

Outlet nozzle for a cartridge system

The invention relates to an outlet nozzle for a cartridge system for opening a flexible fluid container, with at least one inlet opening formed by an inlet pipe connector, with at least one outlet opening, with a fluid passage extending from the inlet opening to the outlet opening, and with a perforation means configured at the inlet pipe connector for piercing the fluid container.

Outlet nozzles of the type mentioned above are known from the prior art and are used in connection with cartridge systems for spraying fluids, such as for example resins. In a cartridge system of this type, the fluid to be sprayed is located in an initially closed flexible fluid container, such as, for example a plastics material bag. In the cartridge system, this fluid container is arranged inside a tubular cartridge, which is fitted in a metering pistol. To spray fluid, an actuating piston of the dosing pistol presses the fluid container in the cartridge against the outlet nozzle, which is arranged at the end of the cartridge, opposing the actuating piston. If a new, unopened fluid container is pressed against the outlet nozzle, the perforation means of the outlet nozzle pierces the fluid container, so the fluid container slides over the nozzle and fluid can flow out of the outlet opening. The emptied fluid container, after the actuating piston has been drawn back, is removed from the cartridge and replaced by a new, full fluid container. The cartridge and the metering pistol are reusable in this case.

The problem exists in known outlet nozzles that the perforation means may malfunction and a new fluid container is not reliably opened during operation of the cartridge system. Rapid use of the cartridge system with a new fluid container is therefore not possible. Furthermore, it may occur in the outlet nozzles from the prior art that fluid escapes between the opened fluid container and the outlet nozzle and soils the cartridge system with fluid.

The object of the invention is therefore to provide an outlet nozzle, by means of which the fluid container is reliably opened during operation of the cartridge system and fluid is prevented from escaping between the fluid container and outlet cover.

This object is achieved according to the invention in that the inlet pipe connector comprises an external peripheral face which tapers with respect to the inlet opening and an inlet end face which is inclined relative to a longitudinal axis of the pipe connector of the inlet pipe connector at an acute angle of inclination and encloses the inlet opening and in that the perforation means has at least one cutting edge, which is formed by the intersection line of the inlet end face with the external peripheral face of the inlet pipe connector.

The solution according to the invention is simple in construction and has the advantage that the fluid container that is pressed against the outlet cover is easily and reliably pierced by means of the cutting edge.

The inclined inlet end face forms a projecting cutting edge portion, in which the pressure of the fluid container is concentrated on the outlet nozzle, so the wall of the fluid container can be particularly easily pierced.

The pierced fluid container then slides with its pierced opening cut open by the cutting edge over the pipe connector. As the pipe connector widens behind the cutting edge, the slid-on pierced opening of the fluid container clamps tightly around the pipe connector. The fluid container is therefore sealed with respect to the outlet cover, so no fluid escapes next to the pipe connector.

The outlet nozzle according to the invention can be further developed by various configurations which are independent from one another and in each case intrinsically advantageous. These configurations and the advantages connected in each case with the configurations will be briefly dealt with below.

A cutting edge angle of the cutting edge may thus be configured as a acute angle between the external peripheral face of the pipe connector and the inlet end face. This has the advantage that the cutting edge is sharp, so it can particularly easily penetrate the flexible wall of the fluid container, which is, for example, produced from a plastics material. Particularly good results have been shown in tests with a cutting angle of less than 60°.

Furthermore, the angle of inclination of the inlet end face may form at least two thirds of the cutting edge angle in an advantageous development. It has been shown that the sliding on of the pierced opening of the fluid container onto the pipe connector, which is particularly important for the tightness, is particularly reliably ensured with this development. With an angle of inclination which is too small, it may occur that the pierced opening which has been cut open cannot be slid completely over the inlet opening and that fluid escapes inside the cartridge. The inlet end face can be configured in a substantially level or undulating manner.

In order to clamp the pierced opening cut by the perforation means in the fluid container as uniformly as possible around the pipe connector, the pipe connector may have a substantially conical external peripheral face, at least in portions. It has been shown that a cone angle of between 2° and 30° , preferably 20° is particularly suitable.

In a further advantageous configuration, the pipe connector may have a substantially conical internal peripheral face, at least in portions, which tapers in the direction of the inlet opening. The wall thickness of the pipe connector, which tapers at the external peripheral face, is thus increased and the strength of the pipe connector is increased. Owing to the improved strength, softer materials, such as plastics materials, for example, can also be used to produce the outlet nozzle, so the outlet nozzle can be produced economically, for example as an injection moulded part. A cone angle of about 11° has proven to be particularly suitable in tests. Furthermore, the cone angle of the internal peripheral face may be smaller than the cone angle of the external peripheral face.

Particularly reliable operation of the perforation means has been shown when the maximum length of the inlet pipe connector in the longitudinal direction of the pipe connector is greater than the inside width of the inlet opening transverse to the longitudinal axis of the pipe connector. Thus, the perforation means projects adequately far into the flexible fluid container to build up sufficient pressure to pierce the wall of the fluid container.

To improve the seal between the outlet nozzle and the fluid container, the outlet nozzle may have a flange which extends in the peripheral direction around the pipe connector, with a sealing face. During operation in the cartridge system, the opened fluid container is pressed

against the sealing face by the pressure of the actuating piston, so no fluid escapes. A sealing means, which is a non-adhesive or adhesive sealing means, such as mastic, for example, may be arranged on the sealing face. The sealing means is preferably elastic. The adhesive sealing means has the advantage that it sticks the wall of the flexible fluid container to the sealing means and thus seals it. Moreover, the stickiness brings about the effect that the outlet nozzle can be simply and reliably removed together with the fluid container. In addition, a preferably elastic deformable cushioning means, for example a foam may be arranged between the sealing face and the sealing means to further improve the seal.

It is also advantageous to configure the maximum length of the inlet pipe connector with respect to the longitudinal axis of the pipe connector to be smaller than the external diameter of the flange. Thus, the fluid quantity remaining in the emptied fluid container is kept small as the inlet pipe connector limits the travel of the actuating piston in the metering system.

In a further advantageous configuration, the projection of the inlet opening transverse to the longitudinal direction may be substantially rectangular, at least in portions to improve the operation of the perforation means arranged on the inlet opening and to increase the inlet opening. With this substantially rectangular configuration, it has surprisingly been shown that the fluid container can be particularly reliably perforated.

The invention will be described below by way of example with reference to the accompanying drawings. The different features may, in this case, be combined, independently of one another, as was already shown above in the individual advantageous configurations.

In the drawings:

Fig. 1 to 2 schematically show a first embodiment of the outlet nozzle according to the invention in two different perspective views;

Fig. 3 shows a plan view of the outlet nozzle according to the invention from Fig. 1 along a direction C;

Fig. 4 shows a lateral view of the embodiment according to the invention of Fig. 1 to 3 in a sectional view along a line A-A from Fig. 3;

Fig. 5 shows a sectional view of the embodiment of Fig. 1 to 4 along a line B-B in Fig. 3;

Fig. 6 to 7 show a further embodiment of an outlet nozzle according to the invention in two different perspective views;

Fig. 8 shows a plan view of the embodiment from Fig. 6 along a direction C;

Fig. 9 shows a schematic sectional view of the embodiment of Fig. 6 to 8 along an intersection line B-B in Fig. 8;

Fig. 10 shows a schematic sectional view of the embodiment of Fig. 6 to 9 along an intersection line A-A in Fig. 8;

Fig. 11 shows a schematic view of a cartridge system in a first position;

Fig. 12 shows a schematic view of the cartridge system from Fig. 11 in a second position;

Fig. 13 shows a schematic view of a further embodiment of an outlet nozzle according to the invention;

Fig. 14 shows a schematic view of a further embodiment of an outlet nozzle according to the invention.

The general structure of an outlet nozzle 1 according to the invention is firstly shown with reference to Fig. 1 to 5 and the embodiment shown therein by way of example.

The outlet nozzle 1 comprises an inlet pipe connector 2, a flange 3 and an outlet pipe connector 4. The inlet pipe connector 2 has an inlet opening 5, and the outlet pipe connector 4 an outlet opening 6, between which is configured a fluid passage 7 of the outlet nozzle 1.

The inlet pipe connector 2 has an external peripheral face 8, which is formed conically with an acute cone angle α_1 in the embodiment of Fig. 1 to 5. The cone angle α_1 is configured between 2° and 30° , preferably about 20° . The external peripheral face 8 tapers from the flange 3 in the direction of the inlet opening 5.

The inlet pipe connector 2 also has an internal peripheral face 9, which is conical in the embodiment of Fig. 1 to 5. Like the external peripheral face 8, the internal peripheral face 9 forms a portion of a straight cone, with an acute cone angle α_2 . The cone angle α_1 is greater than the cone angle α_2 , so the wall thickness of the inlet pipe connector 2 constantly reduces in the direction of the inlet opening 5. The cone angle α_2 is about 11° , for example, in the embodiment of Fig. 1 to 5.

On the side of the inlet opening 5, the inlet pipe connector 2 ends with an inlet end face 10. The level inlet end face 10 is configured so as to be inclined at an acute angle of inclination α_3 with respect to the longitudinal axis 11 of the pipe connector and surrounds the inlet opening 5. The inlet end face 10 may adopt any forms, such as, for example, a channel or undulations. The inlet pipe connector 2 has a perforation means 12", which, in the embodiment of Fig. 1 to 5, comprises a cutting edge 12. The intersection line of the inlet end face 10 with the external peripheral face 8 extends around the inlet opening 5 and forms the cutting edge 12. The cutting edge angle α_4 changes in the peripheral direction of the inlet connector 2. The length H of the inlet connector 2 also varies in the peripheral direction. The cutting edge angle α_4 is minimal at a tip 13, at which the length H is maximal. The angle of inclination α_3 is measured between the longitudinal axis 11 of the pipe connector and a straight line through two points of the inlet end face 10, in which the length H is minimal or maximal. The inlet end face 10 may extend as a line, in portions, if the external and the internal peripheral face 8, 9 meet one another and intersect.

The inlet pipe connector 2 ends at the flange 3 with an external diameter D1. At the end of the inlet opening 5, the tapering inlet pipe connector 2 has a smaller external diameter D2 compared to D1. The inlet opening 5 has an inside width d1, the projection of the inlet opening 5 being substantially circular transverse to the longitudinal axis 11 of the pipe connector in the embodiment of Fig. 1 to 5. The inside width or the internal diameter of the fluid passage 7 increases in the direction of the outlet opening 6 up to a diameter d2.

The flange 3 adjoining the inlet pipe connector 2 is disc-shaped as a circular cylinder with the external diameter D3 and a thickness 14 in the embodiment of Fig. 1 to 5. A substantially level sealing face 15, on which a disc-shaped seal 16 is arranged, is configured at right angles to the longitudinal axis 11 of the pipe connector, on the flange 3. The seal 16, in the embodiment in Fig. 1 to 5, has adhesive properties, so the seal 16 is fastened, on the one hand, to the sealing face 15, and, on the other hand, parts pressed against the seal 16, such as a fluid container, for example, are stuck fast. The seal 16 is produced, for example, from mastic or a similar material with adhesive properties. The seal 16 may also have a foam layer between the mastic layer and the sealing face 15. The external diameter of the seal 16 is substantially identical to the external diameter D3 of the flange 3.

The outlet pipe connector 4 adjoins, opposing the inlet pipe connector 2 in the longitudinal axis 11 of the pipe connector, the flange 3. The outlet pipe connector 4 extends in the same longitudinal axis 11 of the pipe connector as the inlet pipe connector 2. A plurality of guide bodies 17 and 18, which are uniformly distributed in the peripheral direction, and an external thread 19 are configured on the external diameter of the outlet pipe connector 4. An end face outlet plane 20 of the outlet pipe connector 4 extends substantially at right angles to the longitudinal axis 11 of the pipe connector. The outlet opening 6 at the end of the outlet pipe connector 4 has a diameter d2.

The fluid passage 7 firstly extends in the outlet pipe connector 4 from the outlet opening 6 in the direction of the inlet opening 5 in a circular cylindrical manner with the diameter d2 over a length l1. After this length l1 the fluid passage 7 tapers conically over a length l2 up to the inlet opening 5, as already described above with reference to the inlet pipe connector 2.

The guide bodies 17 and the guide bodies 18 are in each case arranged opposing one another on the external diameter of the outlet pipe connector 4. The guide bodies 17 are, in each case, offset by 90° in the peripheral direction with respect to the guide bodies 18. The guide bodies 17, 18 are wedge-shaped in each case, the wedge in the guide bodies 17 being oriented in a different manner to in the guide bodies 18. The guide bodies 17 project outwardly at the outlet pipe connector 4 with an external diameter D4. From this external diameter D4, the guide bodies 17 taper in the direction of the outlet opening 6 up to an external diameter D5 of the outlet pipe connector 4. The guide bodies 18 also project with the external diameter D4 from the outlet pipe connector 4. In contrast to the guide bodies 17, the guide bodies 18 in the direction of the outlet opening 6 do not taper with respect to their external diameter, but with respect to their width 21.

The inlet pipe connector 2, the flange 3 and the outlet pipe connector 4 are configured integrally as an injection moulded part, for example made of PVC, PP, PS, ABS or another plastics material or metal.

The use of the connection nozzle 1 according to the invention in a cartridge system 21 will be described below with reference to Fig. 11 and 12.

The cartridge system 21 comprises a conventional commercial metering pistol 22 with an actuating piston 23, which, actuated by means of a handle, for example, carries out a feed movement. Inserted in the metering pistol 22 is a tubular cartridge 24, in which a flexible fluid container 26 filled with a fluid 25, such as a resin, for example, is located.

The initially closed fluid container 26, during operation of the metering pistol 22, is pressed by the actuating piston 23 with an actuating force F in the direction of the outlet nozzle 1. The actuating piston 23 exerts a pressure of up to 20 bar. The fluid container 26 is pressed in the direction of the outlet nozzle 1 and initially against the tip 13 of the outlet nozzle 1 projecting furthest. Owing to the pressure of the actuating piston 23, the tip 13 with the cutting edge 12 pierces the flexible wall of the fluid container 26. As shown in Fig. 12, the pierced opening in the fluid container 26 then enlarges owing to the further feed of the actuating piston 23 and slides over the inlet pipe connector 2 of the outlet nozzle 1. The size

of the pierced opening is substantially identical with the projection of the inlet opening 5 transverse to the longitudinal axis 11 of the pipe connector. As the external diameter of the inlet pipe connector 2 in the direction of the outlet opening 6 widens up to the diameter D1, the pierced opening of the fluid container 26 is clamped around the inlet pipe connector 2 and thereby sealed. Fluid 25 is thus prevented from escaping next to the inlet pipe connector 2 and discharging into the metering pistol 22. This is particularly advantageous, because the metering pistol 22 is reusable, without being cleaned.

For additional sealing, the fluid container 26 is pressed by the actuating piston 23 against the adhesive seal 16 and stuck to it. Small quantities of fluid 12, which possibly escape between the inlet pipe connector 2 and the fluid container 26 are thus prevented from arriving in the metering pistol 22 or the cartridge 24. The outlet nozzle 1 and the empty fluid container 26 are disposed of after use in the normal manner, and the metering pistol 22 and the cartridge 24 are reused.

As shown in 12, the fluid 25, which is pressure-loaded by the piston 23, flows through the fluid passage 7 out of the outlet opening 6 of the outlet nozzle 1. To form the fluid jet, different additional nozzles (not shown) can also be screwed onto the thread 19 of the outlet nozzle. The standardised guide bodies 17, 18 fit into guide openings (not shown) configured in a complementary manner, of the conventional commercial metering pistol 22 to fasten the outlet nozzle 1 in the metering pistol 22 and prevent twisting.

A further embodiment of the outlet nozzle 1 according to the invention will be shown below with reference to Fig. 6 to 10. For the sake of brevity, only the differences from the embodiment of Fig. 1 to 5 will be dealt with below. The same parts are designated here with the same reference numerals.

In contrast to the embodiment of Fig. 1 to 5, the outlet nozzle 1 of Fig. 6 to 10 has an inlet opening 5, the projection of which to the longitudinal axis 11 of the pipe connector is substantially rectangular, in portions. This inlet opening 5, which is enlarged compared to the embodiment of Fig. 1 to 5 is achieved by a flared portion 27 of the inlet pipe connector 2. The external peripheral face 8 of the inlet pipe connector 2 does not extend conically at the

flared portion 27, but, in portions, substantially cylindrically. The inside wide d1 of the inlet opening 5 is larger than the embodiment of Fig. 1 to 5.

A further embodiment of the inlet nozzle 1 according to the invention is shown, in each case, in Fig. 13 and 14. For the sake of brevity, likewise only the differences from the embodiment of Fig. 1 to 5 are dealt with here. The same parts are designated with the same reference numerals as the embodiment of Fig. 1 to 5.

The embodiment of Fig. 13 has an additional inlet opening 5', which is configured in a second inlet pipe connector 28.

The second inlet pipe connector 28 has a further inlet end face 10', which is configured inclined with respect to the longitudinal axis 29 of the second inlet pipe connector 28. The inlet end face 10' is arranged inclined at an angle of 10° to 90° with respect to the longitudinal axis 11 of the pipe connector of the inlet pipe connector 2. As in the case of the inlet pipe connector 2, the second inlet pipe connector 28 forms a cutting edge 12', with which the fluid container 26 can be pierced during operation of the cartridge system 21.

The additional perforation means through the inlet pipe connector 28 of the embodiment of Fig. 13 has the advantage that, during operation of the cartridge system 21, the fluid container 26 can be pierced at a second point and the piercing reliability of the outlet nozzle 1 is thus increased.

Elastic cushioning means 16', which is produced, for example, from a foam, is arranged between the sealing means 16 and the sealing face 15 of the flange 3.

The same advantage as the embodiment in Fig. 13 is also offered by the embodiment of Fig. 14, which also has a second inlet pipe connector 28. In contrast to the embodiment of Fig. 13, the additional inlet pipe connector 28 in Fig. 14 has a substantially rectangular external peripheral face. Unlike the embodiment of Fig. 13, the second inlet pipe connector 28 of the embodiment in Fig. 14 has no inlet end face, but a channel-shaped curved inlet face 30. A particularly acute cutting edge angle with the external peripheral face 8', which can pierce the

fluid container 26 particularly easily during operation of the cartridge system 21, is configured owing to the curved inlet face 30.

Claims

1. Outlet nozzle (1) for a cartridge system (21) for opening a flexible fluid container (26), with at least one inlet opening (5) formed by an inlet pipe connector (2), with at least one outlet opening (6), with a fluid passage (7) extending from the inlet opening (5) to the outlet opening (6), and with at least one means (12'') configured at the inlet pipe connector (2) for piercing the fluid container (26), characterised in that the inlet pipe connector (2) comprises an external peripheral face (8) which tapers with respect to the inlet opening (5) and an inlet end face (10) which is inclined relative to a longitudinal axis (11) of the pipe connector of the inlet pipe connector (2) at an acute angle of inclination ($\alpha 3$) and encloses the inlet opening and in that the perforation means (12'') has at least one cutting edge (12, 13), which is formed by the intersection line of the inlet end face (10) with the external peripheral face (8) of the inlet pipe connector (2).
2. Outlet nozzle (1) according to claim 1, characterised in that the cutting edge (12, 13) is formed by an oblique cutting angle ($\alpha 4$) between the inlet end face (10) and the external peripheral face (8).
3. Outlet nozzle (1) according to claim 2, characterised in that the cutting angle ($\alpha 4$) is less than 60° .
4. Outlet nozzle (1) according to claim 2 or 3, characterised in that the angle of inclination ($\alpha 3$) is at least two thirds of the cutting angle ($\alpha 4$).
5. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the inlet end face (10) extends in a substantially level or undulating manner.
6. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the cutting edge (12, 13) has a sharp edge, the sharpness of the edge in the peripheral direction being different at least in portions.

7. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the outlet nozzle (1) has a further inlet pipe connector (28) with a further inlet end face (10'), the further inlet end face (10') being inclined relative to the longitudinal axis (11) of the pipe connector at an angle of 10° to 90° .
8. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the inlet pipe connector (2) has a substantially wedge-shaped external peripheral face (8), at least in portions.
9. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the inlet pipe connector (2) has a substantially conical internal peripheral face (9), at least in portions, which tapers in the direction of the inlet opening (5).
10. Outlet nozzle (1) according to claim 8 or 9, characterised in that cone angle (α_2) of the internal peripheral face (9) is smaller than the cone angle (α_1) to the external peripheral face (8).
11. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the maximum length (H max) of the inlet pipe connector (2) with respect to the longitudinal axis (11) of the pipe connector is greater than the inside width (d1) of the inlet opening (5).
12. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the outlet nozzle (1) has a flange (3), which extends in the peripheral direction of the inlet pipe connector (2), with a sealing face (15).
13. Outlet nozzle (1) according to claim 12, characterised in that the maximum length (H max) of the inlet pipe connector (2) in the longitudinal axis (11) of the pipe connector, is smaller than the external diameter (D3) of the flange (3).
14. Outlet nozzle (1) according to claim 12 or 13, characterised in that a sealing means (16) is arranged on the sealing face (15).

15. Outlet nozzle (1) according to claim 14, characterised in that a preferably elastic cushioning means (16') is arranged between the sealing face (15) and the sealing means (16).

16. Outlet nozzle (1) according to claim 14 or 15, characterised in that the sealing means (16) is an adhesive sealing means (16).

17. Outlet nozzle (1) according to any one of the above-mentioned claims, characterised in that the projection of the inlet opening (5) transverse to the longitudinal axis (11) of the pipe connector is substantially rectangular, at least in portions.