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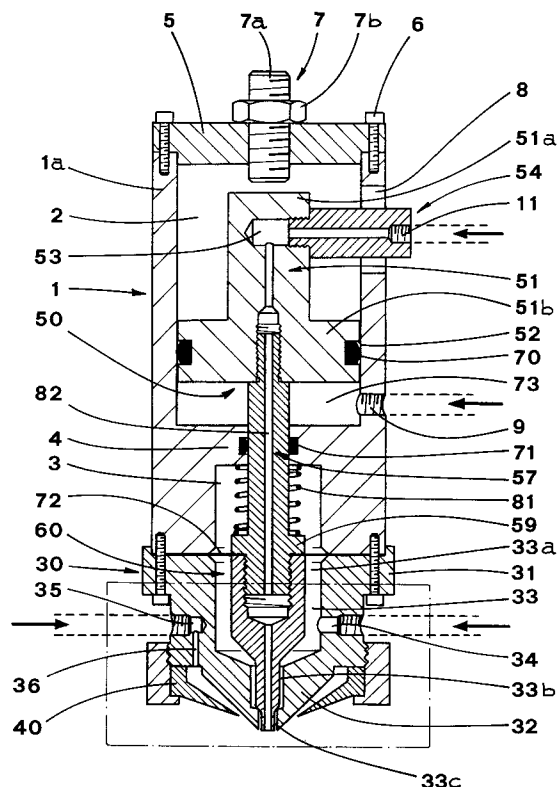
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I-40124 Bologna (IT)(54) **Improved spray gun for glue applications.**

(57) An improved atomising type spray gun for glue application comprises a hollow body (1), with a movable member (50) inserted therein, and forming, in its lower part, a nozzle (60). The movable member (50) slides in a collar section (4) between a closing position (A) and an opening position (B).

The movable member (50) has an axial hole (82) for injecting compressed air and discharging it at an exit orifice (84). The hollow member (1) and nozzle (60) delimit a hollow (33) wherein glue under pressure is injected that is then discharged through a ring-like passage 80 that opens at the said exit orifice (84).

A ring (40) is fixed to the outer surface of the terminal part of the hollow member (1), thus forming a ring-like recess (43), that is supplied with solvent under pressure with a ring-like orifice (44) by which a stream of solvent is directed towards the exit orifice (84).

**FIG. 1****EP 0 682 986 A2**

The present invention relates to a spray gun for application of atomised liquid viscous substances, e.g. glues, on predetermined surfaces.

When the glue is atomised, it results in a more uniform distribution of the same glue on the surfaces.

There are known devices aimed at continuously or intermittently ejecting streams of glue coming from a special container, and at mixing the glue with compressed air in order to atomise it.

One of such devices is described in the European Patent No. 01238253, owned by the same Applicant.

The said device, often identified as spray gun, is formed by a spreading and atomising unit that is supplied with glue and compressed air coming from containers according to consent of flow valve means.

The above mentioned spreading unit includes a main member, comprising three cylindrical portions having respective decreasing diameters.

The said member has an axial hole leading to outside at the lower end, and joining at the top a transverse connecting member.

Glue coming from the respective container is made to pass through this axial hole.

The two cylindrical portions of smaller diameter are held inside a cup-like element that is connected, in coaxial relationship, with the said member so as to delimit an internal chamber designed to contain the compressed air.

The chamber communicates with outside and with the compressed air container through a channel.

At the lower end of the main member, there is joined a nozzle with an axial orifice, leading to outside, made in the bottom of the cup-like element and having a diameter slightly bigger than the diameter of the nozzle.

The glue and air flow valve means are activated contemporarily, thus causing emission of a stream of glue from the above mentioned nozzle, and of an annular jet of compressed air from the annular channel delimited by the said nozzle and the orifice made in the said bottom.

Thus, the glue is atomised and spread on a roughly circular area in a uniform way that is satisfactory.

The above described device has some drawbacks, resulting from the fact that, after long usage, solidified residues of glue remain in the nozzle and they cannot be removed by the depression effect caused by the annular flow of compressed air.

Such solidifications make the glue stream irregular and therefore the distribution of the glue on the surface to be treated is not uniform.

Moreover, the nozzle can be clogged partially or totally by small quantities of glue that can come out of the nozzle when the spray gun is deactivated, since the glue flow is blocked only outside the device.

The object of the present invention is to propose a device, or spray gun, for application of atomised glue, that does not have the above mentioned inconveniences, ensuring the best glue distribution in every moment.

The above mentioned object is obtained in accordance with the contents of the claims.

The characteristic features of the present invention are pointed out in the following with reference to the enclosed drawings, in which:

- Figure 1 shows a schematic side sectional view of the spray gun for the application of atomised glue, being the subject of the present invention;
- Figure 2 shows an enlarged view of a detail of Figure 1, defined by the broken line.

With reference to Figures 1 and 2, reference numeral 1 indicates a hollow member, of substantially cylindrical section and open at its ends.

Inside the said member 1 there are made two chambers, namely an upper chamber 2 and lower chamber 3, separated by a collar section 4.

Preferably, the diameter of the lower chamber 3 is smaller than the diameter of the upper chamber 2.

The member 1 is closed at the top by a cover 5 fastened thereto by screws 6.

In the cover 5 there are situated adjusting means 7 mounted in an axial through hole made in the said cover 5, and formed, preferably, by a screw 7a that is locked in a predetermined position by a lock nut, so that a predetermined adjustable part of the screw protrudes toward the upper chamber 2.

The upper chamber 2 communicates with outside by means of a slot 8, made in one side of the hollow member close to its upper end, and by means of a threaded through hole 9, also made in the side of the hollow member but close to the said collar section 4. The hole 9 is aimed at allowing introduction of compressed air into the upper chamber 2.

Preferably, the hollow member 1 includes a main member 1a and a secondary member 30 that is basically cylindrical in its upper part 31, while its lower terminal part 32 has a diameter smaller than the diameter of the upper part 31 and is tapered.

The secondary member 30 has a hollow 33, formed by three cylindrical sections of decreasing diameter, respectively an upper section 33a, an intermediate section 33b, and a lower section 33c.

The lower section 33c is open to the outside by means of an exit orifice 84, while the upper

section 33a is adjacent and coaxial with respect to the lower chamber 3 of the main member 1a, and has a diameter equal to the diameter thereof.

The inferior part of the upper section 31 is externally threaded so that a screw cap 41 can be screwed thereonto to constrain a ring 40 that remains in abutment on the same upper section 31, so as to cover the terminal section 32.

The ring 40 is tapered according to an angle bigger than the taper angle of the terminal section 32, so as to delimit a ring-like recess 43 therebetween, opening downwards by a ring-like orifice 44.

This orifice is delimited by the lower edge of the ring 40 and by the surface of the terminal section 32 facing the ring 40.

The clearance of the ring-like orifice is small enough to allow solvent to go out in such quantities that a thin layer thereof is formed on the lower surface of the terminal section 32, up to the exit orifice 84.

The secondary member 30 has also glue supplying means 34 and solvent supplying means 35. The solvent supplying means 35 are connected at one side to a container of solvent under pressure, that is not shown, and at the other side to the ring-like recess 43, via a feeding duct 36.

Inside the main member 1a and the secondary member 30 there is located a movable member 50, aimed at directing and controlling the flows of glue and compressed air.

In its lower part, the movable member 50 features a nozzle 60, with axially joined thereto, by means of threaded couplings, other two blocks, a first block 51 and a second block 57 respectively.

The first block 51 is located inside the upper chamber 2 and includes two segments, upper 51a and lower 51b, respectively.

The diameter of the lower segment 51b is bigger than the diameter of the upper segment 51a and equal to the diameter of the said upper chamber 2.

A transverse blind hole 53 is made in the first bar 51 close to its upper end.

A connection member 54 is screwed to the transverse hole 53, by means of a threaded coupling, and goes out of the main member 1a through the slot 8, whose length is not smaller than the full displacement of the movable member 50.

The second block 57, basically cylindrical, is slidably inserted inside the collar section 4 described before, is threaded at both its ends and, right over the lower threading, it features a flange 59.

The nozzle 60 has three cylindrical portions of decreasing diameter respectively, upper 60a, intermediate 60b, and lower 60c, which fit to the shape of the hollow 33 of the secondary member 30 and

are joined one to another by tapered sections.

In particular, the lower portion 60c of the nozzle 60 is introduced in the lower section 33c of the hollow 33 and is similar in length thereto, so as to define a ring-like passage 80 that leads to the outside.

The movable member 50 has also an axial hole 82, that includes a series of holes connected one to another and respectively made in the nozzle 60, in the second block 57 and in the first block 51, so that the lower end of the nozzle 60 can be set into communication with a controlled compressed air feeding device, that is not illustrated.

There are also tight means, respectively first 70, second 71 and third 72.

The first tight means 70 include e.g. a first sealing ring, introduced in a respective first circular groove 52 made in the outer surface of the segment 51b of the first block 51.

The second tight means 71 include, in similar way, a second sealing ring, introduced in a respective second circular groove made in the circular inner surface of the collar section 4.

The first 70 and second 71 sealing rings provide tightness for a delimit an airtight chamber 73 whose volume can be varied, that is filled with compressed air. For this purpose, the airtight chamber 73 is connected, via the threaded hole 9, with a controlled compressed air feeding device that is not illustrated.

The third sealing ring 72 is preferably formed by an ring-like elastic partition, whose outer edge is placed and locked between the main member 1a and the secondary member 30, while its inner edge is placed and locked between the second block 57 and the nozzle 60 of the movable member 50.

The said ring-like elastic partition 72 forms the upper wall of the hollow 33, that is connected, via the glue supplying means 34, with a container of glue under pressure, not illustrated since known.

Moreover, the ring-like elastic partition 72 allows the movable member 50 to slide axially.

In the central part of the said second block 57, there are located elastic reaction means 81, including e.g. an helical spring, acting on the collar section 4 and the flange 59, so as to push downwards the movable member 50 until it reaches a closing position A, illustrated in Figure 2.

In this position, the intermediate portion 60b of the nozzle 60 closes the connection between the ring-like passage 80 and the hollow 33, preventing the same glue from going out.

Operation of the device for glue application will be described in the following, with reference to an inoperative starting situation, in which the movable member 50 is in the closing position A, while the glue is not supplied via the through hole 34, the solvent is not supplied via the hole 35, and the

compressed air is not supplied via the hole 9 and the axial hole 82.

Just before using the device, compressed glue is introduced in the hollow 33.

The glue cannot reach the ring-like passage 80, since its opening is closed by the intermediate portion 60b of the nozzle 60 and therefore the glue remains closed in the hollow 33.

Then, when the device is in operation, compressed air is injected in the airtight chamber 73 and, not necessarily at the same time, in the axial hole 82.

The pressure in the chamber 73 increases and, subsequently, the movable member 50 is axially pushed upwards with a force bigger than the reaction of the helical spring 81, so that the spring is compressed and the movable member 50 slides until it reaches the opening position B, not illustrated, defined by the adjusting means 7, against which the upper end of the first block 51 strikes.

In this position, the hollow 33 is again connected with the ring-like passage 80, through which glue can be spread out in an ring-like jet directed downwards.

The compressed air goes out through the lower end of the nozzle 60, in coaxial relation with and in the middle of the glue stream, thus atomising the glue and distributing it in a circular area concentric with the same nozzle 60.

In a preferred embodiment of the present invention, also the said means 35 feeding the ring-like recess 43 with the solvent are activated. A thin layer of solvent goes out of the recess 43 through the ring-like opening 44 and comes, substantially by action of gravity, at the opening of the ring-like passage 80, thus preventing solidification of glue going out through the said opening 84.

When the device is to be stopped, first the injection of glue is cut off, then the compressed air for atomising the glue is cut off, then the air present in the chamber 73 is let out through the hole 9, and finally, the solvent is no longer injected into the ring-like recess 43.

The reduction of pressure in the chamber 73 allows the helical spring 81 to displace the movable member 50 again to the closing position A and consequently, to stop the flow of glue toward the ring-like passage 80.

In a different embodiment of the present invention, the solvent is introduced only for a predetermined period of time, immediately after and/or before stopping the device.

The present invention, as described and illustrated allows to apply glue, on industrial scale, in a uniform and constant way. In fact, the particular structure of the outlet orifices for glue and compressed air, together with constant flow of solvent

towards the glue exit orifice, permit to avoid any possibility of glue solidification and therefore any unhomogeneity of the distribution of the atomised stream of glue.

It is to be particularly pointed out that the original ring-like arrangement of the glue stream and atomising compressed air jet thereinside allows the best space distribution of the same glue on the surfaces to be glued.

It is obvious that what above has been described as a mere, not limitative example, therefore all possible constructive variants are protected by the present technical solution, as described above and claimed in the following.

Claims

1. Improved atomising type spray gun for applying glue by means of a jet of compressed air, characterised in that it includes:
 - at least one hollow body featuring, at the lower end, a tapered terminal portion (32) that delimits a hollow (33) made in the said lower end and that has an exit orifice (84) that connects the said hollow (33) with outside;
 - at least one movable member (50), situated inside the said body (1) and featuring an axial hole (82) aimed at feeding compressed air and including, at its section situated inside the said hollow (33), a nozzle (60), the said movable element (50) being moved axially between a closing position (A), in which the said nozzle (60) closes the said exit orifice (84), and an opening position (B), in which it delimits, along with the said terminal end (32), a ring-like passage (80), through which glue under pressure, coming from the said hollow (33), passes;
 - at least one ring (40) that is fixed to the outer surface of the said terminal portion (32) and that partially covers it, so as to define a ring-like recess (43) supplied with solvent under pressure, and a ring-like orifice (44) located at the end of the ring-like recess close to the exit orifice (84), this ring-like orifice ejecting a stream of solvent toward the said exit orifice (84);
 - compressed air supply means (11), provided for injecting compressed air into the said axial hole (82), so as to atomise the glue when the said movable member (50) is in the opening position (B);
 - glue supplying means (34) provided for injecting glue under pressure into the said chamber (33);
 - solvent supplying means (35) provided for injecting solvent under pressure into the said ring-like recess (43);
 - adjusting means (7) designed to define the opening position (B) for the movable element

- (50).
2. Spray gun according to claim 1, characterised in that it includes an elastic ring-like partition (72) whose outer edge is fixed to the said body (1), and whose inner edge is fixed to the movable member (50), so that the said movable member (50) is allowed to move between the closing position (A) and the opening position (B), the partition (72) also defining the upper wall of the said hollow (33) aimed at preventing the glue to spread inside the spray gun.

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 3. Spray gun according to claim 1, characterised in that the said movable member (50), in its central part, features a lower section (51b), slidably guided by the said hollow body (1), and an upper section (51a) featuring a transverse hole connected (53) to the said axial hole (82) and made accessible from outside by means of a connection member (54) that passes through a slot (8) made in the said hollow body (1), this slot extending longitudinally to the same hollow body (1) and having a length at least equal to the maximum displacement of the said movable element (50).

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 4. Spray gun according to claim 1, characterised in that the said hollow body (1) features, in its central part, a collar section (4), through which the said movable element (50) passes, the said collar section (4) and movable element (50) together defining an airtight chamber (73) that is connected with further compressed air supplying means (9) which, when activated, urge the said movable member (50) towards the said opening position (B), against elastic reaction of elastic means (81).

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 5. Spray gun according to claim 1, characterised in that the said ring (40) is kept in abutment against a surface (31a) of the said hollow body (1), centred with respect thereto, by a screw cap (41).

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 6. Spray gun according to claim 1, characterised in that the said annular recess (43), delimited by the said ring (40), is supplied with solvent under pressure by the said solvent supplying means (35), through a feeding duct (36).

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 7. Spray gun according to claim 6, characterised in that the said solvent supplying means (35) deliver a continuous stream of solvent to the said ring-like orifice (44).

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 8. Spray gun according to claim 6, characterised in that the said solvent supplying means (35) deliver an intermittent stream of solvent to the said ring-like orifice (44).

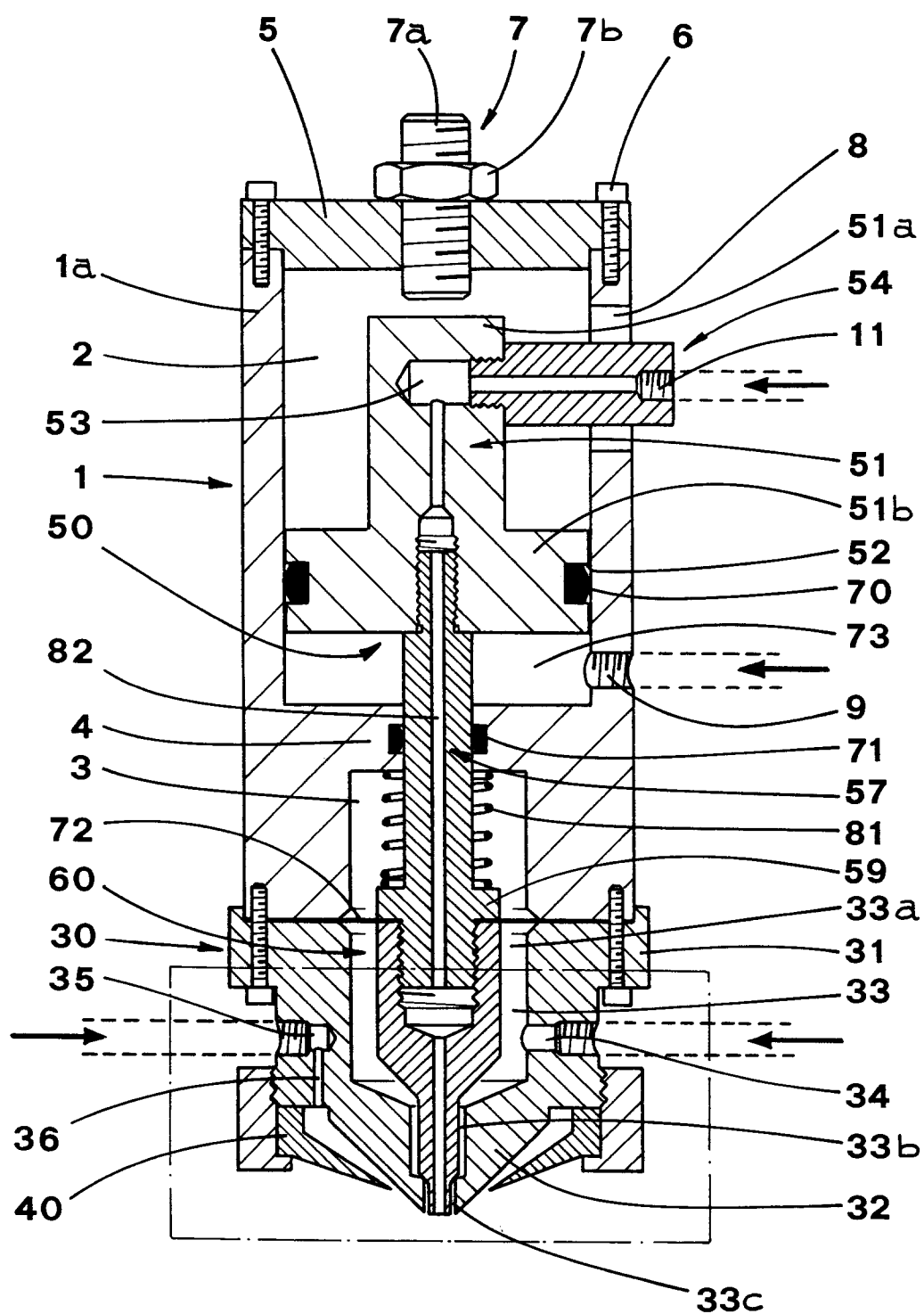


FIG. 1

FIG. 2

