It is an object of the invention to improve over existing devices, in particular over a cartridge, method for operating the cartridge, water nozzle insert and outlet of the type mentioned initially, for use in a washing device in a domestic plumbing installation or in a portable shower or hand washing unit, overcoming the disadvantages mentioned above.

These objects are achieved by a cartridge, method for operating the cartridge, water nozzle insert and outlet according to the corresponding claims.

According to a first aspect of the present invention, there is provided a cartridge for use in a showerhead or tap is designed for dispensing a liquid, in particular water or a water-based mixture. It comprises a set of at least two, in particular exactly two, nozzles arranged to create colliding jets of the liquid and thereby create a spray of droplets of the liquid, and a spray shaper for guiding the spray.

Therein, an inner diameter of the nozzles is between 0.8 and 1.5 millimetres, wherein the jets collide at a collision point, wherein a throat of each of the nozzles, along which the nozzle has a constant diameter, has a length that is at least three times this inner diameter (e.g., at least 2.4 or at least three millimetres). The spray shaper, at an outer end of the spray shaper opposite to a spray shaper back end, ends with a flow guiding edge forming an acute angle (Phi1) between an inner surface of the spray shaper and an adjacent, intermediate surface.

In embodiments, the inner diameter is between 0.8 and 2 millimetres.

In embodiments, a radius (Re) of an edge forming a transition between the inner surface of the nozzles and the inner surface of the spray shaper is less than two or less than one or less than 0.8 or less than 0.5 or less than 0.3 millimetres.

Such a small radius prevents the jet of water exiting the nozzle from following, due to adhesion to the nozzle walls, the surface of the nozzle and being spread out.

In embodiments, a distance between a collision point, at which the jets collide, and front surface is three to four times, or five to nine times, in particular six to eight

PATENT CLAIMS

1. Cartridge for use in a showerhead or tap for dispensing a liquid, in particular water or a water-based mixture, comprising a set of at least two, in particular exactly two, nozzles arranged to create colliding jets of the liquid and thereby create a spray of droplets of the liquid, and a spray shaper for guiding the spray,
wherein an inner diameter of the nozzles is between 0.8 and 1.5 millimetres,
wherein the jets collide at a collision point,

wherein, a throat of each of the nozzles, along which the nozzle has a constant diameter, has a length (L2) that is at least three times this inner diameter, and in particular at least 2.4 or at least three millimetres
and
wherein the spray shaper, at an outer end of the spray shaper opposite to a spray shaper back end, ends with a flow guiding edge forming an acute angle (Phi1) between an inner surface of the spray shaper and an adjacent, intermediate surface.

2. The cartridge of claim 1, wherein a radius (Re) of an edge forming a transition between an inner surface of the nozzles and the inner surface of the spray shaper is less than two or less than one or less than 0.8 or less than 0.5 millimetres, in particular less than 0.3 millimetres.

3. The cartridge of claim 1 or claim 2, wherein a distance between the collision point and a front surface of the cartridge is three to four times, or five to nine times, in particular six to eight times, in particular seven times a distance between nozzle outlets and the collision point.

4. The cartridge of claim 2, wherein, at the edge, an acute angle is formed between the inner surface of the nozzles and the surface of the spray shaper, in particular an angle of less than 85° or less than 80° or less than 75°.

5. The cartridge of one of the preceding claims, wherein the acute angle (Phi1) is an angle of less than 85° or less than 80° or less than 75°.

6. The cartridge of one of the preceding claims, wherein a radius (Rf) of the flow guiding edge is less than two or less than one or less than 0.8 or less than 0.5 or less than 0.3 millimetres.

7. The cartridge of one of the preceding claims, wherein the intermediate surface, beginning at the flow guiding edge, extends in the direction of the spray shaper back end, and then in the opposite direction, passing into a front surface of the cartridge,

8. The cartridge of claim 7, wherein a radial distance (dR) between the flow guiding edge and a point at which the intermediate surface passes into the front surface is at least three millimetres, in particular at least four millimetres, in particular at least five millimetres.

9. The cartridge of claims 7 or 8 wherein the front surface is distanced from the spray shaper back end more than the flow guiding edge is.

10. The cartridge of one of the preceding claims, wherein the spray shaper, including the flow guiding edge, is integrally shaped as part of a skirt of the cartridge.

11. The cartridge of one of the preceding claims, wherein at least the spray shaper and the nozzles comprise surfaces with a roughness (Ra) that is smaller than 0.8 micrometres, in particular smaller than 0.2 micrometres.

12. The cartridge of one of claims 1 to 11, wherein the cartridge is free from filters.

13. The cartridge of one of claims 1 to 12, wherein the cartridge is free from elements that reverse a flow of liquid in the cartridge.

14. The cartridge of one of claims 1 to 13, wherein a distance between the collision point and the spray shaper back end lies between 2 and 7, in particular between 3 and 5, in particular between 3 and 4 millimetres.

15. The cartridge of one of claims 1 to 14, wherein an angle at which the nozzles exit at the inner surface of the spray shaper is more than 70°, in particular more than 80° and in particular equal to 90°.

16. The cartridge of one of claims 1 to 15, wherein the inner surface of the spray shaper is cylindrical.

17. The cartridge of one of claims 1 to 16, wherein the cartridge is fabricated in one piece or is fabricated from separate parts that are inseparably moulded or welded or glued together.

18. The cartridge of one of claims 1 to 17, wherein the cartridge comprises cartridge connection elements for mechanically attaching the cartridge to an outlet and securing the cartridge, in particular wherein the cartridge connection elements are a thread.

19. The cartridge of one of claims 1 to 18, wherein the nozzles each have an asymmetrical cross section, with a narrower part of the cross section being closer to a bisecting line of the longitudinal axes of the nozzles, and a broader part of the cross section being further away from the bisecting line.

20. The cartridge of claim 19, wherein the nozzle cross section is a triangle or a triangle with rounded corners.