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(54) Spray nozzle

(57) A spray nozzle comprises a fluid tip (1), an air cap (2) seated on the body of the fluid tip (1) to form a fluid tip/air cap assembly (1, 2), and an annular passage (4) between the fluid tip (1) and the air cap (2). A plurality of tangentially arranged passages (3) are angled to the exterior of the fluid tip/air cap assembly (1, 2). They extend from the exterior of the fluid tip/air cap assembly (1, 2) to the annular passage (4) and are located in the region of the connection between the air cap (2) and the fluid tip (1).

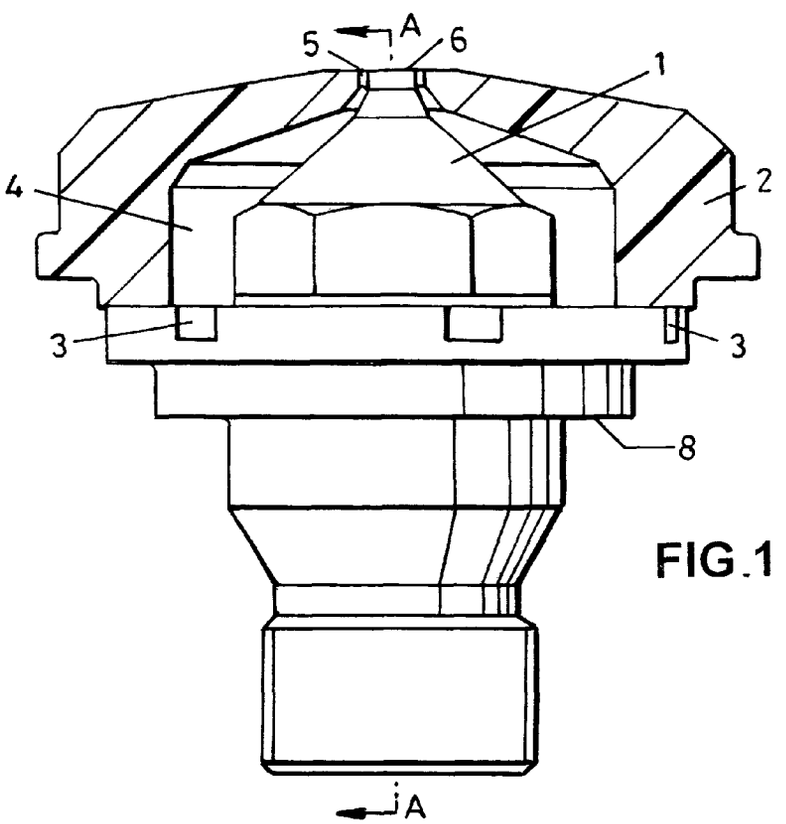

FIG.1.

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Description

[0001] This invention relates to an improved spray nozzle and more particularly to an air-atomised round spray.

[0002] In industries such as the ceramics and food processing industries, there has been a need for some time for a spray set-up capable of producing a large diameter full-cone round spray pattern. In the past this requirement has been partially satisfied with either small fan-shaped patterns or by the use of electrostatic equipment.

[0003] An aim of the present invention is to provide an improved spray nozzle to spray large round spray patterns without the need for electrostatic technology.

[0004] According to the present invention there is provided a spray nozzle comprising a fluid-tip and an aircap, wherein a plurality of tangential slots angled to the outer circumference of the nozzle are located at the interface between the fluid-tip and aircap.

[0005] Preferably, the tangential slots are formed in the fluid-tip and mate with a cone-shaped face on the air cap. In an alternative construction the tangential slots may be formed in the aircap and mate with a cone-shaped face on the fluid tip.

[0006] In a further construction a ring-shaped member interfaces with the fluid-tip and aircap, the tangential slots being formed in the interface between the ring-shaped member and one of the nozzle members. Conveniently, the tangential slots are formed in the ring-shaped member.

[0007] The ring-shaped member or indeed the aircap may be made of a relatively soft material, *i.e.,* moulded from acetal.

[0008] The interface between the fluid-tip and aircap may be cone-shaped. In a modified construction the interface between the fluid-tip and aircap is formed by a ball and cone mating surfaces.

[0009] Embodiments of an improved spray nozzle will now be described, by way of example only, with reference to the accompanying drawings, in which

Figure 1 is a side elevation of a spray nozzle according to a first embodiment of the present invention;
Figure 2 is an end view of the spray nozzle shown in Figure 1, with the aircap removed;
Figure 3 is an axial cross-section taken along the line A-A of Figure 1;
Figure 4 is a view similar to Figure 1 showing a second embodiment of the invention; and
Figure 5 is a view similar to Figure 3, but showing a third embodiment of the invention.

[0010] The spray nozzle comprises a fluid tip 1 and an aircap 2 which can be fitted onto any suitably threaded conventional or HVLP (High Volume Low Pressure) spray gun (not shown). The interior of such a spray head has atomising-air flow passages which are blanked-off by the back face 8 on the fluid tip 1, and the total air flow is directed through what would normally be the fan-air section.

[0011] At the interface between the fluid tip 1 and the aircap 2 the air-flow is directed through tangential slots 3 angled to the outer circumference of the nozzle. The air-flow emerges from the slots 3 as a spinning vortex into the inside surface 4 of the aircap 2. This spinning vortex is accelerated towards the aircap exit 5 by the decreasing cross-sectional area in the path of the air-flow.

[0012] At the nozzle face 6 the liquid jet is broken up and is flung outwards by the spinning air jet. It is the radial air velocity component that produces a large diameter round spray pattern.

[0013] In the embodiment shown in Figures 1 to 3 the fluid tip 1 is formed with the tangential slots 3 and the aircap 2 has a male cone 7. However in a modification of the improved nozzle, shown in Figure 4, the tangential slots 3 are formed in the aircap 2 and the male cone 9 is formed on the fluid-tip 1. This is believed to aid production of the nozzle.

[0014] In a third embodiment of the nozzle, shown in Figure 5, a ring-shaped member 11 which interfaces with the fluid-tip 1 and the aircap 2 has the tangential slots 3 located on either side of the ring-shaped member which slots mate with a smooth cone-shaped face. In the view shown in Figure 5, the tangential slots 3 are shown mating with the air cap. The interfacing member of the three piece nozzle may be manufactured from a relatively soft mouldable material such as acetal.

[0015] A further modification of the nozzle would be to replace the cone-to-cone mating surfaces with ball and cone mating surfaces.

[0016] In operation the typical air-atomised round spray pattern would be approximately 8 inches (203 mm) in diameter when the spray gun nozzle is held at a distance of 7 to 8 inches (178-203 mm) from the workpiece. Prototypes of the improved spray nozzle have sprayed patterns of up to 9 inches (229 mm) in diameter when the spray gun nozzle is held at a spraying distance of 12 inches (305 mm) from the workpiece.

[0017] It will be obvious that with adjustment of the dimensions of the tangential slots it will be possible to produce round patterns of a larger diameter than 9 inches (229 mm).

Claims

1. A spray nozzle comprising a fluid tip (1), an air cap (2) seated on the body of the fluid tip (1) to form a fluid tip/air cap assembly (1, 2), and an annular passage (4) between the fluid tip (1) and the air cap (2) characterised by a plurality of tangentially arranged passages (3) angled to the exterior of the fluid tip/air cap assembly (1, 2), extending from the exterior

of the fluid tip/air cap assembl (1, 2) to the annular passage (4) and located in the region of the connection between the air cap (2) and the fluid tip (1).

2. A spray nozzle as claimed in Claim 1, wherein the fluid tip (1) comprises a first mating surface and the air cap (2) comprises a second mating surface mating with the first mating surface of the fluid tip (1) and the tangentially arranged passages (3) comprise open slots formed in the first mating surface of the fluid tip (1) and are closed by the second mating surface of the air cap (2).

3. A spray nozzle as claimed in Claim 1, wherein the fluid tip (1) comprises a first mating surface and the air cap (2) comprises a second mating surface mating with the first mating surface of the fluid tip (1) and the tangentially arranged passages (3) comprise open slots formed in the second mating surface of the air cap (2) and are closed by the first mating surface of the fluid tip (1).

4. A spray nozzle as claimed in Claim 1, further comprising a ring shaped member (11) located in between the fluid tip (1) and the air cap (2) and having first and second mating surfaces on opposite faces of the ring shaped member (11), a third mating surface on the fluid tip (1) mating with the first mating surface of the ring shaped member (11), a fourth mating surface on the air cap (2) mating with the second mating surface of the ring shaped member (11).

5. A spray nozzle as claimed in Claim 4, wherein the tangentially arranged passages comprise open slots formed in one of the first or second mating surfaces of the ring shaped member (11) and are closed by the third or fourth mating surfaces of the fluid tip (1) or the air cap (2) respectively.

6. A spray nozzle as claimed in Claim 4, wherein the tangentially arranged passages comprise open slots in the third mating surface of the fluid tip (1) or the fourth mating surface of the air cap (2) and are closed by the first or second mating surface respectively of the ring shaped member (11).

7. A spray nozzle as claimed in any preceding claims, wherein the air cap (2) and/or the ring shaped member (11), when provided, comprise a relatively soft material.

8. A spray nozzle as claimed in claim 7, wherein the air cap (2) and/or the ring shaped member (11), when provided, comprise an acetal moulding.

9. A spray nozzle as claimed in any preceding claim, wherein the mating surfaces of the fluid tip (1), the air cap (2) and the ring shaped member (11), when present, are cone shaped.

10. A spray nozzle as claimed in any preceding claim, wherein the mating surfaces of the fluid tip (1), the air cap (2) and the ring shaped member (11), when present, are ball and cone shaped respectively.

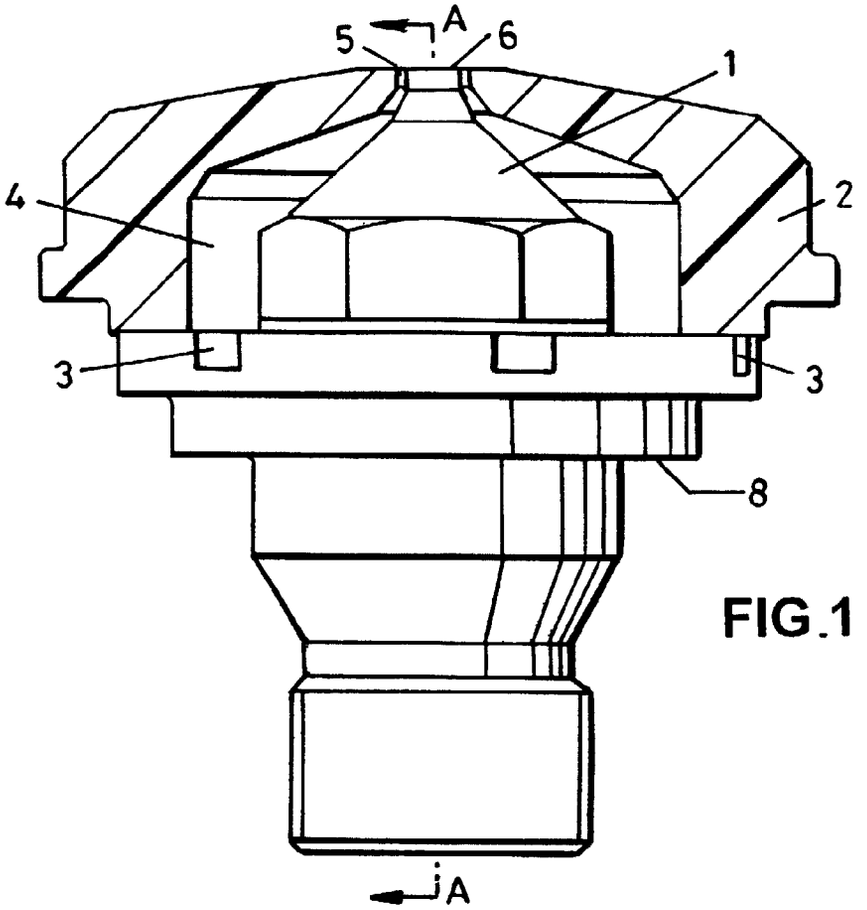

FIG.1.

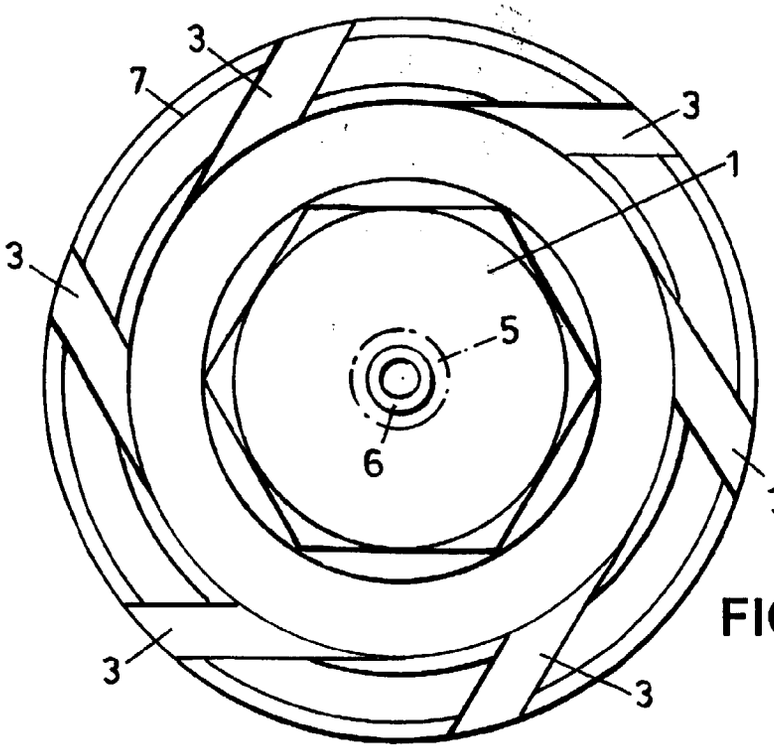

FIG.2.

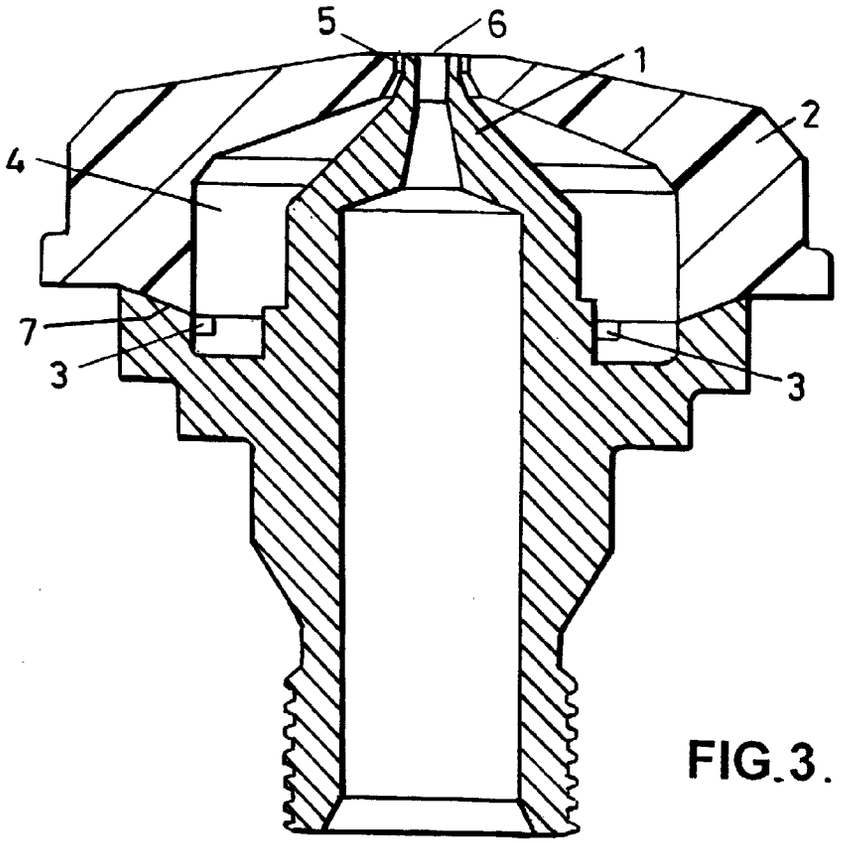

FIG.3.

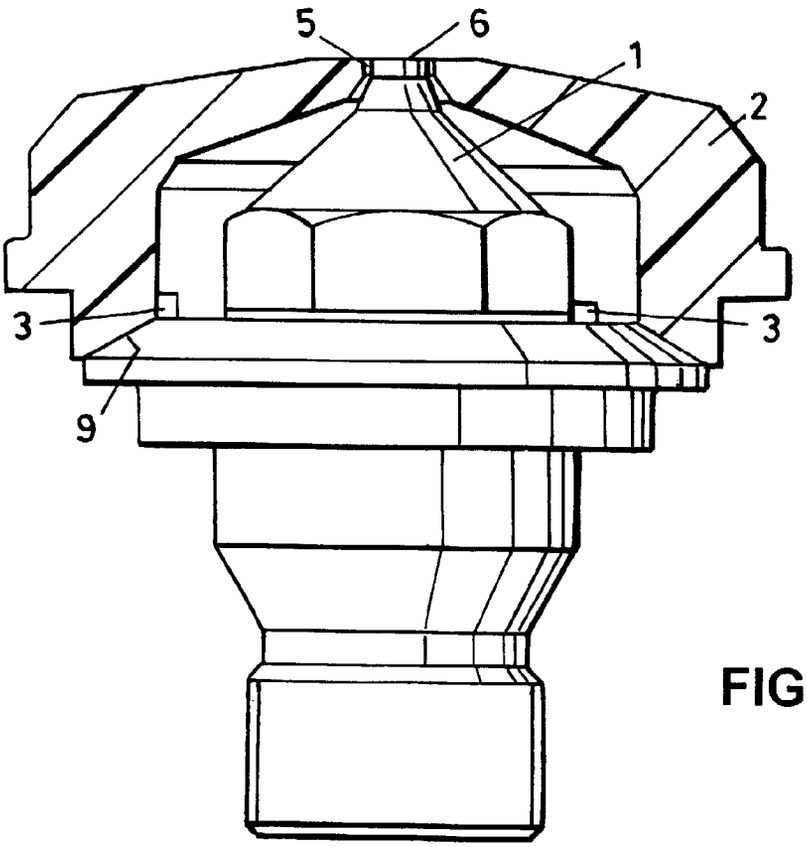

FIG.4.

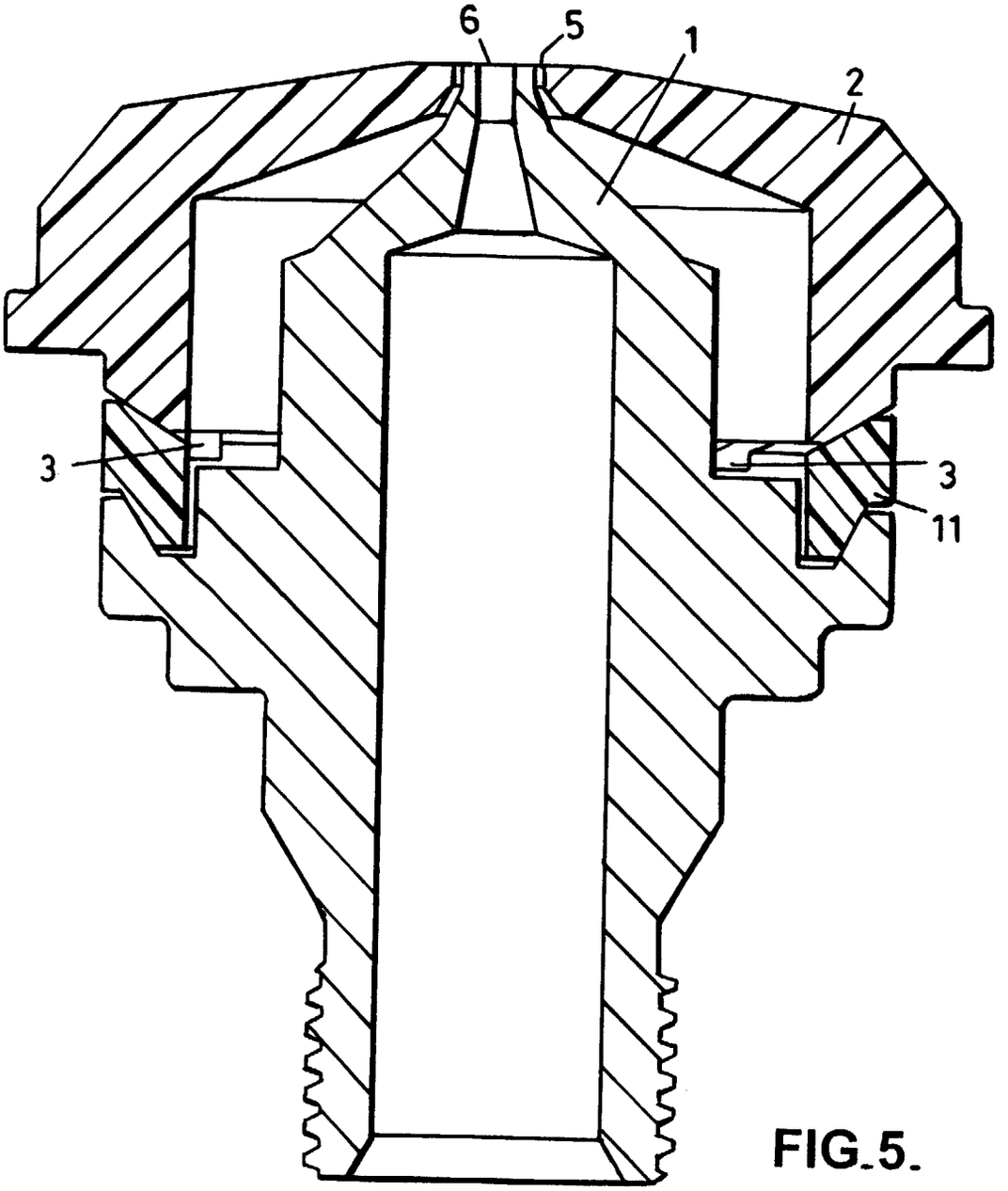

FIG_5_