United States Patent [19]

Roos

[11] **3,823,653**

[45] **July 16, 1974**

[54] **FLUID DISTRIBUTING DEVICE**

[75] Inventor: **Yngve Gustav Sigvard Roos,** Stockholm, Sweden

[73] Assignee: **AR-VENTILATION AB,** Stockholm, Sweden

[22] Filed: **Sept. 28, 1972**

[21] Appl. No.: **293,158**

[30] **Foreign Application Priority Data**

Oct. 4, 1971 Sweden 12489/71

[52] **U.S. Cl.** ..... **98/40 B,** 98/41 R

[51] **Int. Cl.** **F24f 13/06**

[58] **Field of Search** ..... 98/40 D, 40 B, 41 R, 108

[56] **References Cited**

UNITED STATES PATENTS

2,271,010	1/1942	Honerkamp	98/40 B
3,026,787	3/1962	Combe	98/41 R
3,292,522	12/1966	Shur	98/41 R X
3,411,425	11/1968	Lambert	98/41 R X

Primary Examiner—William E. Wayner

Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

This invention pertains to a device for distributing a fluid, such as air, to a surrounding space in a selected air distribution pattern. The device is of the type with which the medium to be distributed is imparted a circulatory motion upon entering the device, wherewith a sub-pressure zone is created in the centre of the device as the result of air being drawn from the region of said zone by the circulating air mass. An axially and radially adjustable regulating means is arranged in the vicinity of the medium outlet of the device to define a gap through which the medium must pass when leaving the device, the regulating means being so constructed that adjustment thereof causes a change in the resistance of fluid flow through the gap and in the distribution pattern of the medium issuing therethrough.

12 Claims, 26 Drawing Figures

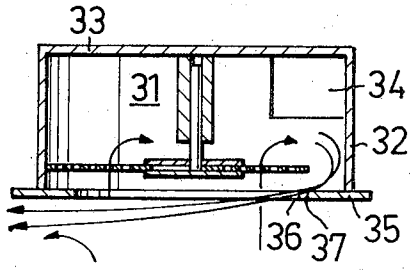


FIG.1

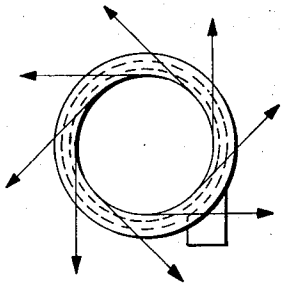


FIG.3

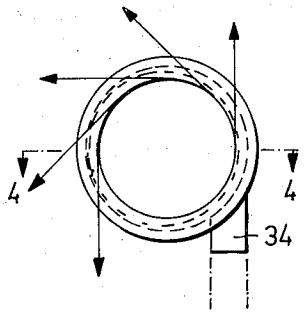


FIG.5

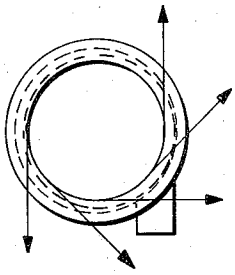


FIG.2

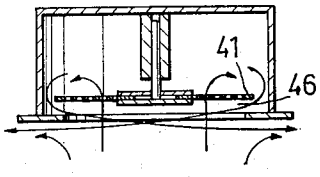


FIG.4

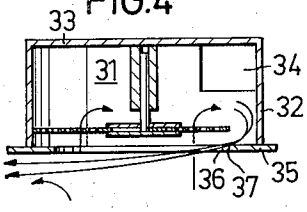


FIG.6

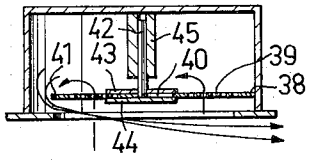


FIG.7

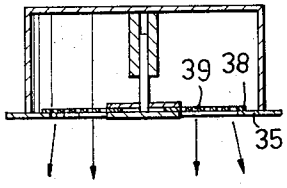


FIG.8

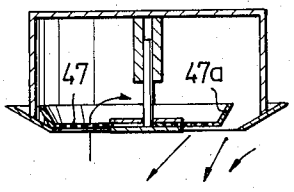


FIG.9

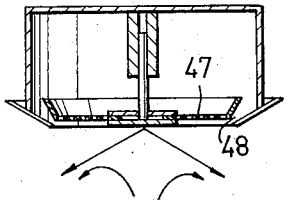
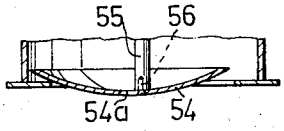


FIG.10



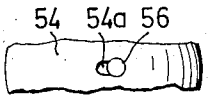


FIG.11

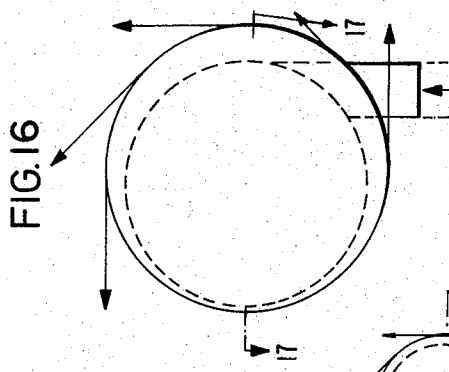


FIG. 16

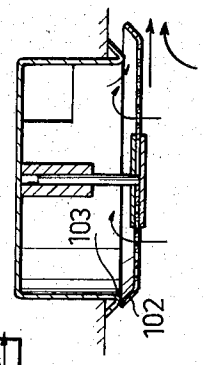


FIG. 17

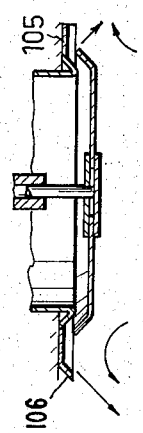


FIG. 18

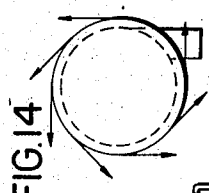


FIG. 14

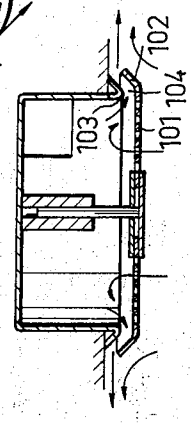


FIG. 13

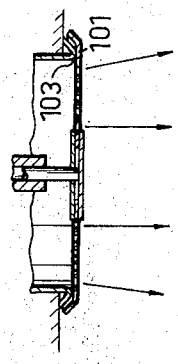


FIG. 15

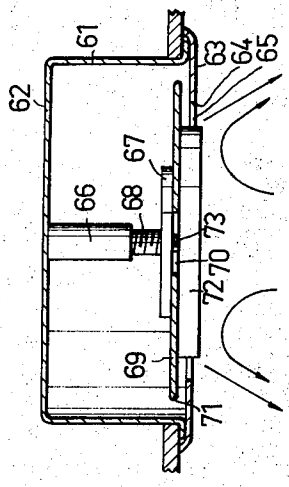


FIG. 12

FIG. 19

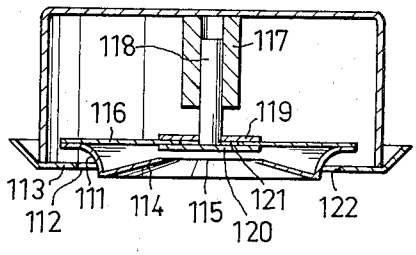


FIG. 20

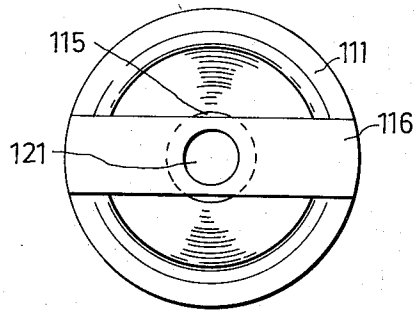


FIG. 21

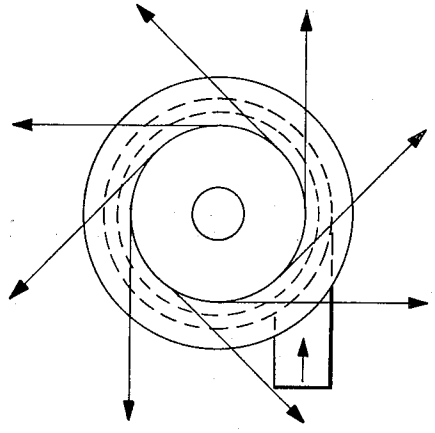


FIG. 23

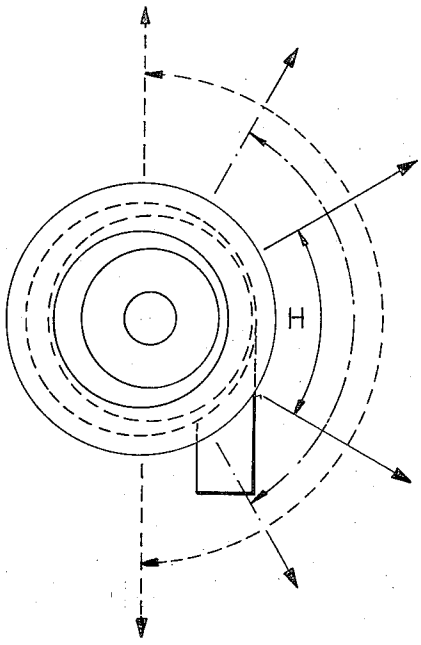


FIG. 22

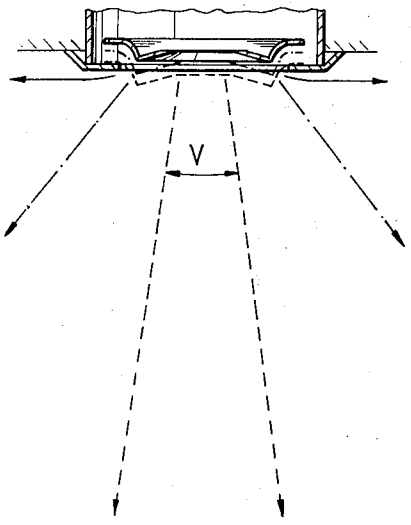


FIG. 24

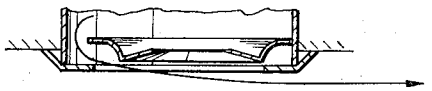


FIG. 25

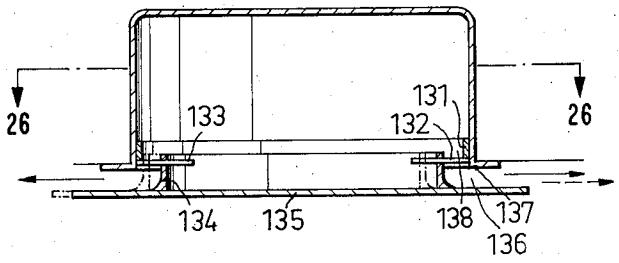
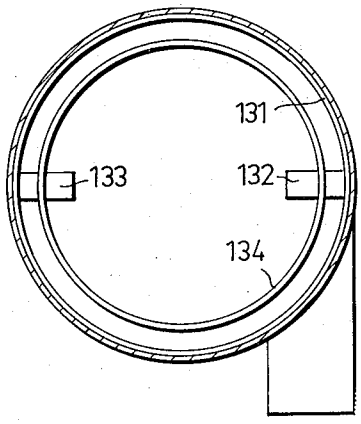


FIG. 26



FLUID DISTRIBUTING DEVICE

The present invention relates to a fluid distributing device of the type with which the fluid to be distributed moves in a circulatory path within the device and is ejected therefrom tangentially to the edge of an exit opening. Although the concept of the invention is described hereinafter with reference to its application for distributing air to the surroundings, it can be applied equally as well with other fluids. With regard to the properties and characteristics desired in modern air distributing devices of the type envisaged, present day devices are encumbered with a large number of deficiencies.

With air distributing devices of present day construction, it is not possible to vary the pattern in which the air is distributed or the direction in which it leaves the nozzle owing to the lack of means which enable the pressure distribution within the device to be controlled, and therewith also permit control of emergent air.

To impart a circulatory motion to the air entering the device, it is provided with a tangentially arranged air intake, which results in an uneven distribution of pressure within the device. In the absence of regulating or control means, this results in a one-sided and unidirectional air flow at the concentrically positioned outlet opening. To counteract this it has been proposed that the wall in the housing of the device is given a helical configuration and that the outlet opening is placed eccentrically. This results in an expensive design, however, and does not permit the air distribution pattern to be varied.

One object of the present invention is to provide a device of the aforementioned type with which the medium, in this case air, is distributed in a horizontal layer and with which the pattern of air distribution can be varied from a 360° emergent pattern around the device to a sector emergent pattern of any angle, in a direction which can be continuously and smoothly changed throughout one revolution.

Another object is to provide a device with which the fluid discharged therefrom can be quickly and readily switched from a horizontal path to a vertical path and with which the vertical fluid distributing angle and distribution pattern can be varied.

An important advantage afforded by devices having these characteristics is that the same device can be used for both cooling purposes, when the device is desired to distribute air horizontally at a temperature below ambient temperature, and for heating purposes where the temperature air is higher than the ambient temperature and the flow is directed downwardly. This can be achieved by providing the device with control means which when adjusted axially causes a change in the vertical air distribution pattern and when adjusted radially changes the pattern horizontally.

When adjusting ventilation systems or reorganizing ventilated rooms etc. it is often found necessary to alter the pattern in which the air is distributed within the space served thereby. This can readily be achieved with the device of the present invention.

When applying the principle of a tangentially located air intake and tangential air discharge, changes in the direction of flow of the air into and out of the device are made smoothly, whereby the level of sound caused by the device is held at a minimum. Owing to the suction effect prevailing at the centre of the device, an intensive mixture with the surrounding air is obtained which causes the speed of the incoming air to be rapidly lowered and provides a draughtfree device. The kinetic energy of the air flowing into the device is also reduced to advantage by the rotating body of air within the device.

The main concept of the invention resides in the arrangement in such devices of control means having the form of a disc or rotation symmetrical body which when centered leaves a relatively narrow gap between its outer peripheral surface and the wall of the device. The resistance to flow offered by the gap stabilizes the flow of air through the device and along the edge of the outlet opening. By displacing the regulating disc radially, it is possible to change the form of the gap and therewith vary the resistance at different points around the gap, thereby enabling the air to be distributed in any desired direction around the periphery of the device. Alternatively the regulating disc can also be perforated and made axially displaceable, wherewith when moved to an axially bottom limit position, in which the disc seats against an outlet flange, a downwardly directed flow of air is obtained.

Although the above description has been given with thought to an air distribution device mounted in the ceiling of a ventilated room, the device may also be mounted in a wall of the room while retaining its efficiency.

In the U.S. Pat. No. 3,026,787 there is described a device having a plate which is displaceable only in the axial direction and which has a diameter substantially smaller than the diameter of the outlet opening, since it is only intended to regulate the amount of air drawn to the sub-pressure zone formed in the centre of the device, the plate also being intended to throttle or close an air intake opening located opposite the outlet opening, as described in column 2, lines 50–60 of said patent. This arrangement does not influence the flow zone in the device of the exeting air and thus has no guiding effect on the air passed to the room. The arrangement is thus of a different character and provides a different effect than the device of the present invention.

In an alternative embodiment of the device according to the present invention, an air gap is formed between an outlet flange and the undersurface of an internally arranged tiltable regulating plate or disc located at a distance from the outlet flange. When the air gap has uniform width around the whole circumference of the device, a circular distribution pattern of the air is obtained around the device, and as a result of the centrifugal effect of the air rotating in the device, said air is ejected horizontally from an outlet opening. Tilting of the plate or disc enables the air resistance to be varied at different points around the gap, air being distributed in the direction where the greatest resistance prevails in the air gap. A more concentrated directioning effect is obtained when the edge of the disc is in contact with the outlet flange. With lateral distribution of the air, obtained by tilting the regulating disc, the centrifugal force and an interface effect created between the undersurface of the disc and the air stream contribute towards causing the air to follow the undersurfaces of the disc and the flange and to be ejected in a horizontal layer beneath the roof. Vertical distribution of the air is obtained when the disc, which is perforated, is brought into engagement with the outlet flange.

An air diffusor is described in U.S. Pat. No. 3,292,522. When comparing this diffusor with the aforedescribed device of the present invention, it will be seen that the nature and the technical effect afforded thereby differ considerably. The diffusor provides for axial air supply to a curved plate or disc located in the path of a downwardly directed air flow, with the convex side of the disc facing upwardly in a downwardly discharging, fully open diffusor funnel hich provides an obliquely downward spread of air with which the downward direction increases with tilting of the disc for intended lateral distribution of the air, and with which the air flow is throttled when the disc is moved to bear against the axial air intake. The construction and mode of operation of this device and the technical advantages afforded thereby are totally different from the aforedescribed device constructed in accordance with the present invention, the inventive device producing, among other things, a horizontal layer of air even with lateral air distribution, which is a prerequisite for the use of the device for coooling purposes. Neither is the operation of the inventive device reliant upon a diffusor effect and no capacity regulation is contemplated therewith since regulation should be effected in the air supply passage prior to entering the device, so as to obtain quiet operation. The performance of the device is fully dependent on the principle of a rotating flow of air in the device.

In a modified form of the invention, the regulating disc is located externally and is provided with a raised edge which, when the disc is displaced radially and axially, co-acts with the outside of the edge on the air ejection opening of the device to vary the distribution pattern; a variation on this theme being a construction with which the disc has a raised edge which co-acts with the inside of the device at the outlet thereof. A specially constructed regulating device whose function is based on an interface effect is also envisaged, and also a device with which the regulating disc is radially displaceable on two diametrically opposed pins extending from a ring rotatable in the device.

The invention will now be described in more detail with reference to a number of embodiments thereof, further features and advantages connected with the invention being made apparent in conjunction therewith.

In the drawing

FIGS. **1–11** illustrate in plane and in section devices provided with an internal regulating disc, and show how the air distribution pattern is changed in response to the position of the regulating disc.

FIG. **12** is a section of a device which can be switched from a horizontal air distribution pattern to different degrees of vertical distribution.

FIGS. **13–18** illustrate a device having an externally located radially and axially displaceable regulating disc.

FIGS. **19** and **20** illustrate in section and in plane a device having a regulating means operating with an interface effect, and

FIGS. **21–24** illustrate air distribution patterns obtained with this device.

FIGS. **25** and **26** illustrate an arrangement for radially and axially adjusting the regulating means.

With a preferred embodiment of the invention, the distributing device includes a circular chamber **31** (FIG. **4**) having a preferably cylindrical wall **32,** and is provided with a tangentially located air inlet connection **34.** The device also has an outlet flange **35** which may be planar or profiled, for example conical, with an outlet **36,** the diameter of which outlet is preferably smaller than the inner diameter of the wall **32** on the outlet side.

The device is provided internally with a regulating disc **38** (FIG. **6**) having a diameter which is preferably larger than the diameter of the outlet **36.** The regulating disc **38** may be provided with air passage orifices **39** or may be imperforate, with the exception of a hole **40** through which a shaft **42** is able to move in a manner to enable the disc **38** to be displaced radially into contact with the inner surface of the wall **32** at any point around the periphery thereof. The disc **38** is inserted between two plates **43, 44** arranged on the shaft **42** and intended to lock the disc in its set position. The shaft **42** can be adjusted vertically by means of screws (not shown) or by being moved up and down in a holder **45.**

As previously mentioned, the air is passed tangentially into the device and is thus caused to flow in a rotary path towards the inside of the wall **32.** This in turn causes air to move from the centre zone of the device, where a sub-pressure zone is created as a result thereof. Air from the ventilated room flows to the sub-pressure zone through the openings **39** in the disc and is mixed with the rotating primary air, whereafter the air is thrown tangentially across the edge **37** of the outlet opening **36** by the centrifugal force of the rotating air mass. Further admixture of ambient air with the primary air is effected by withdrawal of air externally of the device. This mode of operation provides a very efficient device with both heating and cooling operations, and also renders the device draft-free, since the velocity of the injected air is rapidly reduced.

When the disc **38** is centrally aligned, whereby it takes an axial position which provides an air gap **46** (FIG. **2**) between the disc **38** and the outlet flange **35,** there is obtained a circular air distribution pattern with horizontal flow streams as shown in FIGS. **1–2.** By displacing the disc **38** radially, a sector-shaped air distribution pattern is obtained as shown in FIG. **3,** said pattern extending in the direction towards which the disc is moved. An oppositely directed distribution pattern is illustrated in FIGS. **5–6.** The direction in which the air is propelled, i.e. the air distribution pattern, can be continuously and smoothly changed in either direction around the full circumference of the device, since the disc **38** is capable of being moved radially against any point on the inner surface of the wall **32.** Movement of the disc **38** changes the distribution of the air resistance in the gap between the edge **41** of the disc and the inside of the wall **32,** and therewith also the distribution of the air ejected around the edge **37** of the outlet opening.

With the illustration of FIG. **7** the disc **38** is shown to be in abutment with the outlet flange **35.** In this way the air is blown downwardly through the openings **39.**

FIG. **8** illustrates a device having a profiled outlet flange and a regulating disc **47** having a conically raised edge **47***a* with which the air is blown obliquely downwardly when the disc is displaced radially in its lowermost position. As previously mentioned, the air distribution pattern can be varied and directed around the full circumference of the device.

FIG. 9 illustrates the control regulating disc 47 in a centered position and slightly raised above the outlet flange, whereby downward distribution of the air is obtaining over a wider area than when the disc abuts the flange. The vertical distributing angle can be changed by raising and lowering the disc 47 with subsequent change in the amount of air passing through the annular gap 48. Horizontal and downwardly directed distribution of air is obtained with the embodiments illustrated in FIGS. 1–7.

FIGS. 10 and 11 illustrate a device having a curved regulating disc 54 which is retained to a rod 55 by means of a screw 56 passing through a hole 54*a* disposed in the disc 54 and permitting centering and radial displacement of the disc.

The device illustrated in FIG. 12 has a cylindrical or slightly conical wall 61, an outlet flange 63 having an outlet opening 65, the diameter of which is smaller than the inner diameter of the device. An internally threaded pipe 66 is secured to the roof 62 of the device. A flange 67 has arranged thereon a threaded stud 68 capable of being screwed into the pipe 66 to enable vertical movement of a regulating disc 69, said disc being mounted between the flange 67 and a circular plate 72, which by means of a threaded stud 73 can be caused to lock the radially movable disc 69 in its adjusted position. The disc 69 has disposed therein a hole 70 having a diameter which permits free passage when the disc is moved radially so that its edge 71 is able to contact the wall of the device. The device provides horizontal distribution of the air with a change in the direction of distribution, and vertical air distribution where the vertical distribution angle is changed by moving the plate 72 to different vertical positions when said plate is inserted in the outlet opening 65.

FIGS. 13–18 illustrate an embodiment with which a perforated regulating disc 101 located externally of the device has an upwardly raised edge 102 and is axially and radially manoueverable according to the previously described principle, the edge 102 co-acting with an edge 103 defining the outlet opening of the device to permit variation of the air distribution pattern. When the regulating disc 101 is centrally aligned to form an air gap 104 between the edge 103 and the disc 101, there is created a circular air distribution pattern having a horizontal extension, as illustrated in FIGS. 13 and 14. Lateral distribution of the air is obtained by radially moving the disc 101, the air being blown out in the direction in which the disc is moved. A more concentrated directioning effect is obtained when the edge 102 is in contact with the edge 103, a maximum air ejection opening being obtained in the direction in which the air leaves the device, as illustrated in FIG. 17. When wishing to eject the air vertically, the disc 101 is moved upwards into abutment with the edge 103, as shown in FIG. 15.

FIG. 18 illustrates a device provided with a roof flange 105 having a downwardly folded edge 106 to direct the horizontally ejected air downwardly, when so required.

FIG. 19 illustrates a special embodiment of a regulating means providing greater advantages and possibilities of variation.

With this embodiment, a profiled ring 111 is given an inwardly bulging surface so that its upper edge diameter is less than the inner diameter of the device, but greater than the diameter of an outlet opening 112 in a flange 113 and having a lower edge diameter which is less than the diameter of the outlet opening 112, and has a bottom 114 provided with a hole 115. The ring 111 has a diametrically located base 116, for example in the form of a relatively narrow plate on which supporting means for supporting and radially displacing the regulating means can be mounted. In the illustrated embodiment, the supporting means comprises a shaft 118 which is vertically displaceable in or capable of being screwed into a holder 117, and which has two plates 119, 120 between which the base 116 can be radially displaced owing to the arrangement of a hole 121 which permits free movement around the shaft 118, thereby enabling the ring 111 to be moved into contact with the inside of the device in any direction around the circumference thereof, or to be locked in an intermediate position.

FIGS. 21–24 illustrate diagrammatically examples of air distribution patterns obtained with the device of FIG. 19 and show how said patterns can be varied according to requirements by simply adjusting one single regulating means. FIGS. 22–24 do not identify the elements responsible for creating the distribution pattern, reference being made in this respect to FIGS. 19 and 20. The vertical distribution angle V shown in FIG. 22 can be smoothly and continuously varied by raising and lowering the ring 111 and the mode of operation depends on the particular construction of the ring and the manner in which it co-acts with the flange 113, which enables the interface effect, which causes air blown along a surface to be sucked in towards the same, and the centrifugal effect of the ejected air to be utilized in a very effective manner so that a device is obtained having a performance not previously achieved, and also providing an attractive, simple and easily regulated device. The principle on which the device operates will be evident. Lateral distribution of the air is obtained by radially displacing the ring 111 as shown in FIGS. 23 and 24, the smallest distribution angle H being obtained when the upper edge of the ring 111 reaches contact with the inner surface of the device, the distribution angle then increasing progressively with displacement of the ring 111 towards its centered position. Lateral distribution of the air can be combined with a downward distribution by lowering the ring 111 in a radially displaced position.

FIGS. 25 and 26 illustrate a device with which air is supplied tangentially and which has an alternative embodiment of the arrangement for radially and axially adjusting the regulating means. This alternative comprises a rotatable ring 131 having two diametrically opposed bars 132, 133 extending in recesses disposed in an internal regulating ring 134 which is provided at the bottom thereof with a plate 135 which, in its lowered position, provides a vertical gap 136 between its upper surface and the edge 137 defining the outlet opening of the device.

When the regulating ring 134 is moved radially on the bars 132, 133, the air is directed horizontally in the direction opposite to that in which the ring was moved since the width of the horizontal gap 136 between the ring 134 and the ring 131 increases in this direction, thereby to provide an increase in the air flow, the directing effect being greatest when the regulating ring 134 is in contact with the rotatable ring 131 in the direction of displacement, by which ring 131 the adjusted

distribution pattern can be obtained in any direction around the whole circumference of the device.

What is claimed is:

1. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said circular wall, said regulating means having the form of a disc arranged for radial movement into contact with said circular wall around the full circumference thereof or locked in an intermediate position, the disc when occupying a centered position providing a gap of uniform width around the full circumference of said circular wall and being arranged so that when displaced radially, a reduction in gap width is obtained on one side with a corresponding increase of gap width on a diametrically opposite side, which causes the total resistance to be constant but divided with a successively increasing and successively decreasing resistance along the gap, whereby it is possible to vary the resistance distribution and therewith the flow distribution in the gap and around the outlet opening to provide control of the distribution angle and distribution direction, which can be continuously changed in any direction around the full circumference of said circular wall.

2. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said circular wall, and a flange defining said outlet opening, the diameter of which is smaller than the internal diameter of said circular wall, so as to form a vertical gap between the flange and a disc mounted within said chamber and constituting the regulating means, the disc having at least one opening to permit inflow of fluid through said opening to a subpressure zone formed by the withdrawal of fluid from the central portion of the chamber by the body of fluid rotating adjacent said circular wall before said fluid is ejected tangentially through the vertical gap located between the disc and the flange.

3. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said circular wall, and a flange defining said outlet opening, the diameter of which is smaller than the internal diameter of said circular wall, so as to form a vertical gap between the flange and a disc mounted within said chamber and constituting the regulating means, the regulating means being a disc having openings and being axially adjustable, said disc when abutting the flange providing a downwardly directed flow of fluid through said openings.

4. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said circular wall, and a flange defining said outlet opening, the diameter of which is smaller than the internal diameter of said circular wall, so as to form a vertical gap between the flange and a disc mounted within said chamber and constituting the regulating means, said regulating means being displaceable both radially and axially.

5. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said cir-

cular wall, the regulating means comprising a radially adjustable disc and a cylindrical plate abutting said disc and capable of being inserted in said outlet opening to permit combined radial and axial adjustment of the regulating means, which means is arranged to provide downward distribution of fluid when the plate is lowered in the outlet opening and horizontal distribution of fluid when the plate is located above an outlet flange forming part of said chamber.

6. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means being mounted within said chamber in a region upstream of said outlet opening, said gap being defined between the edge of the regulating means and said circular wall, the regulating means being a profiled ring provided with a diametrically located base having the form of a relatively narrow plate or spline on which means for supporting and radially displacing the regulating means is mounted, said supporting means comprising a holder and a screw shaft or a vertically displaceable shaft having two plates between which the base can be readily displaced, the ring having an inwardly bulging surface so that its upper edge diameter is smaller than the inner diameter of said chamber but larger than the diameter of said outlet opening in a flange forming part of said chamber, and having a lower edge diameter which is smaller than the diameter of the outlet opening, and having a bottom in which is disposed a hole through which fluid is ejected when the ring is lowered into abutment with the flange, whereby when lifting the ring so as to form a gap between said ring and the edge of the flange, fluid is initially ejected both through the hole and through the gap, the flow through the gap following the contours of the inwardly bulging surface of the ring as a result of the interface effect created between the side of the ring and the flow, and joins the flow through the hole, thereby providing a greater fluid distribution angle which progressively increases with increased lifting of the ring as a result of widening of the gap and an increase in the quantity of fluid passing therethrough while simultaneously the centrifugal effect of the fluid mass rotating in the device effects to a greater extent the flow through the gap until finally, in a position with the under edge of the ring level with or above the flange, the interface effect against the side of the ring causes the flow through the gap to ease, the centrifugal effect of the flow rotating in the chamber causing the fluid to be effected tangentially from the edge of the flange in a horizontally extending distribution pattern, and the lateral direction of the distribution pattern being controlled by radially setting the regulating means.

7. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, the regulating means comprising a radially and axially adjustable disc located externally of said outlet opening, said disc having an upwardly turned edge which coacts with the edge of said outlet opening upon radial or axial adjustment of said disc, displacement of the disc to one side providing a horizontal distribution of fluid in this direction and central alignment of said disc providing a circular horizontal distribution of fluid whereby when the disc is perforated, a downwardly directed fluid distribution is obtained as the disc is moved into abutment with the edge of the outlet opening.

8. A device according to claim 7, having an outer roof flange having a downwardly turned edge for causing the horizontally directed fluid from the device to be turned downwardly.

9. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, and an internal, rotatable ring having two diametrically opposed bars extending in recesses disposed in an internal regulating ring for radial displacement thereof towards the rotatable ring, the regulating ring having a plate having perforations to provide downward flow of fluid when the plate is moved into abutment with a surrounding said outlet opening.

10. A fluid distribution device comprising a circular chamber within which the fluid follows a rotary path, said chamber having tangential fluid inlet means and an outlet opening, regulating means for constantly maintaining a resistance to the flow of fluid at the peripheral flow zone of said chamber, thereby to counteract uneven pressure distribution, said regulating means being so mounted adjacent said outlet opening of said chamber that a relatively narrow gap is formed between an edge of the regulating means and a circular wall of said chamber, the fluid spiraling through said gap before being ejected tangentially over an edge of said outlet opening in a horizontally extending distribution pattern through the action of centrifugal force, said regulating means comprising a circular member whose outer diameter is substantially less than the inner diameter of said circular wall of said chamber, and means adjustably mounting said circular member for movement in any direction perpendicular to its axis to adjusted posi-

tions of variable eccentricity relative to said circular wall.

11. A device according to claim 10, said circular member comprising a disc.

12. A device according to claim 10, and a radially inwardly extending flange on said circular wall defining said outlet opening, said circular member having a greater diameter than said flange.

* * * * *