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(54) **Rotary spray gun**

(57) A rotary spray gun formed of a control grip (1), a fluid supply unit (2) and a nozzle assembly (3) is disclosed. The nozzle assembly (3) includes a nozzle tube (31) surrounding a water tube (15) being connected to the fluid supply unit (2) and adapted for guiding in the forced-air from a connection tube (14) of the control grip

(1), an adapter tube (32) rotatably mounted on the nozzle tube (31) by bearings, and a hard curved nozzle tip (34) suspending in an injection tube (16) of the control grip (1) and connected to the adapter tube (32) and rotatable with the adapter tube (32) for discharging the fluid out of the water tube (15) and the forced-air out of the nozzle tube (31).

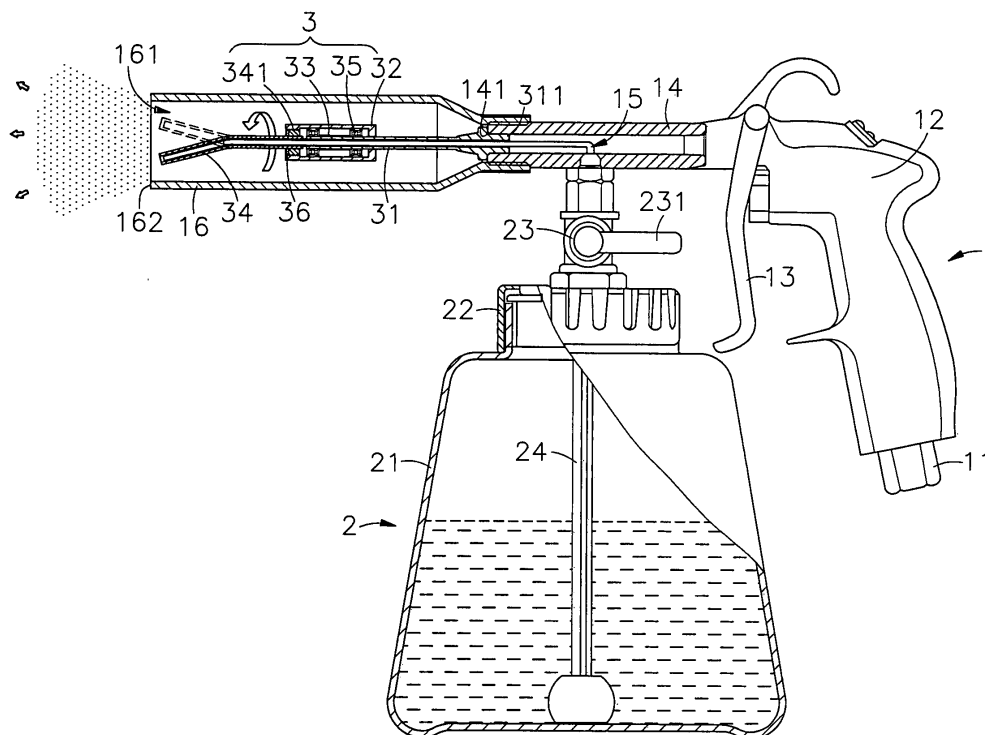


FIG. 5

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] The present invention relates to spray guns for cleaning purposes and more particularly, to a rotary spray gun, which has a fluid and a flow of forced-air be mixed in a hard curved nozzle tip so that the hard curved nozzle tip is forced to rotate when spraying the fluid in the form of a mist of fine drops.

2. Description of the Related Art:

[0002] When performing a cleaning work, brushes, wipes, cleaning cloth, and/or many other cleaning tools may be used. Further, when washing a car, a forced flow of water may be applied. After washing of a car with a forced flow of water, a piece of cloth is usually used to dry and clean the car. This cleaning method takes much time and labor and consumes a big amount of water. To avoid these problems, rotary spray guns are created.

[0003] FIG. 7 illustrates a known design of rotary spray gun. According to this design, the rotary spray gun **A** comprises a grip **A1**, a T-pipe **A2**, a water container **A3** and a nozzle assembly **B**. The nozzle assembly **B** comprises a flared pipe **B1** that has a fixed nut **B11** located on its rear end and threaded onto the front end of a forced-air outlet port **A4** at the front end of the T-pipe **A2** of the rotary spray gun **A**, and a plastic rotary nozzle tube **C**, which has a connector **C1** located on its rear end and connected to an inner thread in the forced-air outlet port **A4** and a plurality of ring-shaped weight members **C2** fastened to the periphery and spaced from one another along the length of the plastic rotary nozzle tube **C**. When operating the grip **A1** to input a flow of forced-air from an external forced-air supply unit, the flow of forced-air flows through the T-pipe **A2** toward the forced-air outlet port **A4** to cause a Venturi effect in the T-pipe **A2**, thus water is sucked out of the water container **A3** for mixing with the flow of forced-air in the forced-air outlet port **A4**. The mixed water and forced-air is then forced out of the plastic rotary nozzle tube **C** for cleaning application.

[0004] The aforesaid rotary spray gun is functional, however it still has drawbacks as follows:

1. Because the plastic rotary nozzle tube **C** is a flexible tube and mounted with the ring-shaped weight members **C2**, it rotates at a high speed subject to the centrifugal effect when the mixed water and forced-air is being forced out. Frequently rotating the plastic rotary nozzle tube **C** at a high speed causes it to wear quickly, and the plastic rotary nozzle tube **C** may break suddenly during rotation.
2. During rotary motion of the plastic rotary nozzle tube **C**, the ring-shaped weight members **C2** are forced to rub against the inside wall of the flared pipe

B1, lowering the speed of rotation of the plastic rotary nozzle tube **C** and damaging the inside wall of the flared pipe **B1**.

5 SUMMARY OF THE INVENTION

[0005] The present invention has been accomplished under the circumstances in view. It is one object of the present invention to provide a rotary spray gun, which eliminates the drawbacks of the aforesaid prior art design.

[0006] To achieve this and other objects of the present invention, a rotary spray gun comprises a control grip, which has an air hose connection located on the bottom side and connected to an external forced-air supply means for guiding in a flow of forced-air, a valve seat located on the top side and disposed in air communication with the air hose connection, a trigger pivoted to the valve seat for controlling output of the flow of forced-air through the valve seat, a connection tube horizontally forwardly extended from the valve seat, a water tube suspending in the connection tube, and an injection tube connected to a distal end of the connection tube, a fluid supply unit providing a fluid to the water tube, and a nozzle assembly fastened to a front connection end of the connection tube within the injection tube and connected to the water tube for directing the fluid out of the water tube. The nozzle assembly comprises a nozzle tube sleeved onto the water tube and connected to the connection tube for guiding in the flow of forced-air from the external forced-air supply means, an adapter tube rotatably mounted on the nozzle tube by a plurality of bearings, and a hard curved nozzle tip connected to one end of the adapter tube and rotatable with the adapter tube for discharging the fluid out of the water tube and the flow of forced-air out of the nozzle tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is a plain view of a rotary spray gun in accordance with the present invention.

FIG. 2 is a sectional view of the rotary spray gun in accordance with the present invention.

FIG. 3 is an exploded view in section of the rotary spray gun in accordance with the present invention.

FIG. 4 is an exploded view of a part of the rotary spray gun in accordance with the present invention.

FIG. 5 is a schematic drawing of the present invention, showing the rotary spray gun in operation.

FIG. 6 is similar to FIG. 5 but showing a brush installed in the outer end edge of the injection outlet of the injection tube.

FIG. 7 is a schematic sectional view of a rotary spray gun according to the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0008] Referring to FIGS. 1–4, a rotary spray gun in accordance with the present invention is shown comprising a control grip 1, a fluid supply unit 2 and a nozzle assembly 3.

[0009] The control grip 1 comprises an air hose connection 11 located on its bottom side for the connection of an air hose of an external forced-air supply means for the inputting of forced air, a valve seat 12 located on its top side and disposed in air communication with the air hose connection 11, a trigger 13 pivoted to the valve seat 12 for controlling output of forced air through the valve seat 12, a connection tube 14 horizontally forwardly extended from the valve seat 12 and terminating in a front connection end 141, a water tube 15, which is concentrically mounted in the connection tube 14 and has its one end turned through 90-degrees and transversely extended out of the bottom side of the connection tube 14 and its other end suspending outside the connection tube 14, and an injection tube 16, which has one end connected to the front connection end 141 of the connection tube 14 and the other end terminating in an injection outlet 161. The injection tube 16 can be fastened to the front connection end 141 of the connection tube 14 by a screw joint, or by means of a tight-fit connection.

[0010] The fluid supply unit 2 comprises a fluid container 21, a screw cap 22 capped on the top side of the fluid container 21, a control valve 23 installed in the screw cap 22 and kept in fluid communication with the water tube 15 in the connection tube 14, a control knob 231 pivoted to the control valve 23 and operable to regulate the flow rate of the control valve 23, and a dip tube 24 vertically downwardly extended from the control valve 23 and suspending in the fluid container 21.

[0011] The nozzle assembly 3 comprises a nozzle tube 31, which has its rear connection 311 located on its rear end and fitted onto the water tube 15 and press-fitted into the front connection end 141 of the connection tube 14 and a front connection 312 at its front end, an adapter tube 32 sleeved onto the front connection 312 of the nozzle tube 31, a plurality of bearings 35 mounted in the adapter tube 32 around the periphery of the front connection 312 of the nozzle tube 31 to support the adapter tube 32 on the nozzle tube 31 for allowing rotation of the adapter tube 32 relative to the nozzle tube 31, a spacer tube 33 sleeved onto the front connection 312 of the nozzle tube 31 within the adapter tube 32 and connected between the bearings 35 to keep the bearings 35 apart, a curved nozzle tip 34, which has a rear connection 341 fastened to one end, namely, the front end of the adapter tube 32 and connected with the water tube 15, and a retaining ring 36 fastened to the front end of the adapter tube 32 to secure the curved nozzle tip 34 to the adapter tube 32 firmly. When the rotary spray gun is assembled, the injection tube 16 surrounds the nozzle assembly 3, and the curved nozzle tip 34 can be rotated with the

adapter tube 32 in the injection tube 16 relative to the nozzle tube 31.

[0012] During installation, connect the air hose connection 11 of the control grip 1 to an external forced-air supply means (not shown), then connect the connection tube 14 to the valve seat 12 and the control valve 23 to keep the water tube 15 in fluid communication with the dip tube 24 in the fluid container 21 of the fluid supply unit 2, and then connect the rear connection 311 of the nozzle tube 31 of the nozzle assembly 3 to the front connection end 141 of the connection tube 14 to keep the curved nozzle tip 34 in fluid communication with the water tube 15 in the connection tube 14, and at final connect the injection tube 16 to the front connection end 141 of the connection tube 14 around the nozzle assembly 3.

[0013] Referring to FIGS. 5 and 6, when using the rotary spray gun, rotate the control knob 231 to adjust the opening degree of the passage between the dip tube 24 and the control valve 23, i.e., to regulate the flow rate of the control valve 23. When pressing the trigger 13 at this time, the forced-air is guided through the air hose connection 11 and the valve seat 12 into the connection tube 14 and then the nozzle tube 31, the spacer tube 33 and the curved nozzle tip 34. When the forced-air enters the connection tube 14, a Venturi effect is produced in the control valve 23, causing the fluid to be sucked through the dip tube 24 into the water tube 15. At this time, the forced-air causes rotation of the curved nozzle tip 34 with the adapter tube 32 in the injection tube 16 relative to the nozzle tube 31 due to the eccentric design of the curved nozzle tip 34, and therefore the fluid that flows through the water tube 15 is forced out the injection outlet 161 of the injection tube 16 by the forced-air in a fine mist for removing dust from an object. Further, the curved nozzle tip 34 is made of a non-soft material, for example, metal or hard plastics, having high strength and toughness for long service life. Therefore, rotation of the curved nozzle tip 34 with the adapter tube 32 does not cause the nozzle tip 34 to break.

[0014] Further, a brush 163 may be installed in an outer end edge 162 of the injection outlet 161 of the injection tube 16, as shown in FIG. 6. Further, the injection tube 16 can be a flared tube with its injection outlet 161 expanding outward.

[0015] Further, a water intake tube may be used to substitute for the aforesaid fluid container 21 and to guide water from an external water source to the control valve 23.

[0016] As stated above, the invention provides a rotary spray gun, which has the following features and advantages:

1. The curved nozzle tip 34 of the nozzle assembly 3 is made of a hard or rigid material that does not break during a high speed rotation.
2. The adapter tube 32 is rotatably mounted on the nozzle tube 31 to hold the spacer tube 33 and the curved nozzle tip 34. Therefore, the curved nozzle

tip **34** can be rotated with the adapter tube **32** inside the injection tube **16** at a high speed without friction contact with the inside wall of the injection tube **16**.

[0017] A prototype of rotary spray gun has been constructed with the features of FIGS. 1~6. The rotary spray gun functions smoothly to provide all of the features disclosed earlier.

[0018] Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A rotary spray gun, comprising:

a control grip, said control grip comprising an air hose connection located on a bottom side thereof and connected to an external forced-air supply means for guiding in a flow of forced-air, a valve seat located on a top side thereof and disposed in air communication with said air hose connection, a trigger pivoted to said valve seat for controlling output of said flow of forced-air through said valve seat, a connection tube horizontally forwardly extended from said valve seat, a water tube suspending in said connection tube, and an injection tube connected to a distal end of said connection tube;
a fluid supply unit providing a fluid to said water tube, and
a nozzle assembly fastened to a front connection end of said connection tube within said injection tube and connected to said water tube for directing said fluid out of said water tube;
wherein said nozzle assembly comprises:

a nozzle tube sleeved onto said water tube and connected to said connection tube for guiding in said flow of forced-air from said external forced-air supply means;
an adapter tube rotatably mounted on said nozzle tube by a plurality of bearings; and
a hard curved nozzle tip connected to one end of said adapter tube and rotatable with said adapter tube for discharging said fluid out of said water tube and said flow of forced air out of said nozzle tube.

2. The rotary spray gun as claimed in claim 1, wherein said injection tube comprises a distal end terminating in an injection outlet, and brush means located on said injection outlet.

3. The rotary spray gun as claimed in claim 1, wherein said fluid supply unit comprises a fluid container holding said fluid, a screw cap capped on a top side of said fluid container, a control valve installed in said screw cap and kept in fluid communication with said water tube in said connection tube, a control knob pivoted to said control valve and operable to regulate the flow rate of said control valve, and a dip tube vertically downwardly extended from said control valve and suspending in said fluid container.

4. The rotary spray gun as claimed in claim 1, wherein said nozzle tube comprises a rear connection located on a rear end thereof and fitted onto said water tube and press-fitted into said front connection end of said connection tube, and a front connection located on a front end thereof for the mounting of said adapter tube.

5. The rotary spray gun as claimed in claim 1, wherein said fluid supply unit comprises a control valve installed in said screw cap and kept in fluid communication with said water tube in said connection tube, a control knob pivoted to said control valve and operable to control the flow rate of said control valve, and a tube connected to an external water supply pipe of an external water source.

6. The rotary spray gun as claimed in claim 1, wherein said injection tube is a flared tube.

7. The rotary spray gun as claimed in claim 1, wherein said nozzle assembly further comprises a spacer tube mounted within said adapter tube around said nozzle tube and connected between said bearings.

8. The rotary spray gun as claimed in claim 1, wherein said nozzle assembly further comprises a retaining ring fastened to said adapter tube to secure said curved nozzle tip.

9. The rotary spray gun as claimed in claim 1, wherein said curved nozzle tip is made of a metal material.

10. The rotary spray gun as claimed in claim 1, wherein said curved nozzle tip is made of a hard plastic material.

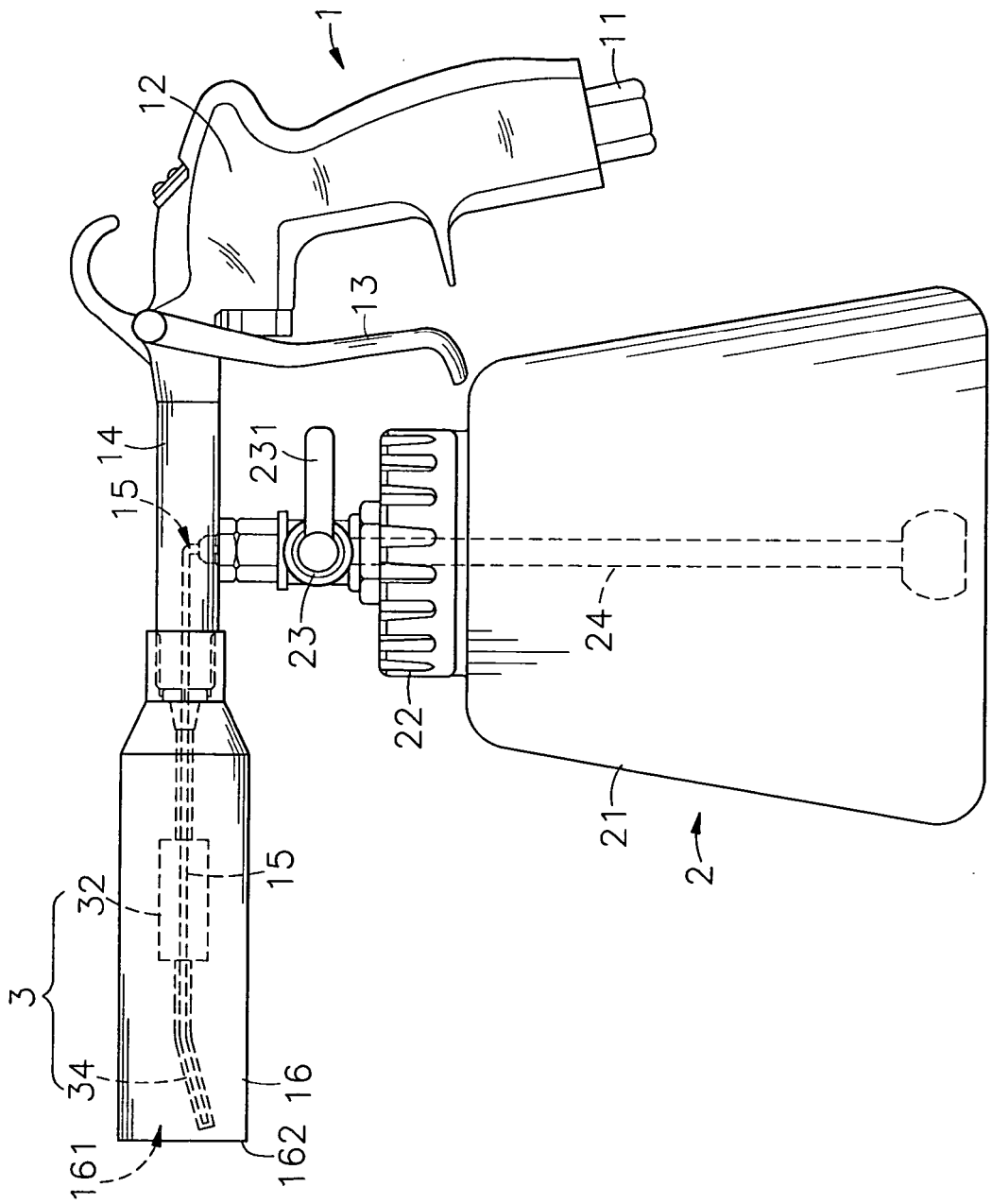


FIG. 1

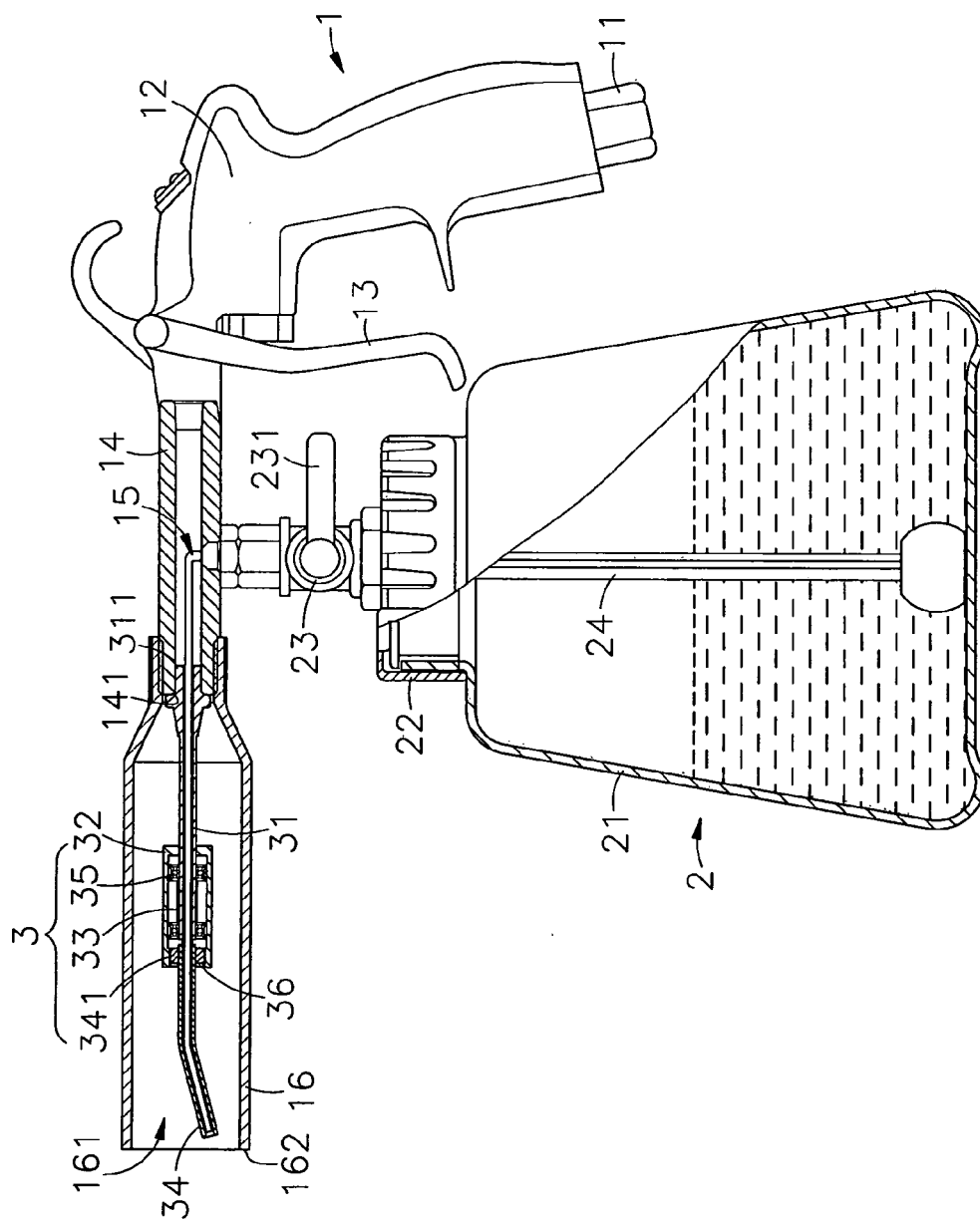


FIG. 2

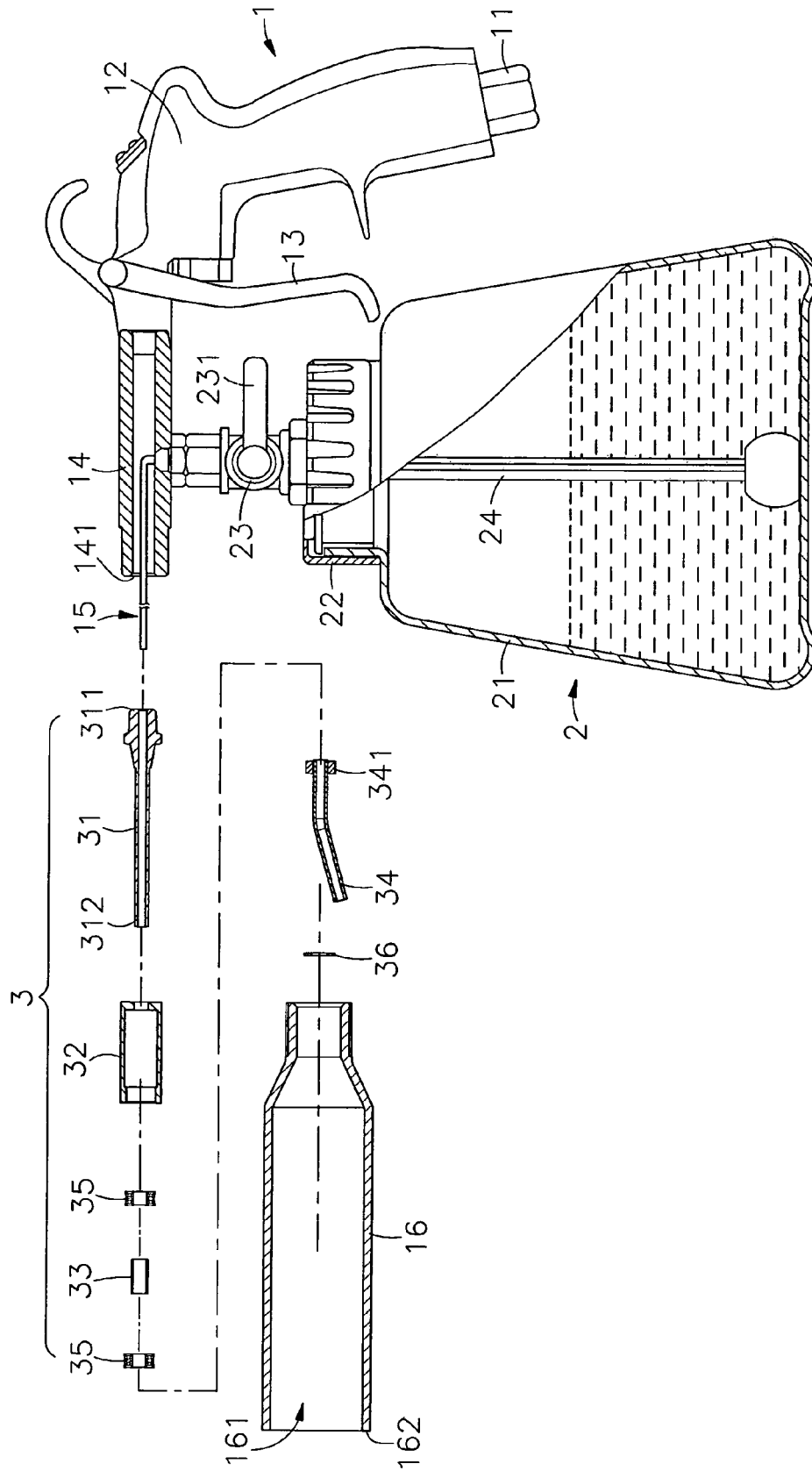


FIG. 3

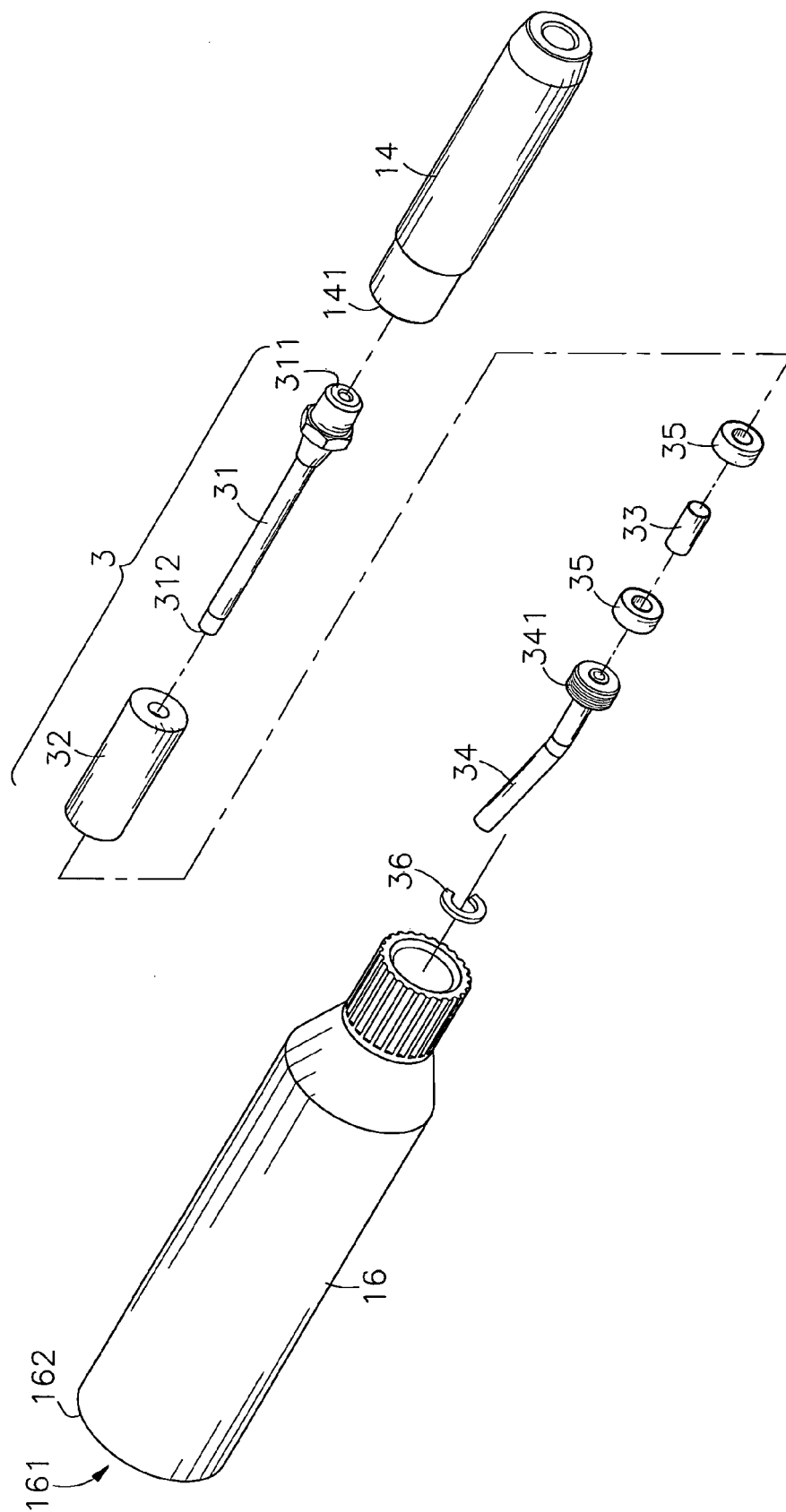


FIG. 4

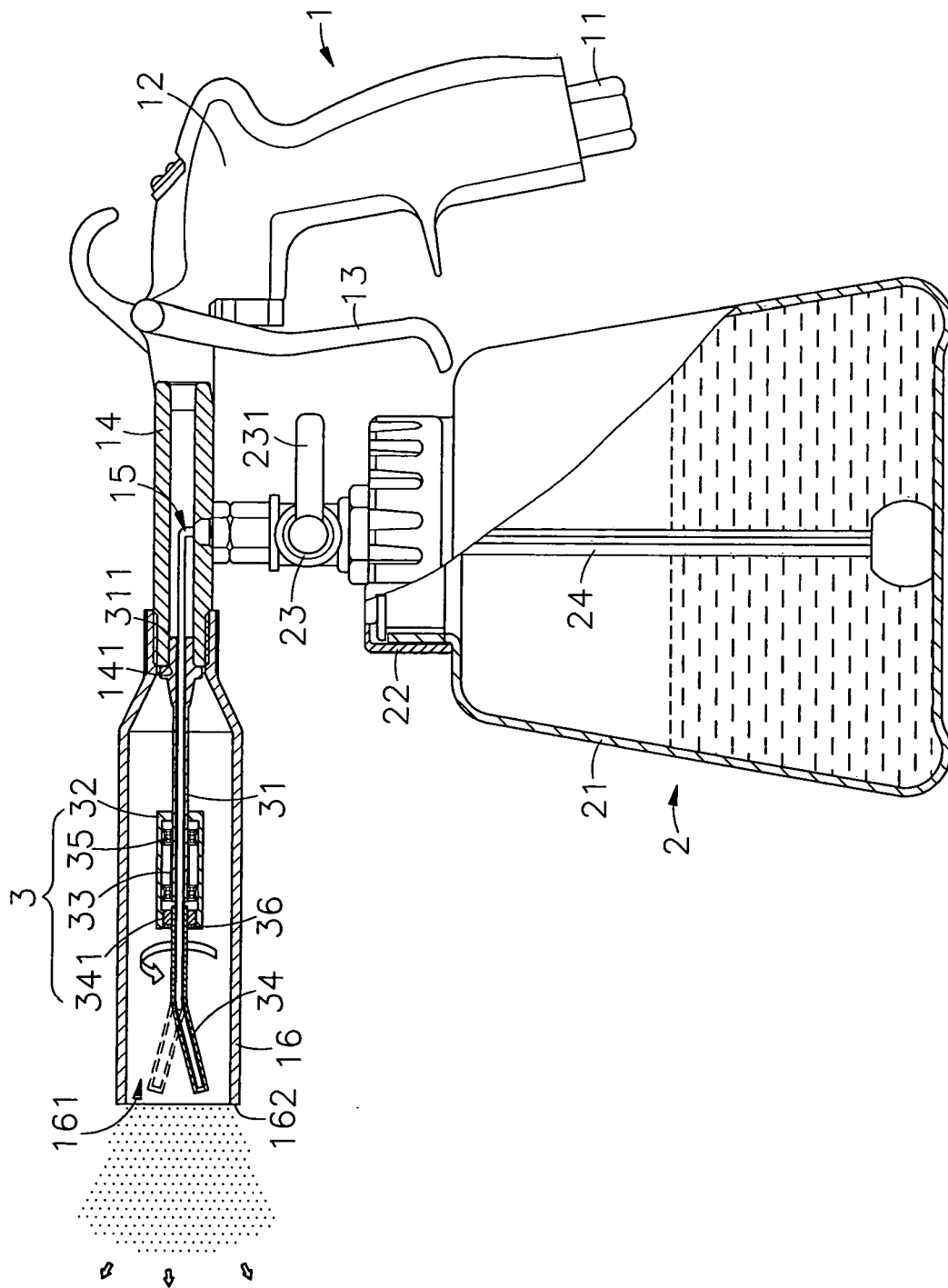


FIG. 5

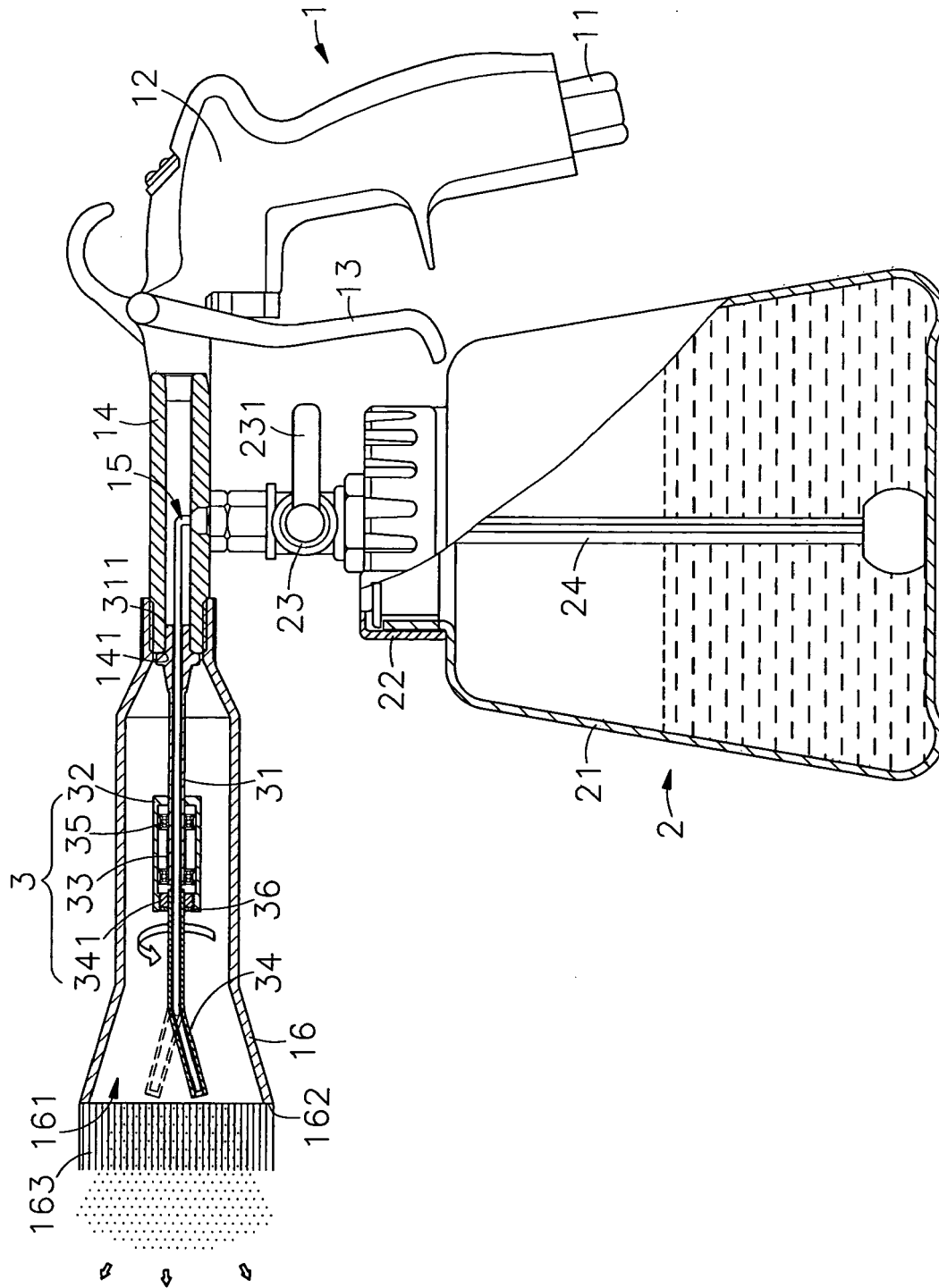
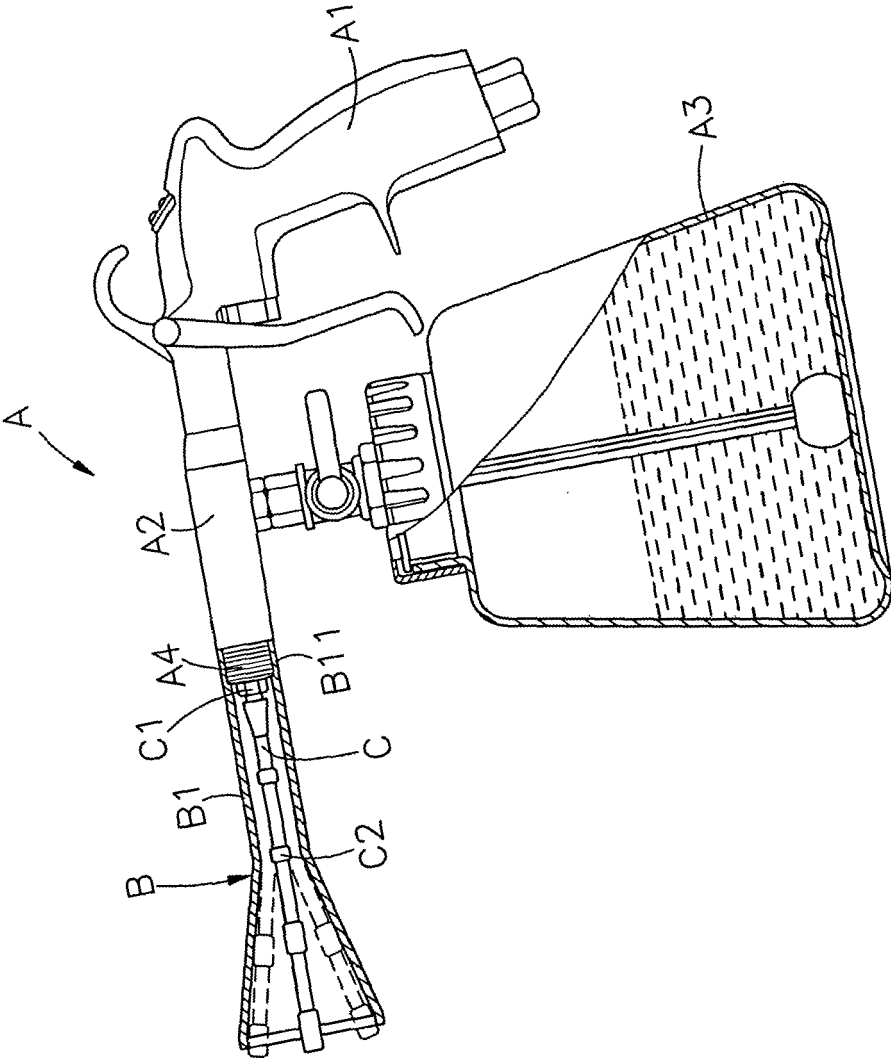


FIG. 6



PRIOR ART
FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 09 00 2360

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Place of search Munich		Date of completion of the search 17 July 2009	Examiner Frego, Maria Chiara
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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