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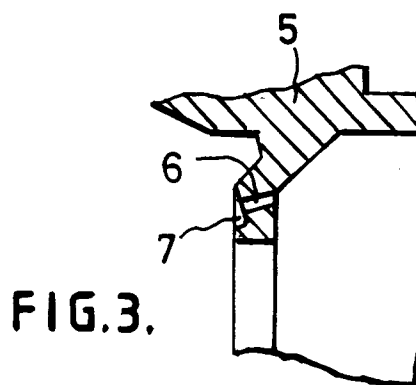
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(54) **Aircap for spray guns.**

(57) An aircap (1) for spray guns comprising a central aperture (2) through which a nozzle (5) for a spray fluid projects, an annular part surrounding the aperture (2), two horns (3) projecting forwardly from the aircap (1) on opposite sides of aperture (2), the horns (3) having two spray holes (6) for the supply of air to shape the fluid spray pattern and aligned angular holes (6) passing through opposite sides of aircap (1) to form a secondary shaping of the spray pattern.

Secondary axial holes (8) are drilled through the wall on opposite sides of central aperture (2) perpendicular to the axis of horn holes (4) to modify the even distribution of the fluid.

In a secondary embodiment the rear of central aperture is chamfered at 45°, the width of wall aperture (2) to the forward edge of the chamfer (10) is between 0.0015 inch and 0.005 inch (0.038 and 0.127 mm).



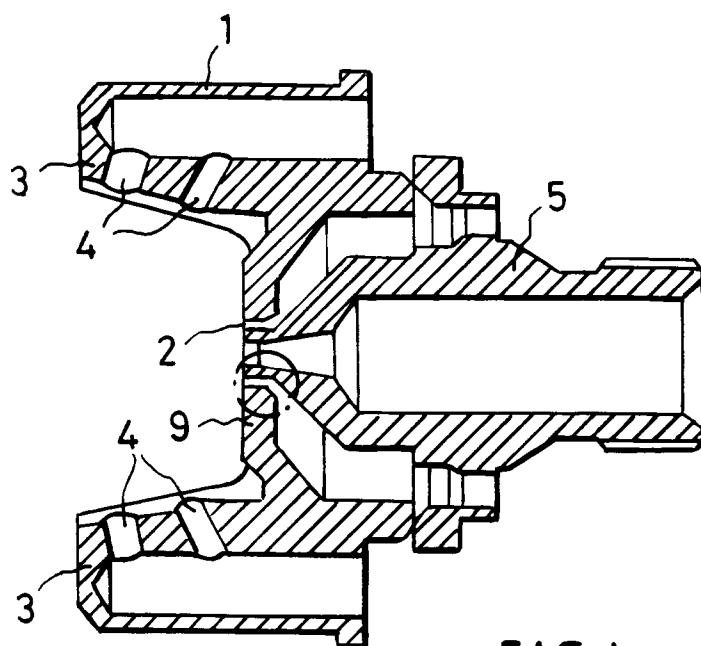


FIG.4.

This invention relates to an improved aircap for spray guns. More particularly the invention provides for a suction or gravity feeding of the fluid, e.g. paint, to be sprayed which produces an even controlled deposition of the paint.

Existing HVLP and high pressure spray guns have a spray nozzle for the fluid to be sprayed encircled by an aircap with horns which supply air at low pressure e.g. 10 lbs. per. sq. inch (0.7 kilograms per square centimetre) to carry the fluid to the article to be sprayed and to disperse it in a controlled spray pattern.

In known HVLP spray guns used for spraying, e.g. paint, the design has hitherto concentrated on the pressure feeding of the paint in order to achieve the results of an even deposition and finish required by industry.

The current design of aircap for the suction and gravity feeding of paint has evolved, which has the disadvantage that the pattern of deposited paint is generally markedly elliptical in shape and the levels of paint distributed across the major axis of the ellipse, when plotted, show that the majority of the paint is deposited in the central area of the pattern which, in some extreme cases, produces a distribution curve which resembles a triangle.

When these known aircaps are used it was supposedly the case that the overlapping of spray patterns correct the above disadvantage to allow an even coat of paint to be deposited on the surface to be painted.

However, current paint finishes, especially those containing metallic or pearlescent particles, are very sensitive to uneven deposition, when banding or mottling effects can be caused thus spoiling the finish. Many of the currently available KVLV suction guns are found to be suitable only for depositing primer paints and are therefore largely unsuitable for depositing finish paint coats.

On known paint spray aircaps fitted to these suction guns a chamfer measuring between 1.5 mm to 3.0 mm is formed on the inner wall aperture which encircles the spray nozzle. A disadvantage with spray patterns normally achieved with this form is that they are elliptical and have an uneven deposition of paint across the deposited pattern. Another disadvantage of the spray guns is that fluid flow of the paint increases by up to 30% when the gun is turned through 90° to spray vertically downwards, caused by the change in gravitational forces acting on the paint in the paint container. The increase in the paint flow changes the deposition in the sprayed pattern and can result in a banded finish visible on the painted articles.

An aim of the present invention is to provide a suction aircap which controls the flow of air to the nozzle outlet and overcomes the above disadvantage.

Another aim of the present invention is to provide

an aircap for spray guns which overcomes the above disadvantage and which facilitates an even paint distribution across the major axis of the pattern, which tapers at the ends to avoid lines being produced on the finished painted surface.

According to the present invention there is provided an aircap for spray guns the aircap having a central aperture through which a nozzle for a fluid to be sprayed projects, an annular part surrounding the aperture, two horns projecting forwardly from the aircap on opposite sides of the aperture, the horns having a pair of spray holes for the supply of air to shape the fluid spray pattern and aligned angular holes at opposite sides of the aperture passing through the aircap to form a secondary shaping of the spray pattern, characterised in that secondary axial holes are drilled through the aircap at opposite sides of the central aperture perpendicular to the axis of the horn holes to modify the even distribution of the fluid across the deposited layer of fluid.

Preferably, the aircap is used on HVLP spray guns which operate on a suction or gravity feeding of the fluid to be sprayed.

Conveniently, a single secondary axial hole is drilled at opposite sides of the central aperture.

In a preferred construction of the aircap the secondary holes are 1.15 mm in diameter.

In a preferred construction of the present invention there is provided a suction aircap comprising a wall having a central circular aperture encircling a fluid spray nozzle, wherein the rear of the wall is chamfered at 45° and the width of the chamfer from the rear wall surface to the forward edge of the chamfer is between 0.0015 inch and 0.005 inch (0.038 mm and 0.127 mm). Preferably, the width is between 0.002 inch and 0.003 inch (0.051 mm and 0.076 mm).

According to another aspect of the present invention there is provided an HVLP spray gun having a suction aircap as set forth in the preceding paragraph.

Embodiment of an aircap for use with a suction or gravity fed spray gun, will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a front elevation of an aircap according to the present invention;

Figure 2 is an axial section of the aircap and a spray gun nozzle taken along the section line II-II of Figure 1,

Figure 3 is a fragmentary cross-section, on an enlarged scale, of an aperture taken along the section line III-III of Figure 1;

Figure 4 is an axial cross-section of a spray gun nozzle and suction aircap;

Figure 5 is an enlarged fragmentary view of the part ringed in Fig. 4;

Figure 6 is a diagrammatic view of a spray pattern of a conventional HVLP spray gun; and

Figure 7 is a diagrammatic view; similar to Fig. 6, of a spray pattern of an HVLP spray gun using a suction aircap of the present invention.

The aircap 1 is an annular member having a central aperture 2 and two forwardly extending horns 3 at opposite sides of the aperture 2, with pairs of horn holes 4. A fluid nozzle 5 e.g. for spraying paint is formed to a parallel diameter and projects through the central aperture 2 forming an annulus around the nozzle to form a relatively long parallel bore with a sharp entrance and exit.

Located on opposite sides of the aperture 2, in alignment with the horns 3, are a pair of holes 6 drilled through the part surrounding the central aperture 2 in a sloping recess 7. The holes 6 are at an angle to the longitudinal axis of the central aperture 2 and effect a secondary shaping of the paint spray pattern.

The air jets from the holes 6 impinge on the air jets from the horn holes 4 to improve the straightness of the sides of the pattern and to prevent paint being deposited on the horn faces.

Secondary holes 8 measuring 1.15mm in diameter are drilled one at each side of the central aperture 2, perpendicular to the axis of the horn holes 4. These two holes 8 provide jets of air to modify the ends of the spray pattern to create a more even distribution of the paint across the finally deposited layer of paint.

Although a single secondary hole 8 has been described and illustrated at opposite sides of the central aperture, more than one hole may be provided to improve the distribution of the paint.

In the second embodiment of the improved air cap like parts have the same reference numerals.

The suction aircap 1 is an annular member having a central circular aperture 2 and two forwardly extending horns 3 at opposite sides of the aperture 2, with pairs of horn holes 4. A fluid nozzle 5, e.g. for spraying paint, is formed with a parallel diameter and projects through the central aperture 2 forming an annulus around the nozzle 5 to form a relatively long parallel bore with a sharp entrance and exit.

The suction cap 1 has a wall 9 containing the aperture 2. The rear of the wall has a chamfer 10 at 45°, the width of which is between 0.0015 inch to 0.005 inch (0.038 mm and 0.127 mm) and preferably between 0.002 inch and 0.003 inch (0.051 mm and 0.076 mm) as shown by the dimensions.

Figure 6 illustrates an elliptically shaped pattern produced by conventional HVLP spray guns which, as a result of its shape, produces an uneven distribution of the deposited paints over the spray area. This becomes more pronounced when the spray gun is turned through 90° to spray vertically downwards as a result of changes in the gravitational forces acting on the paint in a paint container (not shown) attached to the spray gun. The paint flow increases by up to 30% causing changes in the deposited pattern which can result in a banded finish visible on the finished

painted article.

Figure 7 shows a spray pattern achieved for an HVLP spray gun using the improved suction aircap of the present invention.

When the pattern shown in Fig. 7 is sprayed vertically downwards, the increased paint flow due to the effects of the increased gravitational forces causes the deposition of the paint within the straight sided pattern to become concentrated at the ends of the pattern and so results in banding in the painted finish.

With an HVLP gun using the improved suction aircap having the improved control of airflow shown by the arrow 11 (see Fig. 5), a spray pattern shown in Fig. 7 can be achieved having both straight sides and even deposition of paint in all orientations of spraying where the changes in gravitational forces result in changes of paint flow.

The improvement in the pattern shape is also accompanied by an improved fluid distribution within the deposited pattern which compensates for the increase in fluid flow when the spray gun is spraying in a vertical position, thus preventing banding without the need for the operator to modify the spray gun settings.

Claims

1. An aircap (1) for spray guns the aircap (1) having a central aperture (2) through which a nozzle (5) for a fluid to be sprayed projects an annular part surrounding the aperture (2), two horns (3) projecting forwardly from the aircap (1) on opposite sides of the aperture (2), the horns (3) having a pair of spray holes (6) for the supply of air to shape the fluid spray pattern and aligned angular holes (6) at opposite sides of the aperture (2) passing through the aircap (1) to form a secondary shaping of the spray pattern, characterised in that secondary axial holes (8) are drilled through the aircap (1) at opposite sides of the central aperture (2) perpendicular to the axis of the horn holes (4) to modify the even distribution of the fluid across the deposited layer of fluid.
2. An aircap as claimed in Claim 1, characterised in that the aircap (1) is used on HVLP spray guns which operate on a suction or gravity feeding of the fluid to be sprayed.
3. An aircap as claimed in Claim 1 or 2, characterised in that a single secondary axial hole (8) is drilled at opposite sides of the central aperture (2).
4. An aircap as claimed in any preceding claim, characterised in that the secondary holes (8) are 1.15 mm in diameter.

5. An aircap as claimed in any preceding claim, comprising a wall (9) having a central circular aperture (2) encircling an fluid spray nozzle (5), characterised in that the rear of the wall (9) aperture is chamfered at 45° the width of the chamfer (10) from the rear wall surface to the forward edge of the chamfer (10) is between 0.0015 inch and 0.005 inch (0.038 mm and 0.127 mm). 5
6. An aircap as claimed in Claim 5, characterised in that the width of the chamfer (10) is between 0.002 inch and 0.003 inch (0.051 mm and 0.076 mm). 10
7. A high volume low pressure spray gun having a suction aircap as claimed in any preceding claim. 15

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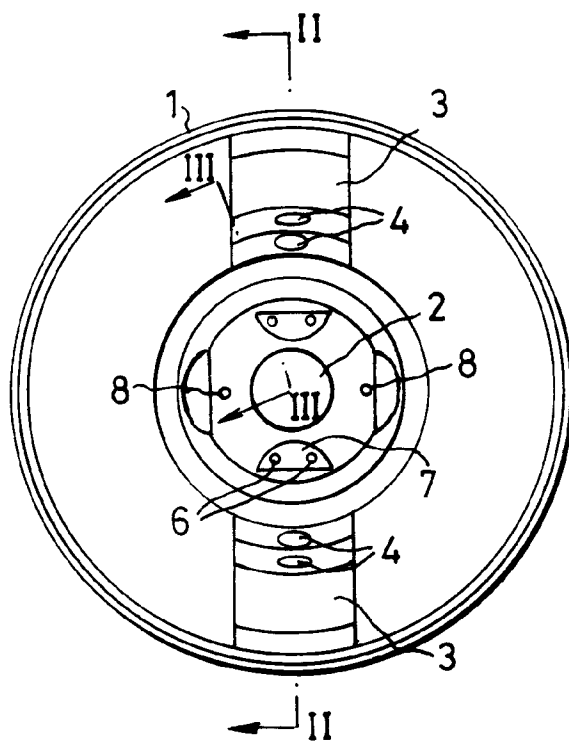


FIG.1.

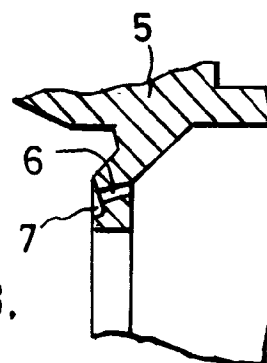


FIG.3.

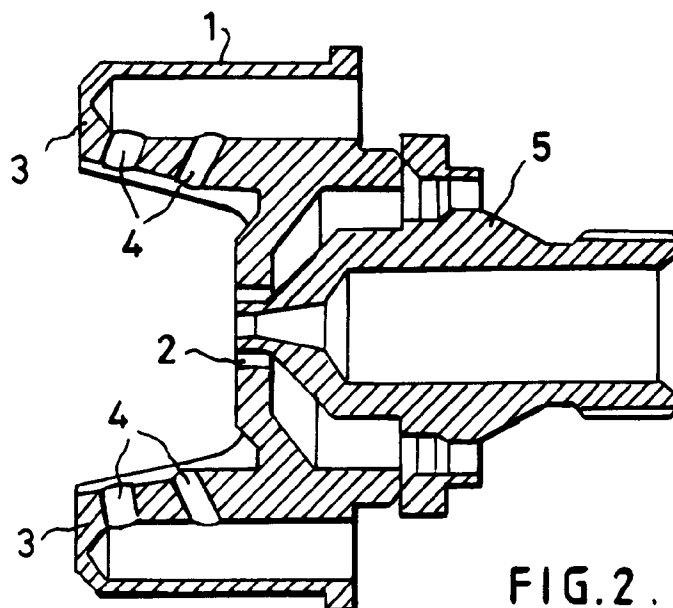


FIG.2.

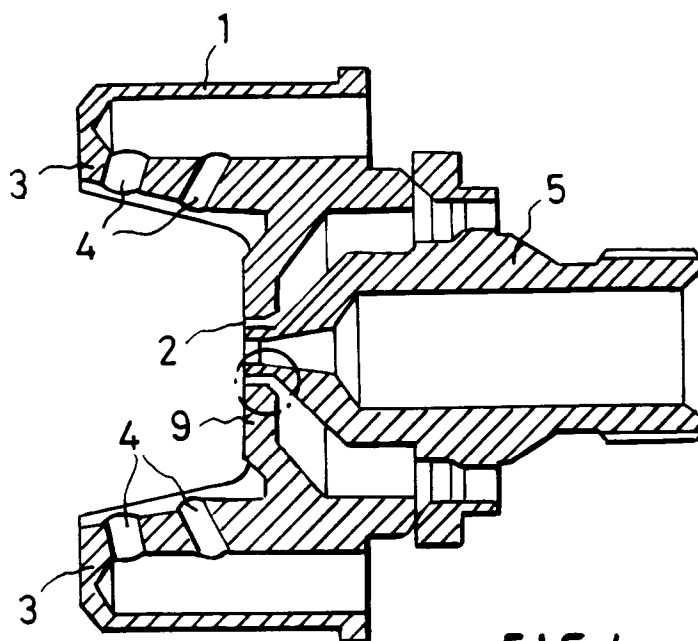


FIG. 4.

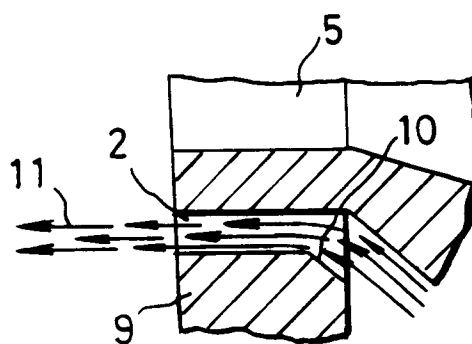


FIG. 5.

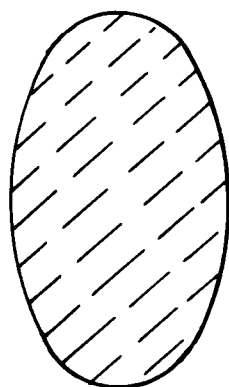


FIG. 6.



FIG. 7.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 0352

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 456 523 (IWATA AIR COMPRESSOR) * column 3, line 26 - column 4, line 48; figures 3,4 *	1,2,7	B05B7/08
X	GB-A-623 269 (D.J. PEEPS) * claim 1; figures 1,3 *	1,3,7	
X A	GB-A-701 280 (DE VILBISS CO.) * page 2, line 108 - page 3, line 33; figure 4 *	1,7 4,5	
X A	GB-A-445 764 (DE VILBISS) * page 1, line 91 - page 2, line 17; figures 1,4 *	1,3,7 4,5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B05B
Place of search THE HAGUE		Date of completion of the search 13 April 1994	Examiner Guastavino, L
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