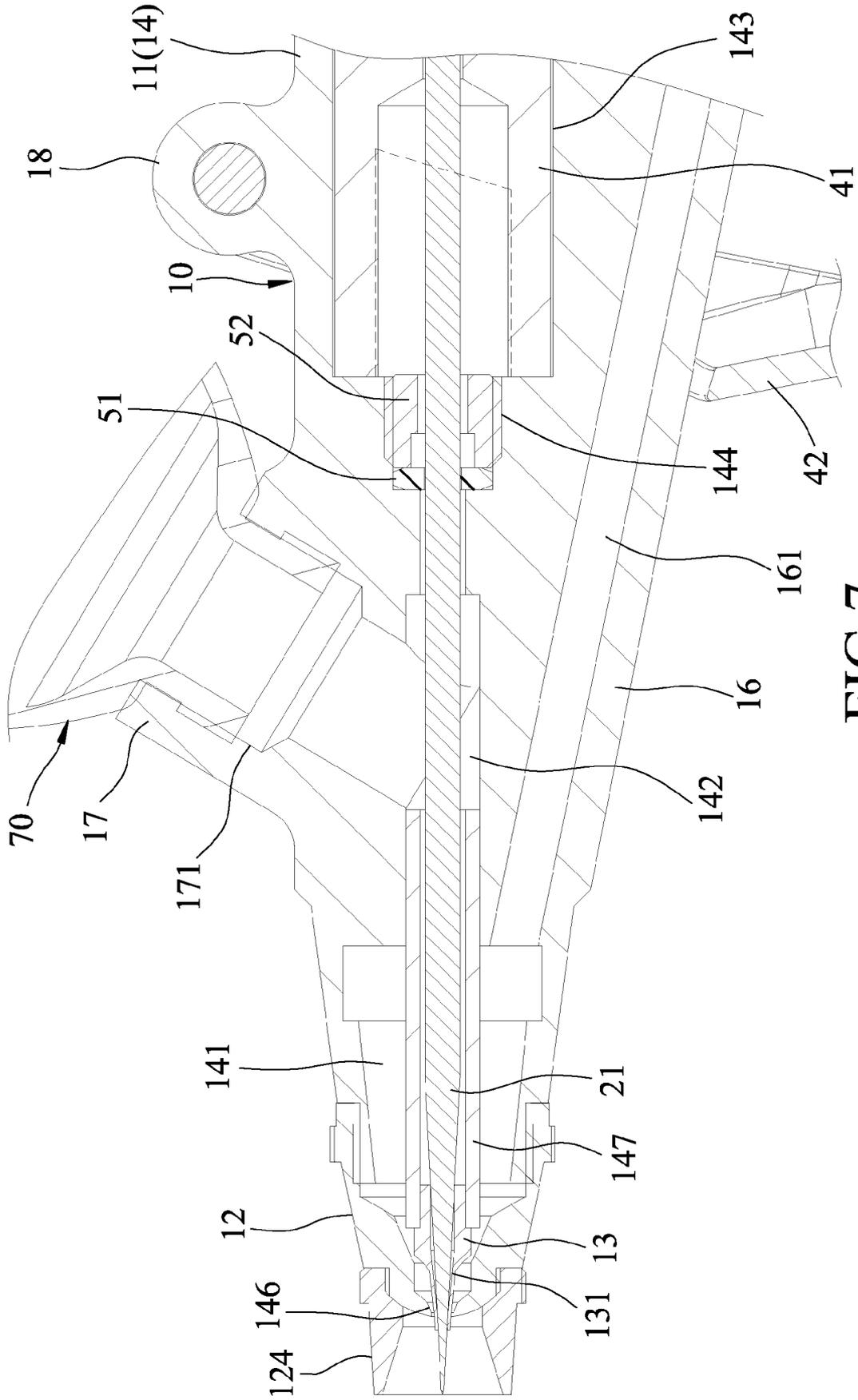


FIG. 7

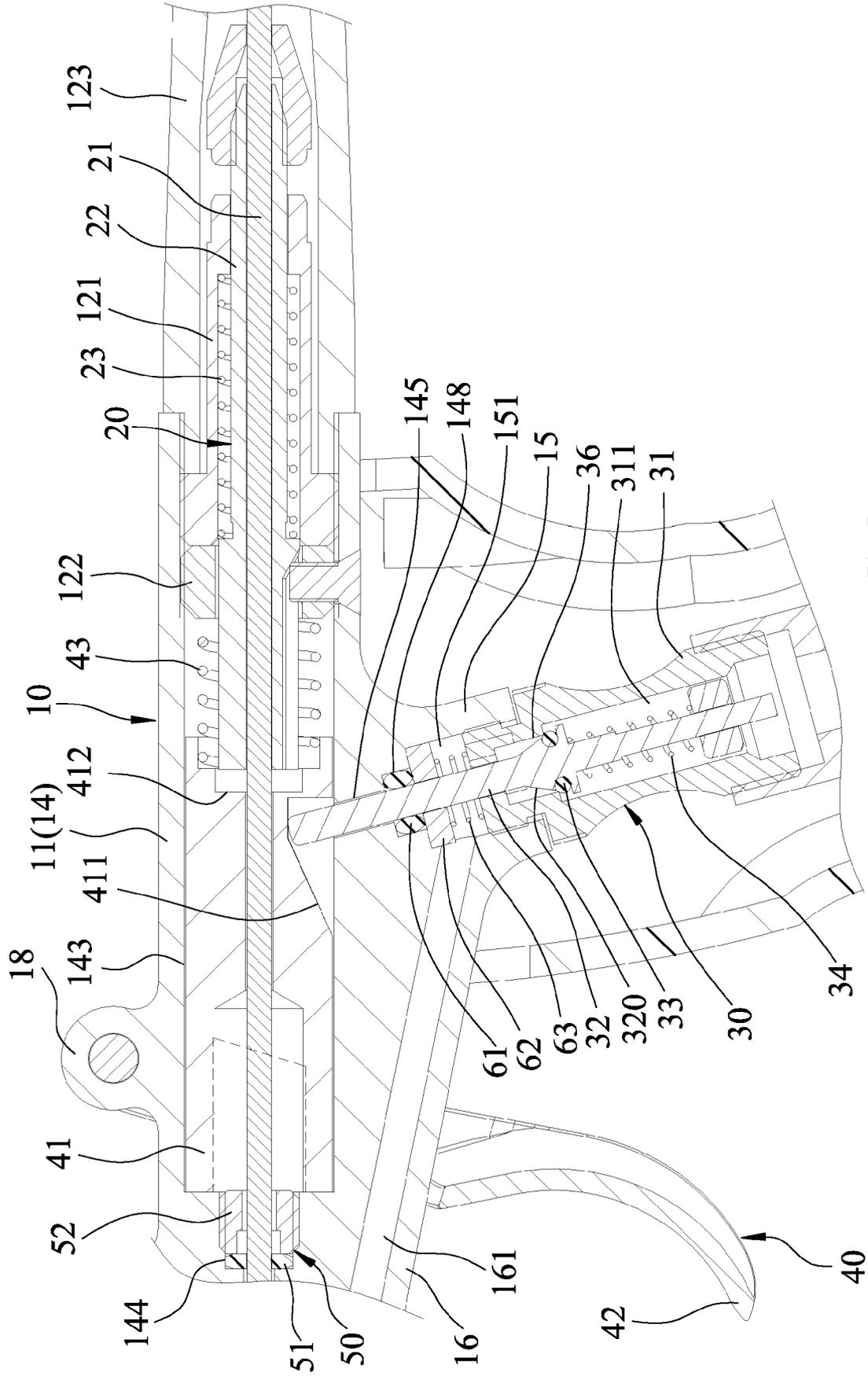


FIG. 8

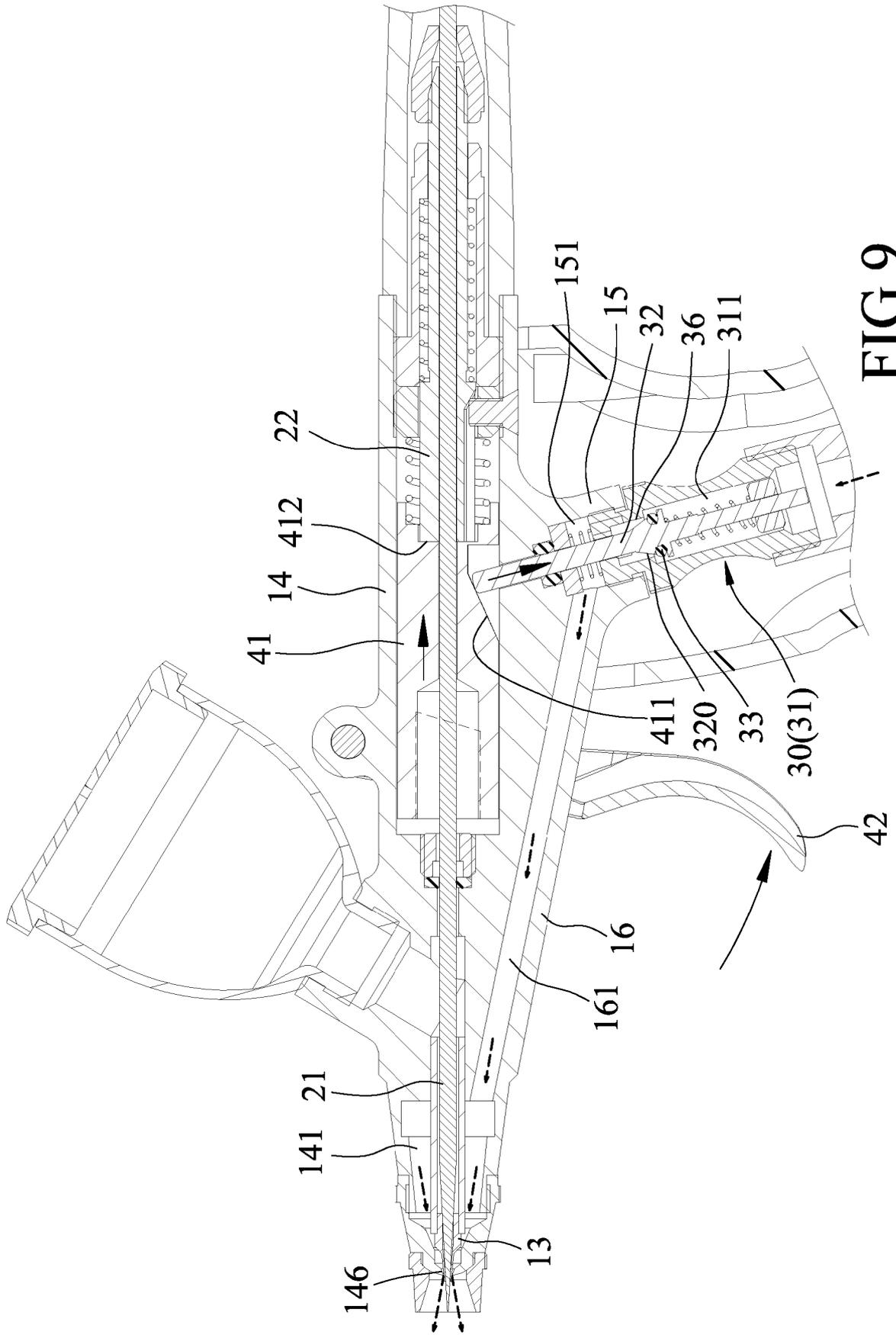


FIG. 9

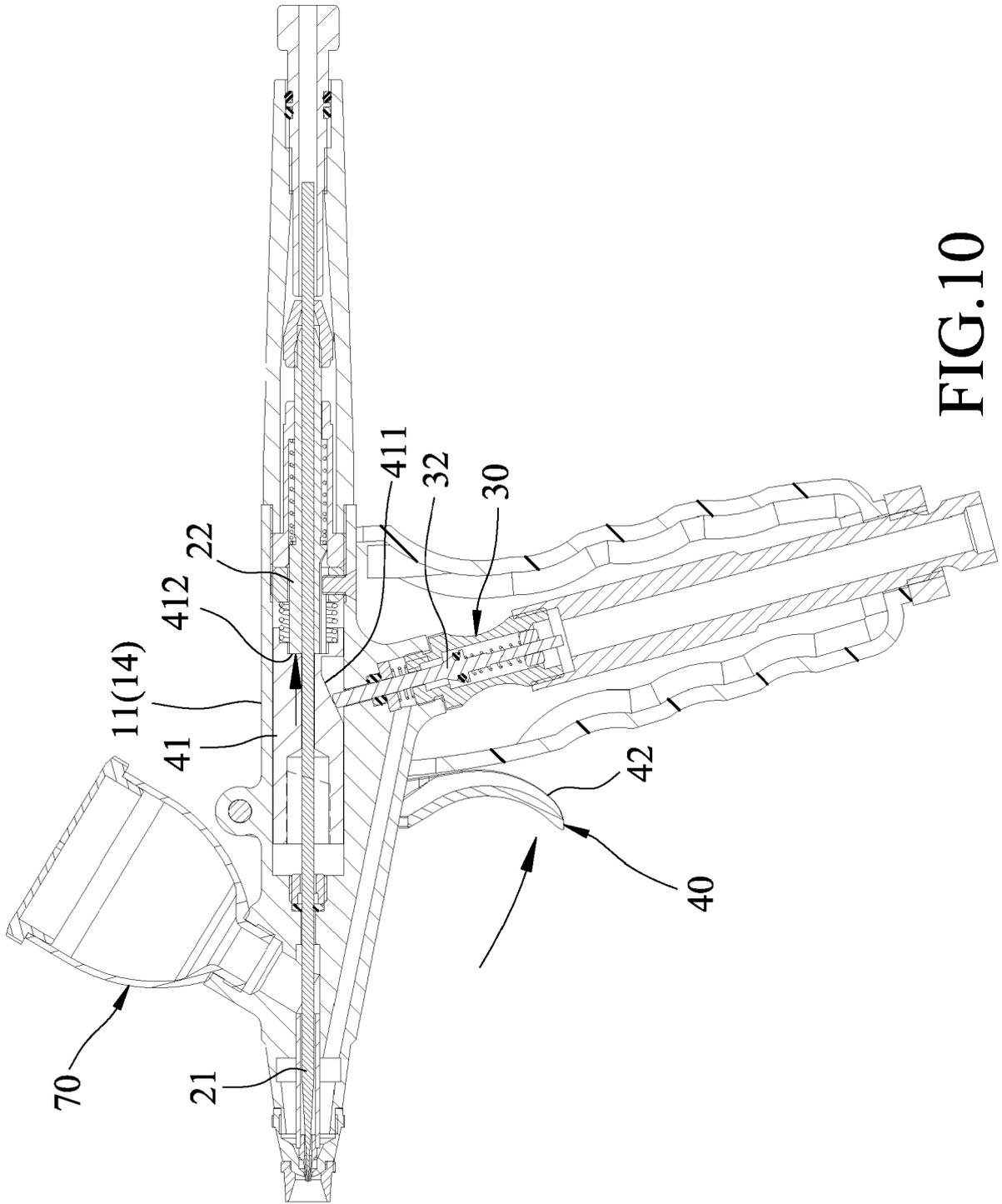


FIG. 10

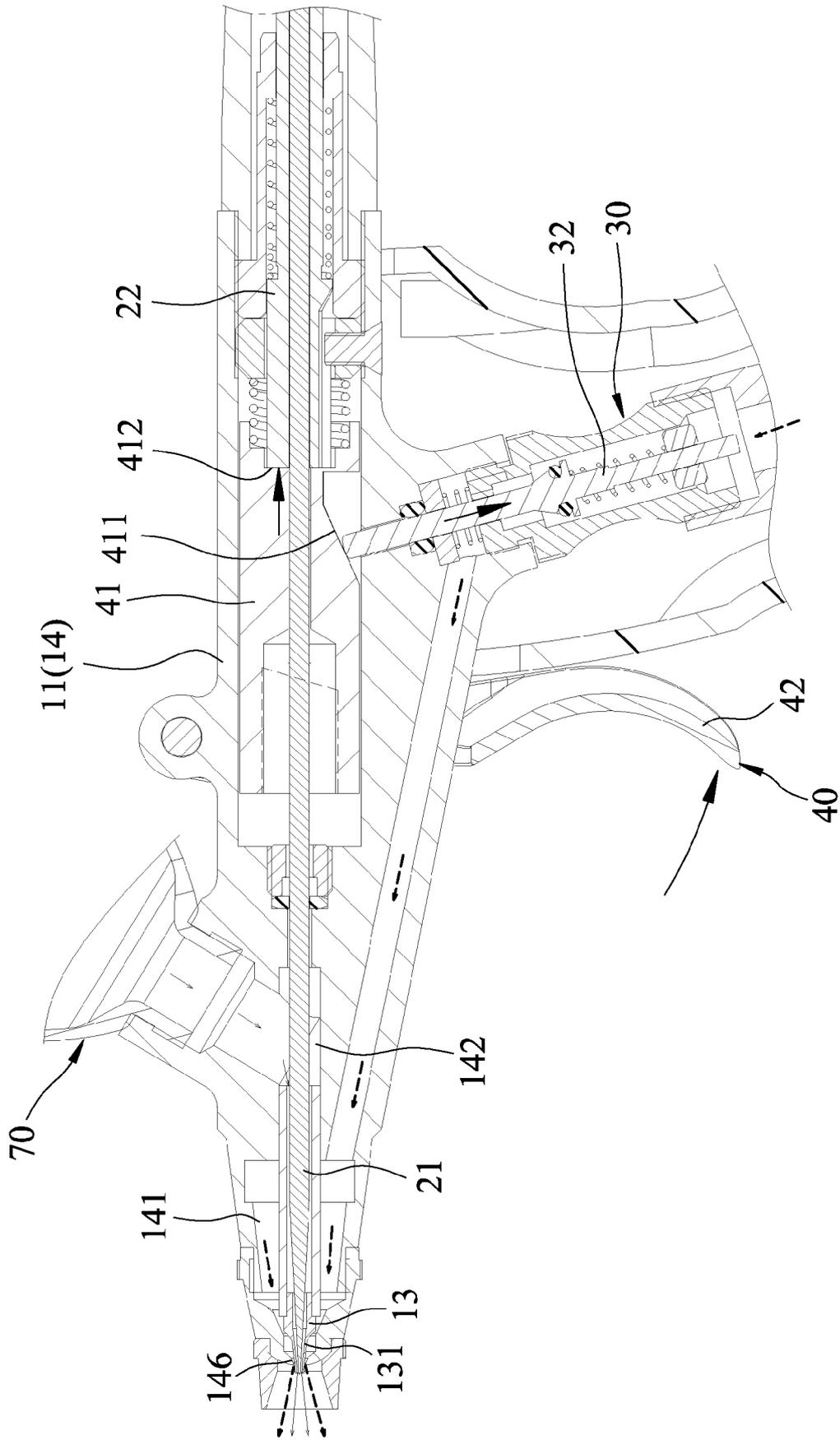


FIG. 11

REFERENCES CITED IN THE DESCRIPTION

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