Aug. 26, 1958 C. DEMUTH 2,848,935

AIR DISTRIBUTING DEVICES

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Fig. 1.

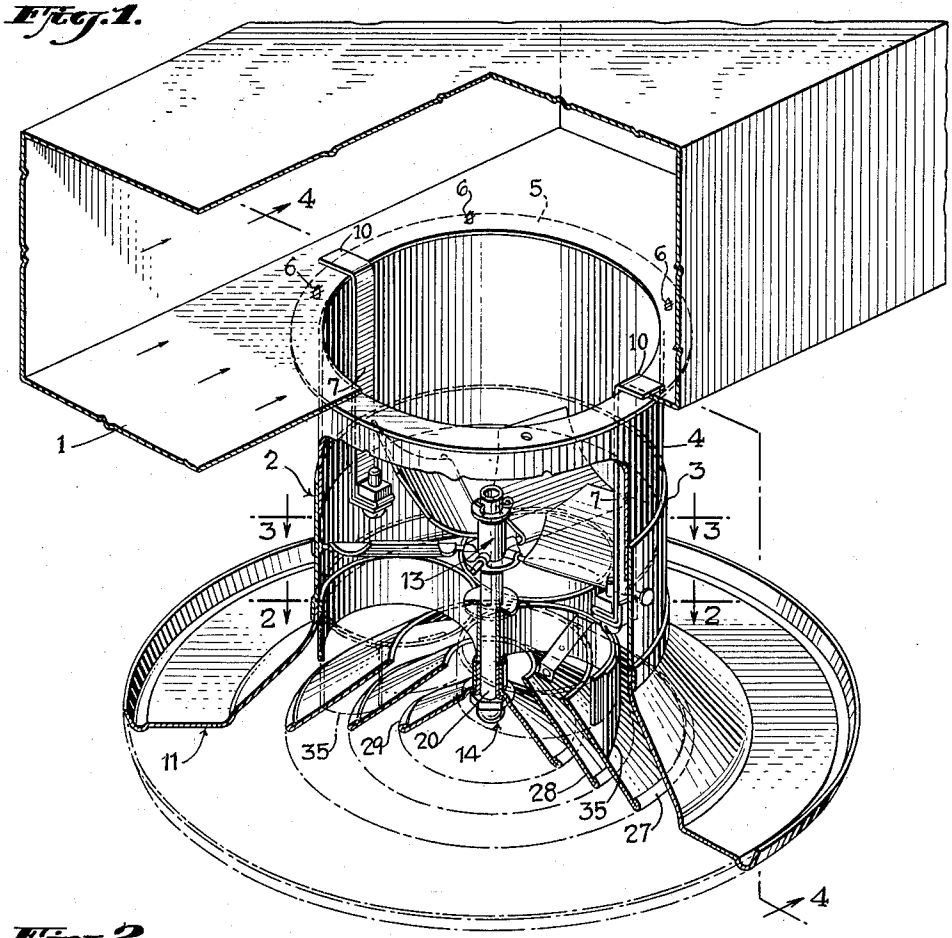


Fig. 2.

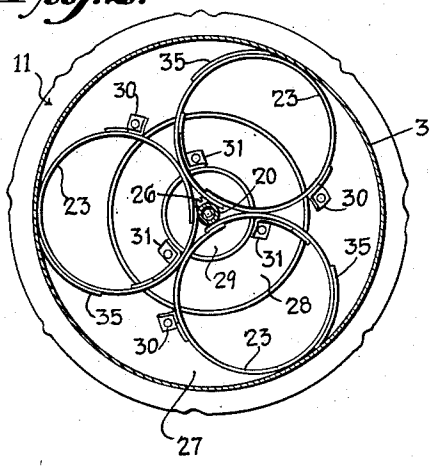
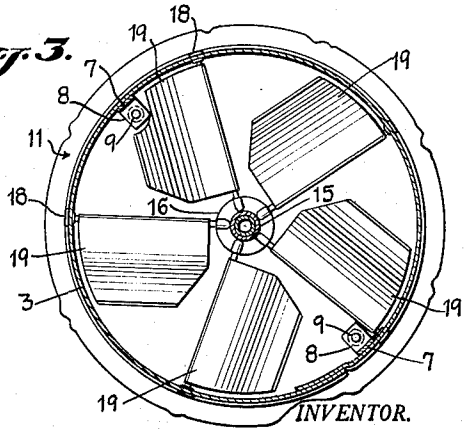


Fig. 3.



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Fig. 7.

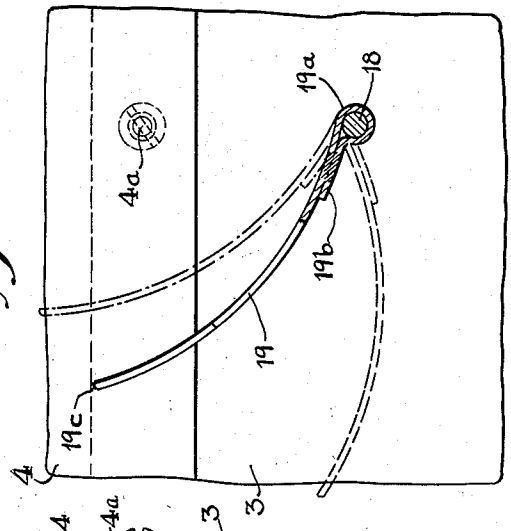


Fig. 10.

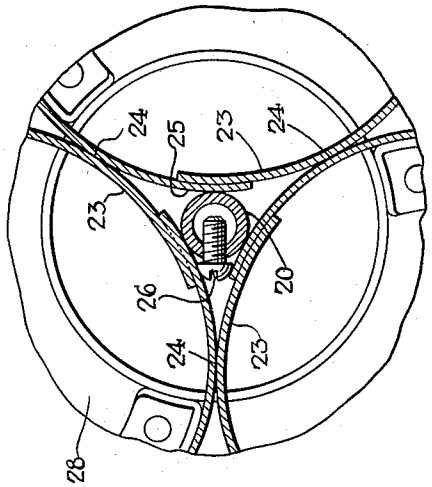


Fig. 6.

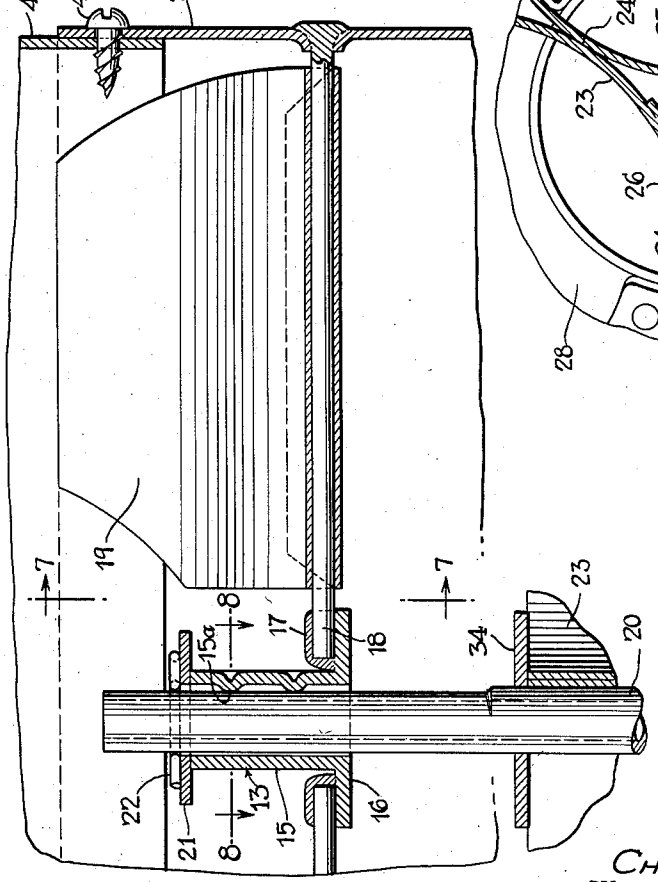


Fig. 9.

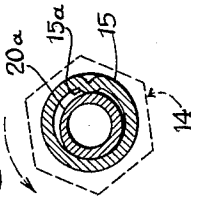
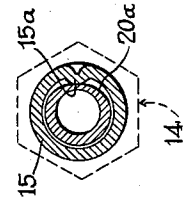


Fig. 8.



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Fig. 4.

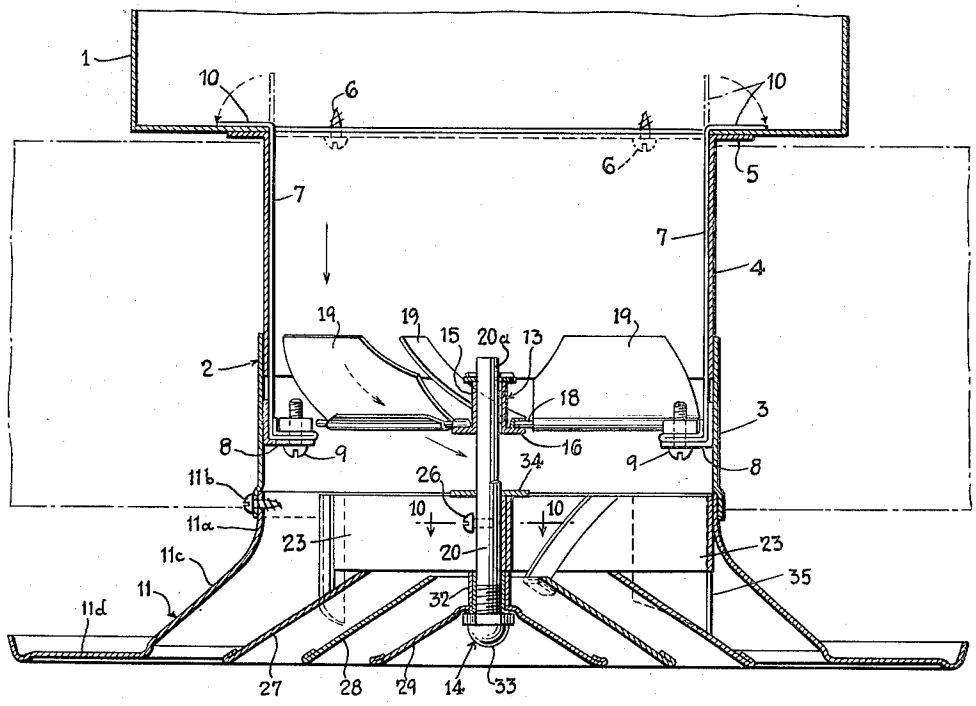
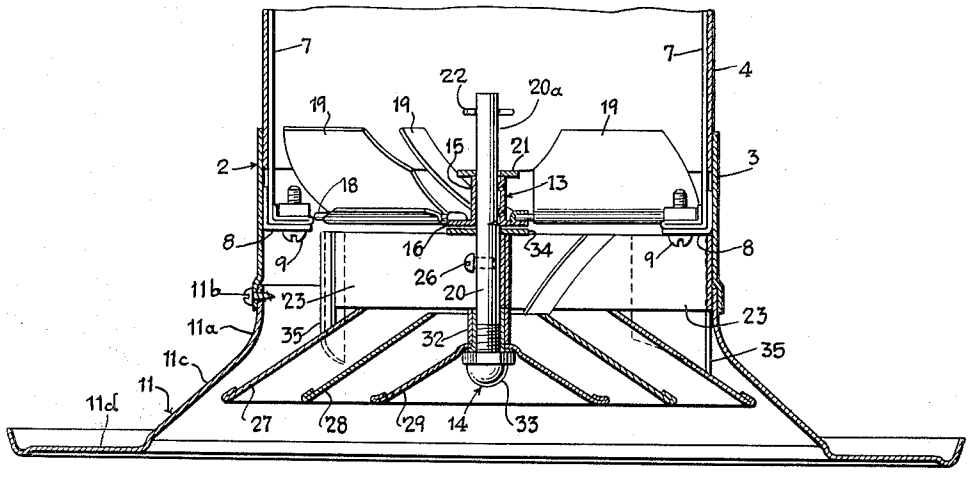


Fig. 5.



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United States Patent Office

2,848,935

Patented Aug. 26, 1958

2,848,935

AIR DISTRIBUTING DEVICES

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Application October 11, 1955, Serial No. 539,725

3 Claims. (Cl. 98—40)

This invention relates to air distributing devices and more particularly to distributors adapted to take off air from a running air duct common to a plurality of distributors.

In distributing air taken off from a running air duct through take-off pipes, it is necessary for best results to equalize the air flow through the individual take-off pipes in accordance with one or more variable conditions, so that the air as it passes out of said take-off pipes may be made to flow in a substantially uniform cross-sectional flow through each pipe. It is likewise necessary to diffuse the air as it passes out of each take-off pipe so as to distribute it over the desired space; and because of varying space and outlet positions, the extent of diffusion should be variable.

An object of this invention is to provide a device of the character described, having improved means for meeting the requirements above set forth, in such manner as to effect an efficient change in the direction of air flow from the horizontal flow in the running air duct to an outwardly and downwardly spiral flow at the outlet end of the device.

Another object of the invention is to provide a device of the character described so constructed and arranged as to facilitate its manufacture and installation assembly.

A further object of the invention is to provide a device of the character described which has improved adjustable means for equalizing the air as it flows through the take-off pipe and for diffusing the air emerging therefrom in accordance with varying requirements.

Further objects and advantages of the invention will more fully appear from the following description taken in connection with the accompanying drawings which show, by way of example, the present preferred embodiment of the invention.

The invention consists of the novel features and arrangement of parts embodied, by way of example, in the structure hereinafter described as illustrating a present preferred form of the invention, and the invention will be more particularly pointed out in the appended claims.

Referring more particularly to the drawings:

Fig. 1 is a perspective view, partly in section, showing a distributing device embodying my invention secured to a running air duct;

Fig. 2 is a cross-sectional view taken along the line 2—2 of Fig. 1, showing further structural details;

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 1, showing further details;

Fig. 4 is a longitudinal sectional view taken substantially along the line 4—4 of Fig. 1, showing further structural details of the device on a somewhat enlarged scale;

Fig. 5 is a view similar to the lower part of Fig. 4, showing the parts in a different position of adjustment;

Fig. 6 is a fragmentary view in vertical elevation, showing on an enlarged scale further details of certain of the parts shown in the preceding figures;

Fig. 7 is a vertical sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a cross-sectional view taken at 8—8 of Fig. 6 showing further details of the parts;

Fig. 9 is a view similar to Fig. 8 showing the parts in a different position of adjustment; and

Fig. 10 is a cross-sectional view taken at 10—10 of Fig. 4 showing further details of the structure.

Referring more particularly to Fig. 1: the running air duct is designated as 1. The distributing device is designated in general as 2 and is provided with a neck portion in the form of a cylindrical take-off pipe which, to facilitate production and assembly, preferably comprises a lower section 3 and an upper or extension section 4 whose lower end telescopically engages the upper end of the pipe 3 and is secured thereto as by screws such as 4a (Figs. 6 and 7). The pipe 4 (Fig. 4) is provided at its upper end with a flange 5, adapted to be seated against the lower wall of the duct 1 and to be secured thereto by screws such as 6. A plurality of supporting straps such as 7 have their lower ends off-set inwardly and secured to brackets such as 8 which are fastened, as by welding, to the interior of the pipe 3, the lower ends of the straps 7 being secured to the brackets 8 by means of screws and cooperating nuts such as 9. The straps 7 extend upwardly above the flange 5 of pipe 4 and are readily bendable from the dotted line portion to the solid line position to provide portions 10 serving to support the take-off pipe assembly from the lower wall of the duct 1; the upper end of the strap being conveniently supplied with spaced holes to receive screws, which may conveniently be the screws such as 6, serving to secure the flange 5 in position.

A hood designated as 11 is provided with a neck 11a, secured to the interior of the lower end of pipe 3, as by screws 11b. The hood is slanted downwardly and outwardly from the neck 11a in generally conical form designated 11c and terminates in an outwardly horizontal extending skirt 11d.

A unit designated in its entirety as 13 is disposed in fixed horizontal position within pipe 3, to be more particularly described below and in its preferred form serves to adjustably support a diffuser unit designated in its entirety as 14 and which will be more fully described hereinafter.

Referring more particularly to Figs. 4, 3, and 6: the unit 13 comprises a hub 15 provided with a lower flange 16 to which are rigidly attached as by welding 17 the inner ends of a plurality of radially extending round rods such as 18 whose outer ends are rigidly secured to the pipe 3, so that the hub 15 is rigidly supported at the axis of the pipe 3 by means of the radially extending rods 18. Each of the rods 18 has a corresponding curved blade such as 19 and a pivotal mounting as preferably effected (Fig. 7) by having the lower end of the blade 19 pass substantially tangentially over the rod 18, as at 19a; thence around the rod terminating in an end 19b which is secured to the blade as by welding. The loop surrounding the rod 18 serves to engage the rod snugly providing sufficient friction to hold the blade in adjusted angular position while permitting such adjustment. The blades such as 19 are curved smoothly and continuously from the portion 19a upwardly and outwardly to the end 19c which preferably presents a relatively thin or sharp edge. When the blades are set at a maximum angle to the axis of the hub 15, as shown in the lower dotted position, their upper ends will be off-set a maximum distance in the horizontal direction from their corresponding rods 18 and will be directed upwardly a slight vertical distance above said rods 18, and when said blades are set at diminishing angles, the horizontal off-set will be correspondingly decreased and the vertical distance above the

rods will be increased. This arrangement provides for adjustably deflecting the air moving downwardly through the take-off pipe **3** from a vertical toward a horizontal direction; and by separately adjusting the blades corresponding to the respective segments of the cylindrical cross-section of the pipe **3** the air flow may be adjusted with great flexibility to attain the desired distribution.

The diffuser unit **14** (Figs. 4 and 6) comprises a stem **20** adjustably supported from the hub sleeve **15** through which the upper end of the stem passes. In its lowermost position of adjustment as shown in Fig. 4 the stem is supported by means of a washer **21** which rests on the upper end of the sleeve **15** and is secured against upward movement on the stem **20** by a cotter pin **22**. The upper end of the stem **20** is provided with an eccentric cam surface **20***a* (Figs. 6, 8 and 9), extending longitudinally along the stem **20** a suitable distance to permit the desired vertical adjustment of the stem **20**. The sleeve **15** is provided with inwardly extending portions such as **15***a* between which and the intermediate circumferential portion of the cam surface **20***a* sufficient space is provided to permit sliding movement of the stem **20** within the sleeve **15** and limited angular motion between these parts; while serving to frictionally engage the cam surface toward the maximum diameter of the stem **20** upon angular rotation of the stem **20** in either direction. Accordingly, this permits axial adjustment of the unit **14** with respect to the pipe **3** and hood **11**.

A series of hoops such as **23**, in the present instance 3 (Figs. 2, 4 and 10) are disposed around the lower end of the stem **20**, tangential thereto and to each other and tangential to the interior wall of pipe 3. The hoops **23** are fastened together at their points of tangency such as **24**, preferably by welding, and thereby provide a socket **25** for slidably receiving the stem **20**, to facilitate assembly and to center the hoop assembly within the pipe **3**. The hoops **23** are free of attachment to the tangent points of pipe **3** to permit axial adjustment of the unit **14** relative to the pipe **3**. The hoop assembly is prevented from angular movement on the stem **20** by means of a screw **26** which threadingly engages the stem **20**. The diffuser unit **14** further comprises a series of downwardly and outwardly tapered successively smaller frustro-conical deflectors such as **27**, **28** and **29** (Fig. 4). The uppermost deflector **27** is rigidly secured to and supported from the hoops **23** by means of brackets such as **30** (Fig. 2), whose upper ends are rigidly secured to the exterior vertical walls of hoops **23** and whose lower ends are bent outwardly and are rigidly secured to the upper surface of the deflector **27**. The next lowermost deflector **28** is similarly supported by brackets such as **31**, the upper ends of which are secured on the interior vertical walls of the hoops **23**. The lowermost deflector **29** (Fig. 4) is provided with an axially disposed upwardly extending sleeve **32** through which the lower end of the stem **20** passes downwardly and is threaded on its lower end to receive a nut **33** by means of which the parts of the diffuser unit are clamped to the stem **20**; the sleeve **32** engaging the lower end of the hoop socket **25** and clamping it against a washer **34** which is rigidly secured to the stem **20**.

Each of the hoops is provided with a curved vane such as **35** (Figs. 2 and 4) disposed along the outer wall of the hoop and extending downwardly against the upper surface of the uppermost deflector **27**; the curved vanes **35** being disposed in corresponding quadrants of the respective hoops **23** so as to deflect the air passing between the deflector **27** and hood **11** in a generally tangential direction with respect to the pipe **3**.

The device above described provides a ready means for installation and adjustment. For example, in installing the device (Fig. 4), pipe extension **4** is placed in register with an opening in the running air duct **1** and is secured in position by several screws **6**. The take-off pipe **3** is then put in telescopic position with the lower end of pipe **4** and is adjusted to the desired position, whereupon the upper ends **10** of the straps **7** are bent outwardly and downwardly against the interior of the lower wall of the duct **1** and secured in place by suitable screws or bolts (not shown) which may conveniently be some of the screws such as **6** which serve to hold the flange **5** of the pipe **4** against the duct.

The hood **11** is next secured in position (Fig. 4) on the lower end of pipe **3** by means of the screws **11***b*. Thereupon the upper end of the stem **20** of the diffuser unit **14** is inserted through the sleeve **15** of the radial blade unit **13**, the washer **21** (Fig. 6) is placed over the end of the stem and is secured in position by the cotter **22**.

After the device has been assembled as above described, the curved blades such as **19** are adjusted to the desired setting. If desired this may be done before the diffuser unit **14** is inserted in position, to be assured that the downwardly flowing current of air is being distributed throughout the take-off pipe **3** to the best advantage. The frictional pivotal engagement of the blades **19** on their pivotal axes **18** serves to hold the blades in adjusted position. The diffuser unit **14** is then rotated to the position where it is free to slide within the sleeve **15** of the unit **13** and is adjusted to the desired vertical position, and thereafter the unit **14** is rotated so as to cause the projections **15***a* (Figs. 8 and 9) to lock against the cam surface **20***a*. In Fig. 4 the diffuser unit **14** is shown suspended in its lowermost position of adjustment; whereas in Fig. 5 it is shown locked in its uppermost position of adjustment.

Having thus described my invention with particularity with reference to a presently preferred form of the same, it will be obvious to those skilled in the art after understanding the invention, that various changes and modifications may be made therein without departing from the scope of the invention, and it is my intention to cover in the appended claims such changes as come within the scope of the invention.

What I claim is:

1. In an air distributing device, the combination of a take-off pipe for use as an outlet from an air duct, a sleeve axially disposed within said pipe, means supporting said sleeve in said take-off pipe, an outwardly and downwardly flaring hood secured to the lower end of said pipe, a diffuser unit provided with an axially disposed stem the upper end of which is slidably disposed within and supported by said sleeve, means for fastening said stem in its axially adjusted position within the said sleeve to thereby hold said diffuser unit in the desired vertical position within said hood, said diffuser unit comprising a series of downwardly and outwardly tapered successively smaller frusto-conical deflectors fixed in spaced apart relation to provide air passages, a series of hoops disposed around said stem within said pipe and substantially tangential thereto and to each other, said hoops being secured together substantially at their points of tangent contact to thereby provide an included socket embracing the lower end of said stem, the uppermost and next lowermost diffusers being rigidly secured to and supported by said hoops, the lowermost diffuser having an axially disposed upwardly extending sleeve through which the lower end of said stem extends, and a member threadingly engaging the lower end of said stem and serving to clamp said hoops to said stem and hold said diffuser unit in assembled condition.

2. In an air distributing device, the combination of a take-off pipe for use as an outlet from an air duct, a sleeve axially disposed within said pipe, means supporting said sleeve in said take-off pipe, an outwardly and downwardly flaring hood secured to the lower end of said pipe, a diffuser unit provided with an axially disposed stem the upper end of which is slidably disposed within and supported by said sleeve, means for fastening said stem in its axially adjusted position within the said sleeve

to thereby hold said diffuser unit in the desired vertical position within said hood, said diffuser unit comprising a series of downwardly and outwardly tapered successively smaller frusto-conical deflectors fixed in spaced apart relation to provide air passages, a series of hoops disposed around said stem within said pipe and substantially tangential thereto and to each other, said hoops being secured together substantially at their points of tangent contact to thereby provide an included socket embracing the lower end of said stem, the uppermost and next lowermost diffusers being rigidly secured to and supported by said hoops, the lowermost diffuser having an axially disposed upwardly extending sleeve through which the lower end of said stem extends, and a member threadingly engaging the lower end of said stem and serving to clamp said hoops to said stem and hold said diffuser unit in assembled condition, said hoops also providing vertically extending peripheral walls disposed above said frusto-conical diffusers, each of said hoops being provided with a curved vane following the general curvature of said hoop and extending downwardly below the lower end of said take-off pipe closely adjacent the tapered wall of the uppermost diffuser, said vanes being limited in circumferential extent and being disposed within the corresponding quadrants of said hoops so as to serve to direct the air current flowing over said uppermost diffuser outwardly in a direction generally tangential to said take-off pipe.

3. In an air distributing device, the combination of a take-off pipe for use as an outlet from the lower wall of a running air duct, a hub axially disposed within said pipe, a plurality of rods secured at their inner ends to said hub and extending radially outwardly therefrom and having their outer ends secured to said pipe, a plurality of deflector blades having lower edges pivotally mounted

on said rods as axes of rotation respectively, said blades being separately frictionally held in desired adjusted angular position by their respective pivotal mountings, a take-off pipe extension whose lower end is telescopically slidably disposed on the upper end of said take-off pipe, the upper end of said extension being provided with an outwardly extending flange providing a means of attachment to the lower wall of said running air duct, a plurality of straps whose lower ends are secured to the interior wall of said take-off pipe and whose upper ends extend upwardly within said pipe and pipe extension beyond said pipe extension flange, said upper ends being readily bendable outwardly over said pipe extension flange at the desired weight therebeyond for supporting engagement on the peripherial margin of an opening in the lower wall of said air duct.

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