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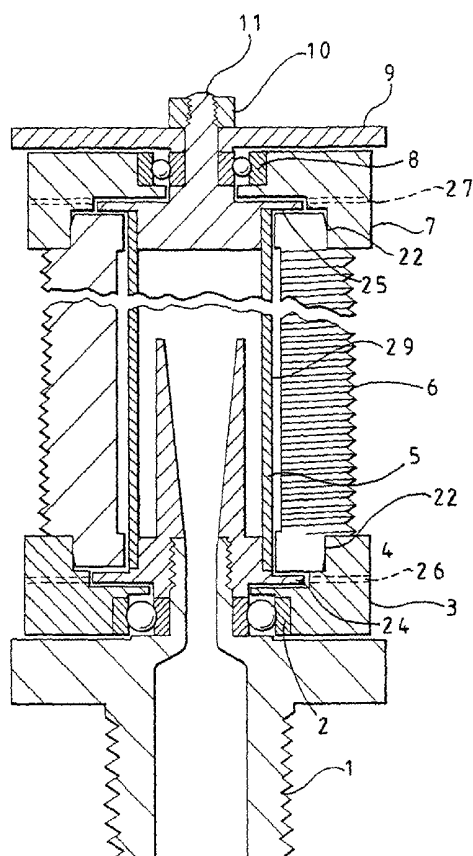
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[Continued on next page]

(54) Title: ROTARY ATOMISERS



(57) Abstract: A rotary atomiser comprises a drum (14) rotatable about its longitudinal axis and a nozzle located inside of the drum (14) such that the drum (14) is rotatable about its axis relative to the nozzle. The nozzle is coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum (14) causing the drum to rotate. A multiplicity of channels (17) passing substantially radially through the drum (14) conduct liquid from the inside to the outside of the drum (14), the channels (17) being substantially V-shaped in cross-section and oriented such that when the drum (14) rotates the narrower ends of the channels (17) trail the wider ends.

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Rotary Atomisers

This present invention relates to rotary atomisers and in particular, though not necessarily, to rotary atomisers such as may be attached to moving vehicles or aircraft
5 for spraying liquid.

Cotton and similar crops can be severely damaged by insect pests and this occurs well into the advanced stages of growth of the crop so that low clearance, land-based spraying systems are not practical. Thus spraying insecticides from aircraft is an
10 attractive proposition. Spraying from aircraft may also be carried out for other purposes such as to kill weeds. However such sprays are subject to wind effects and severe drifting of the spray cloud can occur. It has been shown that this problem occurs to a possibly damaging extent when the spray drop diameters are less than about 250 μm .

15 Modern aircraft cover a large area in a short time and therefore need to deliver insecticide in an appropriate form at large flow rates. There therefore exists a real need for an atomiser which can be fitted on to agricultural aircraft and which can deliver large flow rates (e.g. up to 10-20 litres per minute flying time) in a narrow band of drop diameter of the order of 250 μm .

20 GB233918 describes a hydraulically driven rotary atomiser for mounting on an aircraft. A liquid to be sprayed is forced out of a nozzle located in the centre of a rotatable drum. The liquid is ejected from the nozzle such that it impinges substantially tangentially on the inner surface of the drum, causing the drum to rotate about its central axis. An
25 annular plate disposed in the wall of the drum has a multiplicity of "V" shaped grooves formed therein, such that the grooves pass from the inside to the outside of the drum for conducting fluid across the drum wall. The outermost ends of the grooves are shaped to provide points, a feature which facilitates droplet formation.

30 The inventor of the present invention has recognised that the "V" shaped grooves of GB233918 are oriented such that the transverse axes of the grooves are aligned with the axis of rotation of the drum, and thus that the rotational force (due to the rotation of the drum and plate) tends to force liquid flowing along the grooves against the sidewalls of

the grooves. This tends to disrupt the flow of liquid and broadens the range of drop sizes which are emitted from the tips of the grooves.

It is an object of the present invention to overcome or at least mitigate the disadvantages of known rotary atomisers. In particular, it is an object of the present invention to
5 provide a rotary atomiser which facilitates the delivery of large flow rates over a narrow band of drop size.

According to a first aspect of the present invention there is provided a rotary atomiser
10 comprising:

a drum rotatable about its longitudinal axis;

a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of
15 the drum;

a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum, the channels being substantially V-shaped in cross-section along all or part of their lengths and oriented such that when the drum rotates in use, the narrower ends of the channels trail the wider
20 ends.

In operation, embodiments of the present invention cause liquid passing through the V-shaped channels to be forced towards the narrow end (or base) of the channels. This overcomes the problem noted above, and tends to facilitate the formation of drops
25 having a relatively uniform size.

It will be appreciated that the shape of said channels need not be a perfect V and that, for example, the bases of the channels may be somewhat rounded or flattened. Furthermore, the channels may have a different cross-sectional shape over a section of
30 their lengths. For example, the channels may have a substantially circular cross-sectional shape at their radially innermost ends, being V shaped over the remainder.

In a preferred embodiment of the invention, the drum comprises a substantially cylindrical member through which said multiplicity of channels extend radially. The drum may be formed from a solid cylinder of plastics or metal or metal alloy material.

- 5 In an alternative embodiment of the invention said drum comprises a multiplicity of plates aligned in respective substantially axial planes. Said V-shaped channels are provided in the leading face (with respect to the direction of rotation) of each plate. More preferably, adjacent plates are in contact with one another so that the plates together form a substantially cylindrical member.

10

Preferably, said V-shaped grooves terminate at the outer surface of said drum in a tooth or point.

- 15 Preferably, said nozzle comprises a substantially cylindrical housing having its longitudinal axis substantially co-axial with the axis of said drum. A multiplicity of nozzle holes are distributed about the housing and extend through said housing from the inside to the outside. The holes extend in a substantially transverse plane, at an angle to the radial direction. In use, liquid under pressure enters the inner space of the housing and exits through the holes so as to impinge on the inner surface of the drum with a tangential directional component.

20

- In one embodiment of the present invention the liquid jets emerging from the nozzle and impinging upon the inner surface of the drum cause or assist the drum to rotate. This results in the application of a centrifugal force to the liquid entering the channels extending through the drum, causing the liquid to be accelerated outwards through the channels to emerge into the surrounding space.

25

- In other embodiments of the rotation of the drum is caused or assisted by some other means. For example, the atomiser may comprise an electric or hydraulic motor coupled to the drum for causing the drum to rotate. Alternatively, the atomiser may comprise a turbine coupled to the drum. The turbine is caused to rotate by the flow of air over the atomiser, thereby causing the drum to rotate.

30

Preferably, a diffuser is contained within said housing for diffusing liquid entering the inner space. More preferably, the diffuser is substantially cylindrical and is co-axial with the housing. The inner surface of the diffuser may taper outwardly from a first end coupled to a source of liquid to a second end which is open to said inner space of the housing.

The rotary atomiser may comprise a deflector plate located in a substantially transverse plane at one end of the drum. The plate is arranged such that in use it leads the drum when the vehicle or aircraft on which the atomiser is mounted is in motion. The deflector plate tends to deflect air around the space surrounding the outer surface of the drum. The deflector plate is stationary relative to the drum. Preferably, said deflector plate has a plurality of holes distributed over its surface so that air can flow through the holes. More preferably, the diameter of said holes increases with radial distance from the axis of the drum. The deflector plate may be formed from a single plate of solid material. Alternatively, the deflector plate can be made of a series of gauze disks, the sizes of the holes in the disks being chosen to vary the porosity with distance from the centre.

According to a second aspect of the present invention there is provided a rotary atomiser comprising:

- a drum rotatable about its longitudinal axis;
- a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum causing the drum to rotate; and
- a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum,
- wherein said nozzle comprises a substantially cylindrical housing having its longitudinal axis substantially co-axial with the axis of said drum and a multiplicity of nozzle holes distributed about the housing and extending through said housing from the inside to the outside, said holes extending in a substantially transverse plane, at an angle to the radial direction.

In use, liquid under pressure enters the inner space of the housing and exits through the holes so as to impinge on the inner surface of the drum with a tangential directional component, causing the drum to rotate.

5

According to a third aspect of the present invention there is provided rotary atomiser comprising:

- a drum rotatable about its longitudinal axis;

- a nozzle located inside of or adjacent the drum such that the drum is rotatable
10 about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum;

- a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum; and

- 15 a deflector plate located in a substantially transverse plane at one end of the drum, the plate being arranged such that in use it leads the drum when the vehicle or aircraft on which the atomiser is mounted is in motion.

Preferably, the plate does not rotate with the drum. The deflector plate tends to deflect
20 air around the space surrounding the outer surface of the drum.

Preferably, said deflector plate has a plurality of holes distributed over its surface so that air can flow through the holes. More preferably, the diameter of said holes increases with radial distance from the axis of the drum.

25 According to a fourth aspect of the present invention there is provided a rotary atomiser comprising:

- a drum rotatable about its longitudinal axis;

- a nozzle located inside of or adjacent the drum such that the drum is rotatable
about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery
30 system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum;

- a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum, the channels being tapered

such that their radially outermost ends have a greater cross-sectional area than their innermost ends.

Preferably, the cross-sectional area of the innermost ends of the channels is less than or
5 equal to 0.1mm^2 .

According to a fifth aspect of the present invention there is provided a method of fabricating a drum for use in a rotary atomiser, the method comprising:

etching a multiplicity of channels into a solid plastic cylinder using a laser beam,
10 each of said channels extending partway towards the centre of the cylinder; and
removing a central core of the cylinder such that each of said channels opens into the opening now formed in the cylinder.

Preferably, the method comprises moving the laser beam during each etching step so as
15 to trace a substantially V shape on the outer surface of the cylinder to thereby form a substantially V shaped channel in the cylinder.

For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made by way of example to the
20 accompanying drawings in which:

Figure 1 illustrates in axial cross-section a rotary atomiser;
Figure 2 illustrates a nozzle housing of the atomiser of Figure 1;
Figure 3 is a transverse cross-section the nozzle housing of Figure 2
Figure 4 shows in more detail a part of the cross-section of Figure 3;;
25 Figure 5 illustrates a flow plate of the atomiser of Figure 1;
Figure 6 illustrates in more detail a part of the plate of Figure 5;
Figure 7 illustrates a cross-section on the lines B-B of Figure 5;
Figure 8 illustrates a cross-section on the lines A-A of Figure 5;
Figure 9 illustrates a section through the centre of a drum of the atomiser of
30 Figure 1;
Figure 10 illustrates a deflection plate for use with the atomiser of Figure 1;
Figure 11 illustrates in cross-section a second embodiment of a rotary atomiser;
Figure 12 illustrates a top plan view of the atomiser of Figure 11;

Figure 13 illustrates a perspective view of a drum manufactured from a solid cylinder; and

Figure 14 illustrates in cross-section a further embodiment of the invention

- 5 The following description concerns a rotary atomiser such as might be fitted, as part of an array of atomisers, to an aircraft for spraying crops with a liquid pesticide, insecticide, fungicide etc. However, the atomiser may also be fitted to other types of vehicles or indeed fixed installations and may be used for purposes other than the spraying of agricultural chemicals.

10

As shown in Figure 1, the atomiser comprises a front attachment fitting 1 having a suitable threaded end to allow the atomiser to be fastened to standard spray booms of agricultural aircraft and to receive fluid pesticides under pressure from a central reservoir. The diameter of the fluid supply hole is smoothly reduced in order to keep
15 the diameter of the front bearing 2 of the atomiser small and therefore to keep the friction of the bearing small. Screwed into the end of the front attachment 1 is a cylindrical diffuser 4 which forms part of a nozzle 29, the inside diameter of the diffuser 4 gradually increasing from the bottom end to the top, thereby reducing the axial velocity of fluid in the diffuser 4 as it flows towards the inner space of a nozzle housing
20 5. The lower end of this housing 5 is rigidly attached to the outer part of the diffuser 4. The front attachment fitting 1, diffuser 4, and nozzle housing 5 remain stationary relative to one another in use.

Figures 2 to 4 show in more detail the nozzle housing 5. The housing 5 has 90 nozzle
25 holes 12 formed therein, each hole being 0.5 mm in diameter with a recess 13 on the outer surface of 1.2 mm diameter. The nozzles are arranged in 5 helices (equally spaced around the circumference of the housing 5). At a given axial position, five nozzles 12 are equally spaced around the circumference of the cylinder 5. Moving from one end of the cylinder to the other, the holes are staggered by 24° between successive stations. As
30 shown in particular in Figure 4, the nozzles are angled such that the fluid jets emerging from them tend to give a clockwise torque (when the atomiser is viewed from the bottom of the illustration of Figure 1). The rear end of the nozzle housing 5 is firmly supported by the rear nozzle mounting 11. Press fitted onto the front attachment fitting

1 is a front ball race 2. The outer housing of the front ball race 2 is pressed into a front plate retaining ring 3.

Forty five specially shaped grooved plates 6 ("flow" plates"), details of which are shown in Figures 5 to 9, are assembled to make a cylindrical drum 14, using a special jig to ensure that each face 15 of each plate is truly radial. The ends 16 of the grooved plates 6 are held tightly together by the front plate retaining ring 3. Over the central 90mm of each plate are a series of V-shaped grooves or channels 17, running from one edge 18 of the plate to the other edge 19. The grooves 17 are located in the leading face with respect to the direction of rotation of the drum 14. Each of the grooves has a cross-section in the shape of an equilateral triangle of side 0.3mm. Viewed from the grooved face, the outer edge 19 of the plate 6 is cut to form a series of teeth 20, the points of the teeth corresponding to the lowest part of each groove 28, and having an angle of 40° . At the outermost edge, the thickness of the teeth is tapered to zero at a 70° angle. In the assembled atomiser as viewed in Figure 1, the grooved plates for a cylindrical drum having V-shaped channels extending radially therethrough. The V-shaped channels are arranged on their sides as illustrated in Figure 7

The outer face of the rear ball race 8 is pressed into the rear plate retaining ring 7. Thus, when the rear ball race 8 is pushed into its position on the shaft of the rear nozzle cylinder mounting 11, the rear plate retaining ring 7 encloses the ends 21 of the assembly of grooved plates 6. The faces 22 of the front and rear retaining rings 3 and 7 are slightly tapered such that as the nut 10 is tightened, pushing the rings 3,7 closer together, the grooved plates 6 are pushed tighter together to make the cylindrical drum 14. Between the nut 10 and the rear ball race 8, is the rear guard plate 9 which is of sufficient diameter to protect the rotating parts of the atomiser from damage if the whole is put down on a surface when not assembled on an aircraft.

The reason for giving the ends of the plates 6 a smaller base radius is to try to contain the film of fluid, formed by the jets on the bases of the plates 6 in the region of the grooves, so that as much as possible of it will escape down the grooves and not out of the ends towards the bearings 2,8. Again, to protect the bearings from receiving fluid,

the diffuser ring 4 and the rear nozzle cylinder mounting 11 have large flanges 24,25. Opposite these flanges, radial holes 26,27 are positioned around the front and rear plate retaining rings 3,7 so that any fluid which does not reach that region is centrifuged out rather than entering the bearings. It is important to protect the bearings as much as possible in this way as seals cannot be used since the torque available from the angled jets 12 is limited and increased friction in the bearings would reduce the rate of rotation of the plate array increasing the size of the drops above that desired.

It will be appreciated that when the drum is rotated liquid impinging on its inner surface enters the inner channels openings. The centrifugal force then exerted on the liquid forces it to travel along the channels and to be expelled in droplets into the surrounding space. The V-shaped cross-section of the channels (with the V "pointing" in the direction opposite to the direction of rotation of the drum) causes the liquid to be forced into the base of the channels.

Alternative embodiments of the invention may use a) different numbers and sizes of plates 6, b) different numbers of grooves and teeth, c) different cross-sectional section size and shapes of grooves and, d) different numbers and diameters of nozzles. This would be necessary for example for atomisers designed for different flow rates or different mean drop size. It will be appreciated that other modifications may also be made.

A potential problem for rotary atomisers is that, whilst droplets of a uniform and appropriate size may be emitted from the outer surface of the rotating drum, these droplets will be broken up upon contact with the fast moving outside air (greater than 80 knots). To help alleviate this problem, a deflector plate may be attached to the atomiser in front of its leading edge to shield the atomiser from the air stream. Such a deflector plate is illustrated in Figure 10 (although only a part of the plate is shown in the Figure) and has a central opening which is used to mount the plate over the front attachment fitting 1 of the rotary atomiser so that the plate lies in a transverse plane with respect to the atomiser drum.

A large number of holes are provided in the deflection plate, arranged around a series of concentric circles. The diameter of the holes increases with radial distance from the centre of the plate. This construction allows drops emitted from the rotating drum to encounter a gradually increasing air flow rate as they move radially outward from the surface of the drum. This helps to prevent a breaking up of the drops which might happen were the drops to encounter air flowing at the full air speed immediately following emission from the drum.

In the arrangement described above, the force exerted by the liquid jets impinging on the inner surface of the drum 14 causes the drum to rotate. In some circumstances it may be necessary to assist rotation of the drum, in order to generate a sufficient centrifugal force to cause the liquid in the channels to be accelerated to an appropriate speed, by some additional means, for example an electrical motor coupled to the drum. However, where the atomiser is to be fitted to an aircraft, the arrangement illustrated in Figures 11 and 12 may be used. In this arrangement, a turbine 30 comprising a set of fan blades 31 is coupled to the base of the drum 32. The nozzle 33 passes through the centre of the turbine such that the turbine and drum can rotate freely around the nozzle. In use, the atomiser is mounted to the aircraft such that its longitudinal axis is substantially horizontal, and the turbine end of the atomiser leads the other end. As air flows over the atomiser, the turbine 30 rotates and turns the drum 32.

In an alternative embodiment of the invention, the cylindrical drum 14 is formed from a solid cylinder of plastics material having an outside diameter equal to that of the drum. Using a laser, channels are etched into cylinder so that they extend partway to the centre of the drum. By tracing a V shape on the outer surface of the drum, V shaped channels are formed. A central core of the cylinder is then etched away, e.g. using a broad beam laser or a drill. A completed drum is illustrated in Figure 13. The atomiser can then be assembled as illustrated in Figure 1.

It will be appreciated that the channels produced using this method may be tapered along their lengths, with the cross-sectional areas increasing with distance from the centre of the drum. It has been found that whilst the inner cross-sectional area should be of the order of 0.08mm^2 or less, the area can increase beyond this with increasing

radial distance. Indeed this may be advantageous as the reducing frictional force retarding the flow of liquid along the channels aids the formation of droplets of uniform size. Due to limits on the size of the laser beam, the channels may have a circular or elliptical cross-sectional shape at their innermost ends, being V shaped over the
5 remaining portions.

Yet another embodiment of the invention is illustrated in Figure 14. In this embodiment, a drum 40 has V-shaped channels extending radially through it as has been described with reference to Figures 1, and 5 to 9. The upper end of the nozzle (as
10 viewed in Figure 14) is closed, whilst the lower end is secured to a mounting 41 by a screw or press fitting. A nozzle arrangement 42 extends through the mounting 41 into the drum 40. The nozzle arrangement is substantially as described with reference to Figures 1 to 4.

15 The mounting 41 is fixed to the nozzle arrangement 42 by a pair of ball races 43,44, such that the mounting and drum can be rotated freely about the nozzle arrangement. A set of turbine blades 45 are fixed to the periphery of the mounting to assist rotation of the drum. The arrangement of Figure 13 facilitates easy removal of the drum 40 from the mounting 41 for cleaning, replacement, etc. Removal of the drum also provides
20 access to the nozzle arrangement 42.

It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiment without departing from the scope of the present invention. For example, it will be appreciated that the grooves formed in the
25 flow plates need not have a perfect V-shape. For example, the bottom of the channel may have some finite width or radius

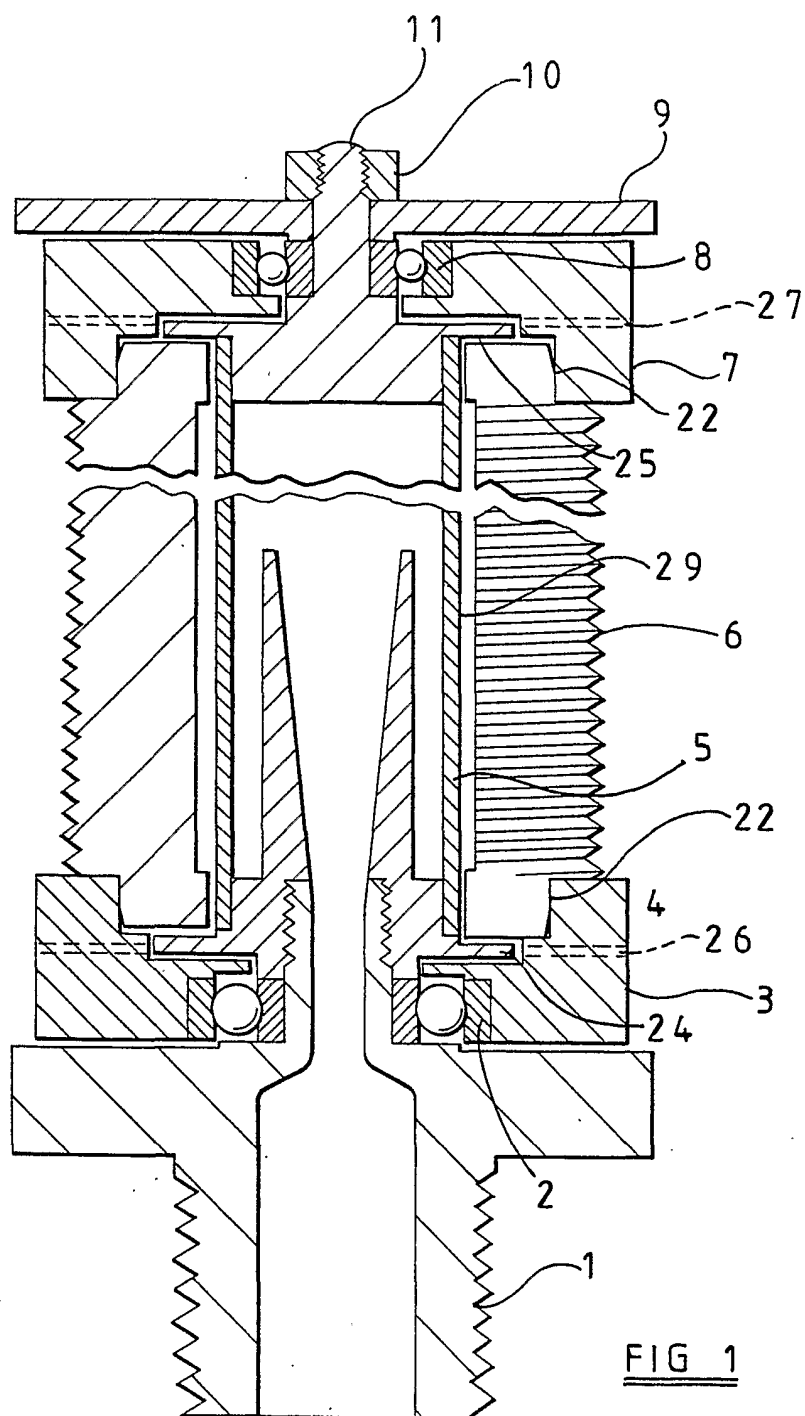
CLAIMS:

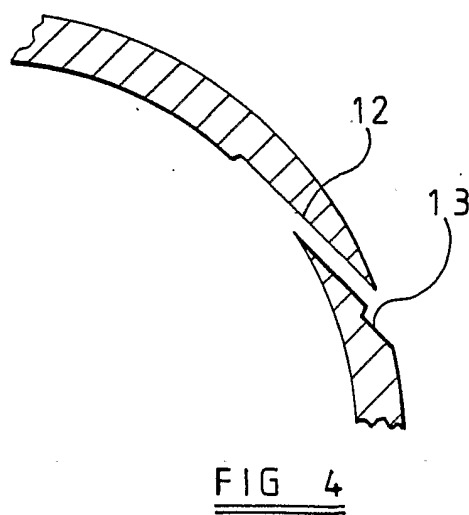
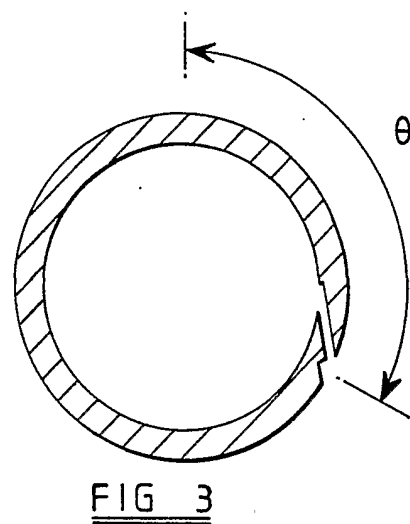
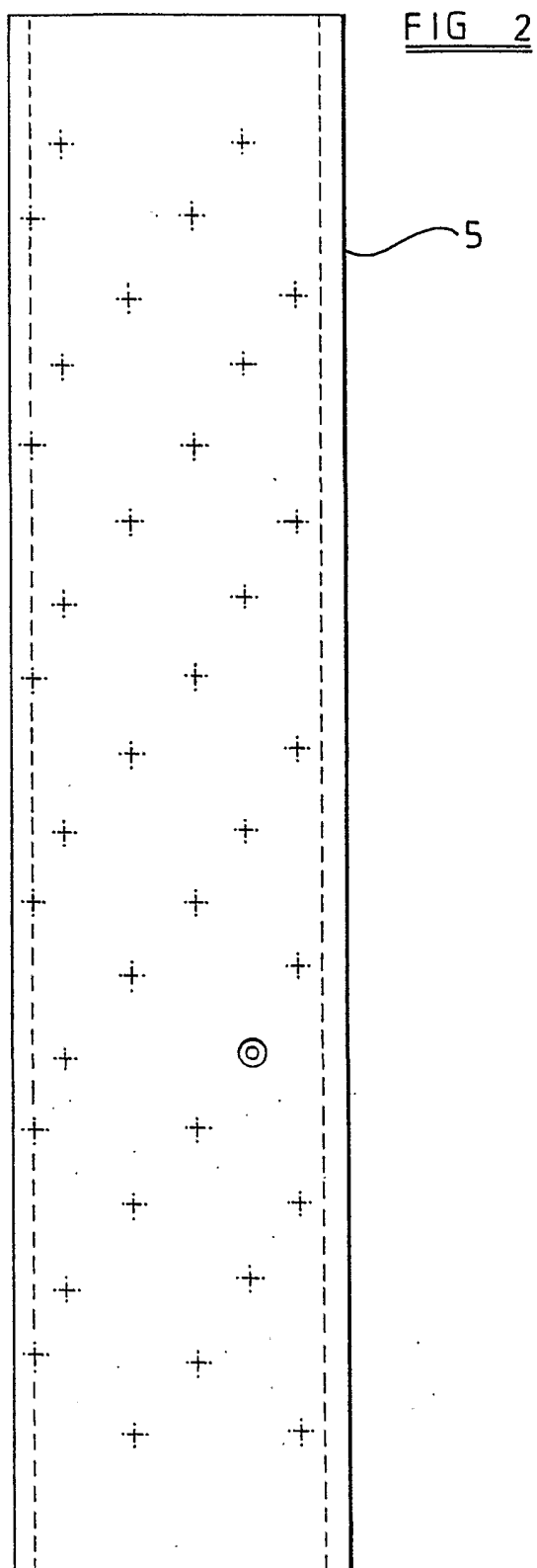
1. A rotary atomiser comprising:
 - a drum rotatable about its longitudinal axis;
 - 5 a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum;
 - a multiplicity of channels passing substantially radially through the drum for
10 conducting liquid from the inside to the outside of the drum, the channels being substantially V-shaped in cross-section along all or part of their lengths and oriented such that when the drum rotates in use, the narrower ends of the channels trail the wider ends.
- 15 2. An atomiser according to claim 1, wherein said drum comprises a multiplicity of plates aligned in respective substantially axial planes, said V-shaped channels being provided in the leading face of each plate.
3. An atomiser according to claim 2, wherein adjacent plates are in contact with
20 one another so that the plates together form a substantially cylindrical member.
4. An atomiser according to any one of the preceding claims, wherein said nozzle comprises a substantially cylindrical housing having its longitudinal axis substantially co-axial with the axis of said drum, a multiplicity of nozzle holes being distributed
25 about the housing and extending through said housing from the inside to the outside, the holes extending in a substantially transverse plane, at an angle to the radial direction.
5. An atomiser according to claim 4 and comprising a diffuser contained within said housing for diffusing liquid entering the inner space, the diffuser being
30 substantially cylindrical and co-axial with the housing.

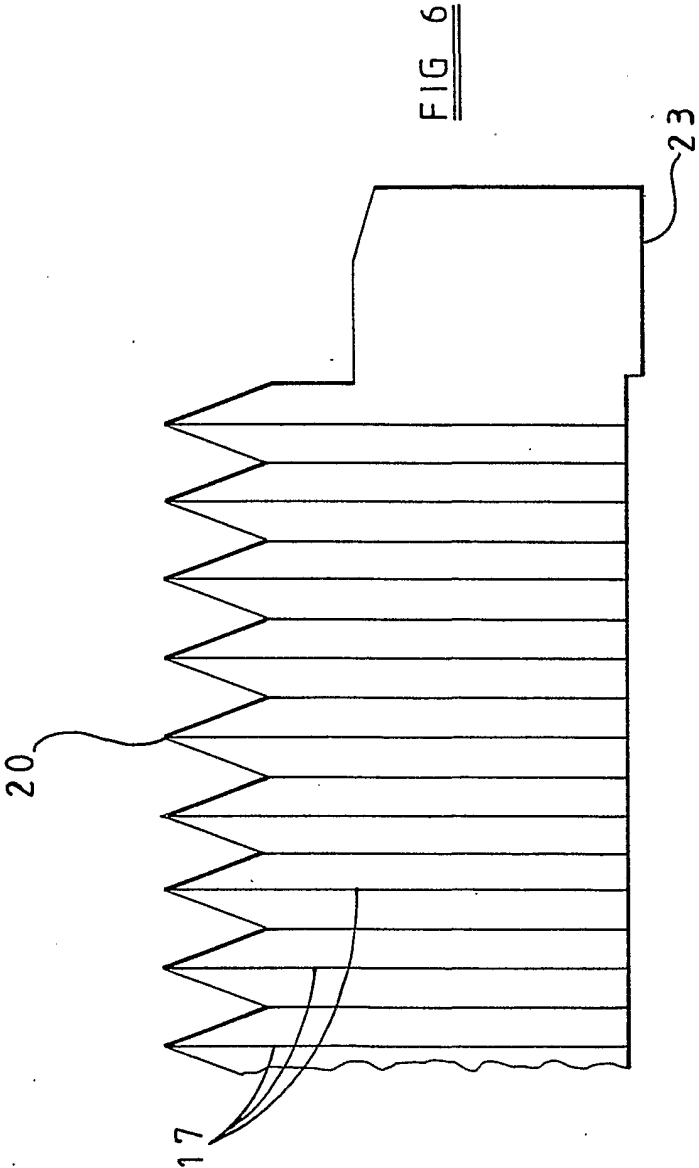
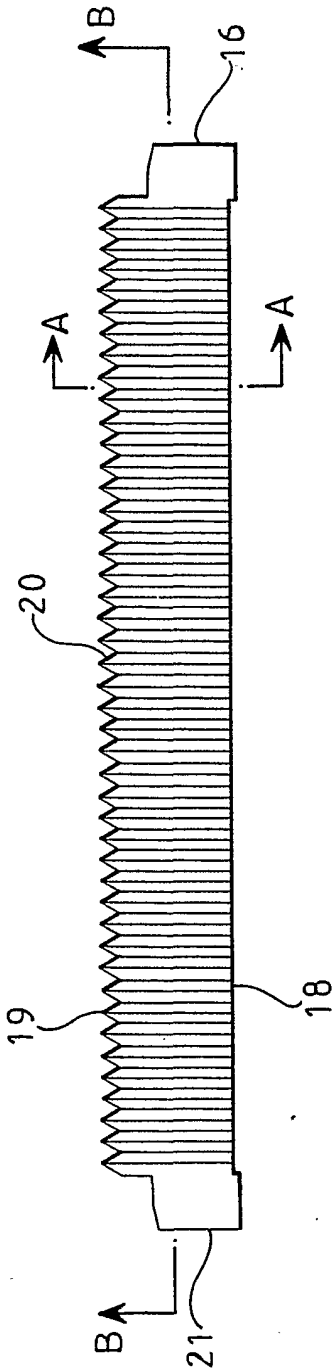
6. An atomiser according to claim 5, wherein the inner surface of the diffuser tapers outwardly from a first end coupled to a source of liquid to a second end which is open to said inner space of the housing.
- 5 7. An atomiser according to any one of the preceding claims, wherein in use the liquid jets emerging from the nozzle and impinging upon the inner surface of the drum cause or assist the drum to rotate resulting in the application of a centrifugal force to the liquid entering the channels extending through the drum, causing the liquid to be accelerated outwards through the channels to emerge into the surrounding space.
- 10 8. An atomiser according to any one of the preceding claims and comprising an electric or hydraulic motor coupled to the drum for causing the drum to rotate.
9. An atomiser according to any one of claims 1 to 7 and comprising a turbine
15 coupled to the drum, the turbine being caused in use to rotate by the flow of air over the atomiser, thereby causing the drum to rotate.
10. An atomiser according to any one of the preceding claims and comprising a deflector plate located in a substantially transverse plane at one end of the drum.
- 20 11. An atomiser according to claim 10, wherein said deflector plate has a plurality of holes distributed over its surface so that air can flow through the holes.
12. An atomiser according to claim 11, wherein the diameter of said holes increases
25 with radial distance from the axis of the drum.
13. An atomiser according to any one of the preceding claims and comprising:
means for supporting said nozzle and for conducting liquid to the nozzle;
a drum mount surrounding and being rotatable around the nozzle supporting
30 means; and
the drum being detachably secured to the drum mount for rotation therewith.

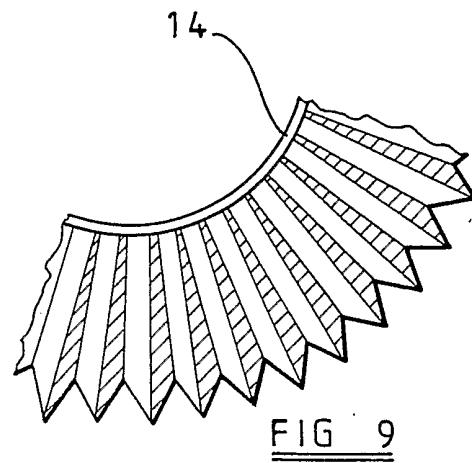
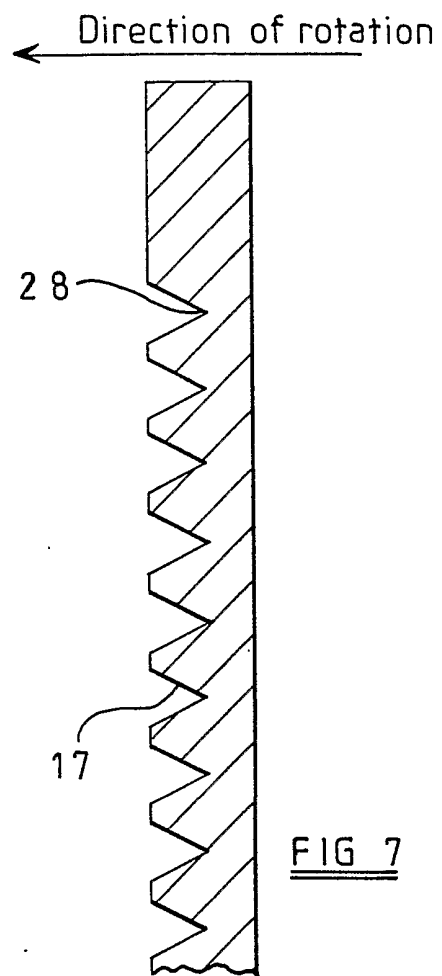
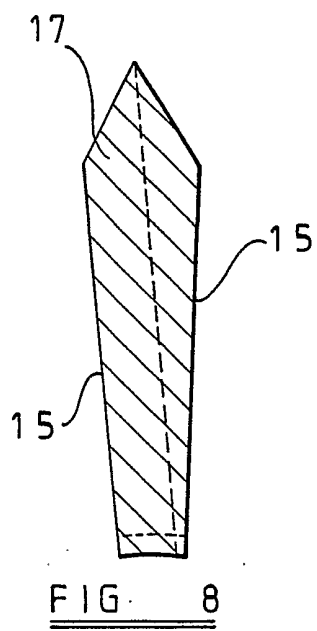
14. An atomiser according to claim 13, wherein the drum mount is attached to the nozzle supporting means by at least two rotary bearings.
15. A rotary atomiser comprising:
- 5 a drum rotatable about its longitudinal axis;
a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum; and
- 10 a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum,
wherein said nozzle comprises a substantially cylindrical housing having its longitudinal axis substantially co-axial with the axis of said drum and a multiplicity of nozzle holes distributed about the housing and extend through said housing from the
- 15 inside to the outside, said holes extending in a substantially transverse plane, at an angle to the radial direction.
16. A rotary atomiser comprising:
- a drum rotatable about its longitudinal axis;
- 20 a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum;
- a multiplicity of channels passing substantially radially through the drum for
- 25 conducting liquid from the inside to the outside of the drum; and
a deflector plate located in a substantially transverse plane at one end of the drum, the plate being arranged such that in use it leads the drum when the vehicle or aircraft on which the atomiser is mounted is in motion.
- 30 17. An atomiser according to claim 16, wherein said deflector plate has a plurality of holes distributed over its surface so that air can flow through the holes.

18. An atomiser according to claim 17, wherein the diameter of said holes increases with radial distance from the axis of the drum.
19. A rotary atomiser comprising:
- 5 a drum rotatable about its longitudinal axis;
- a nozzle located inside of or adjacent the drum such that the drum is rotatable about its axis relative to the nozzle, the nozzle being coupled in use to a liquid delivery system, wherein in use liquid exiting from the nozzle impinges on an inner surface of the drum;
- 10 a multiplicity of channels passing substantially radially through the drum for conducting liquid from the inside to the outside of the drum, the channels being tapered such that their radially outermost ends have a greater cross-sectional area than their innermost ends.
- 15 20. An atomiser according to any one of the preceding claims, wherein the cross-sectional area of the innermost ends of the channels is less than or equal to 0.1mm^2 .
21. A method of fabricating a drum for use in a rotary atomiser, the method comprising:
- 20 etching a multiplicity of channels into a solid plastic cylinder using a laser beam, each of said channels extending partway towards the centre of the cylinder; and
- removing a central core of the cylinder such that each of said channels opens into the opening now formed in the cylinder.
- 25 22. A method according to claim 21 and comprising moving the laser beam during each etching step so as to trace a substantially V shape on the outer surface of the cylinder to thereby form a substantially V shaped channel in the cylinder.









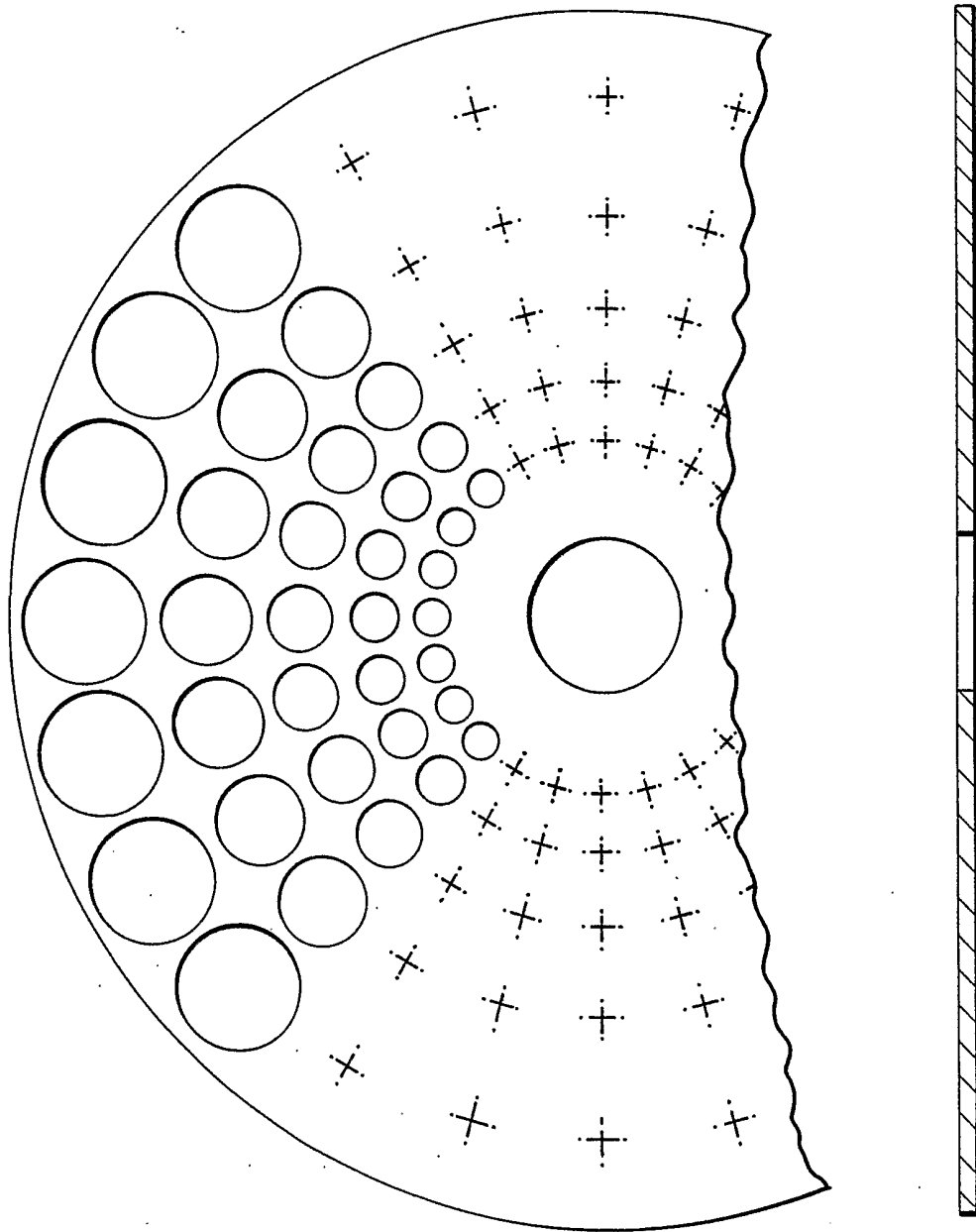


FIG 10

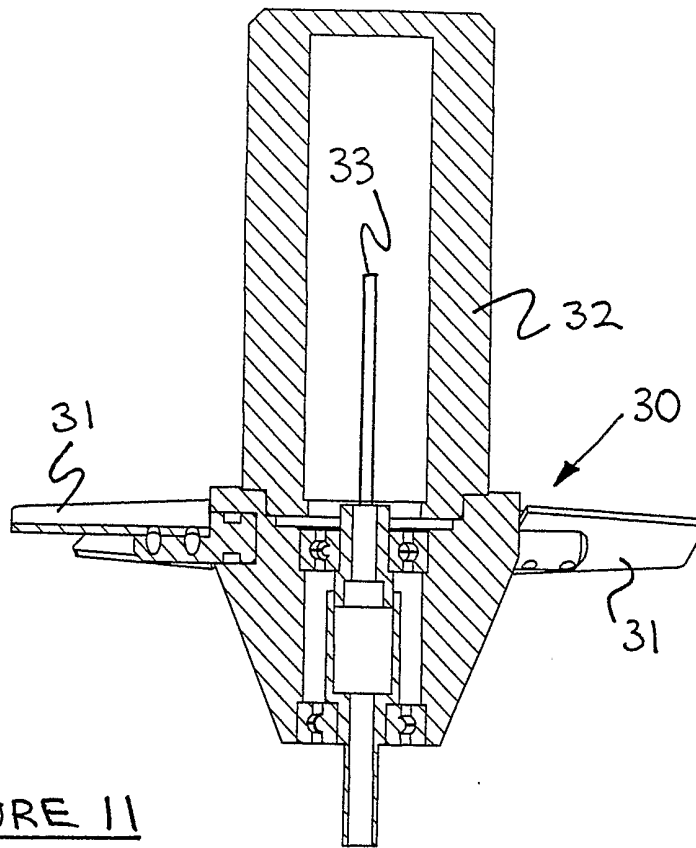


FIGURE 11

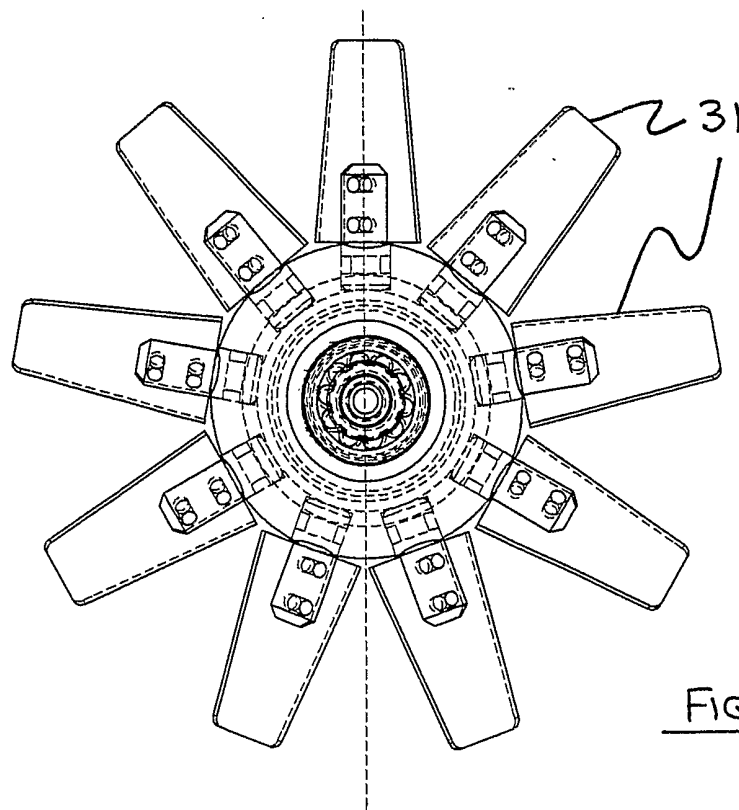


FIGURE 12

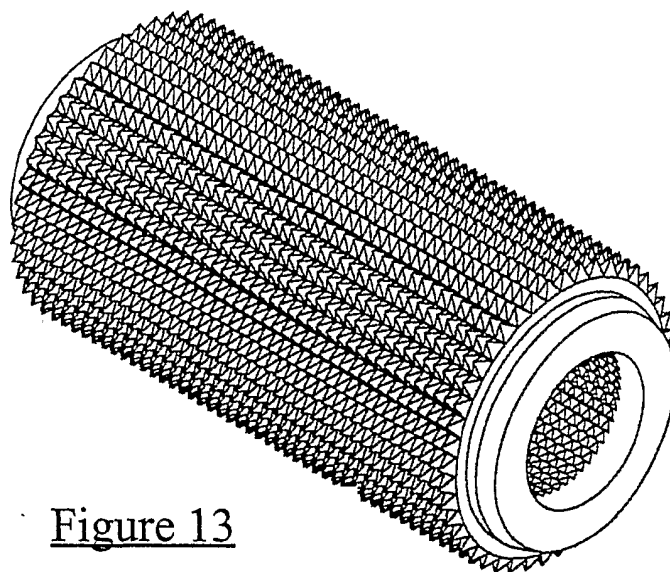


Figure 13

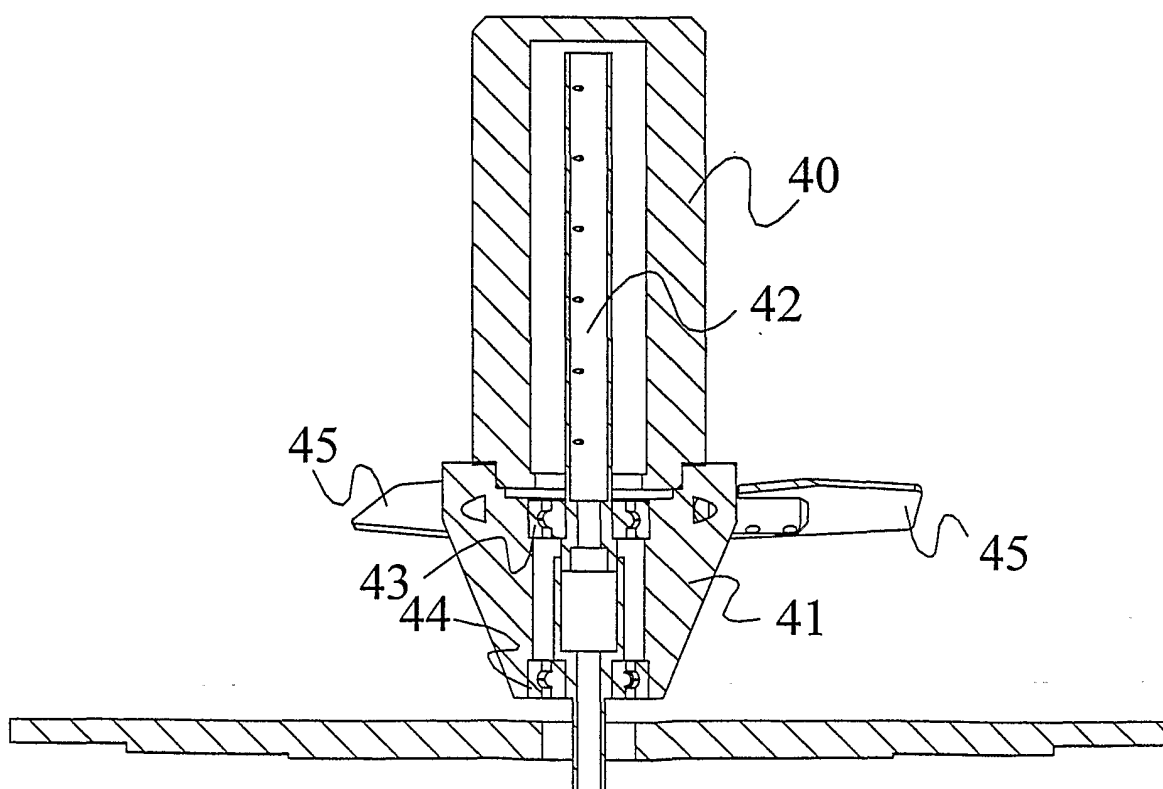


Figure 14