Feb. 25, 1964 C. T. DEMUTH ETAL 3,122,087

AIR DIFFUSER

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Fig. 1

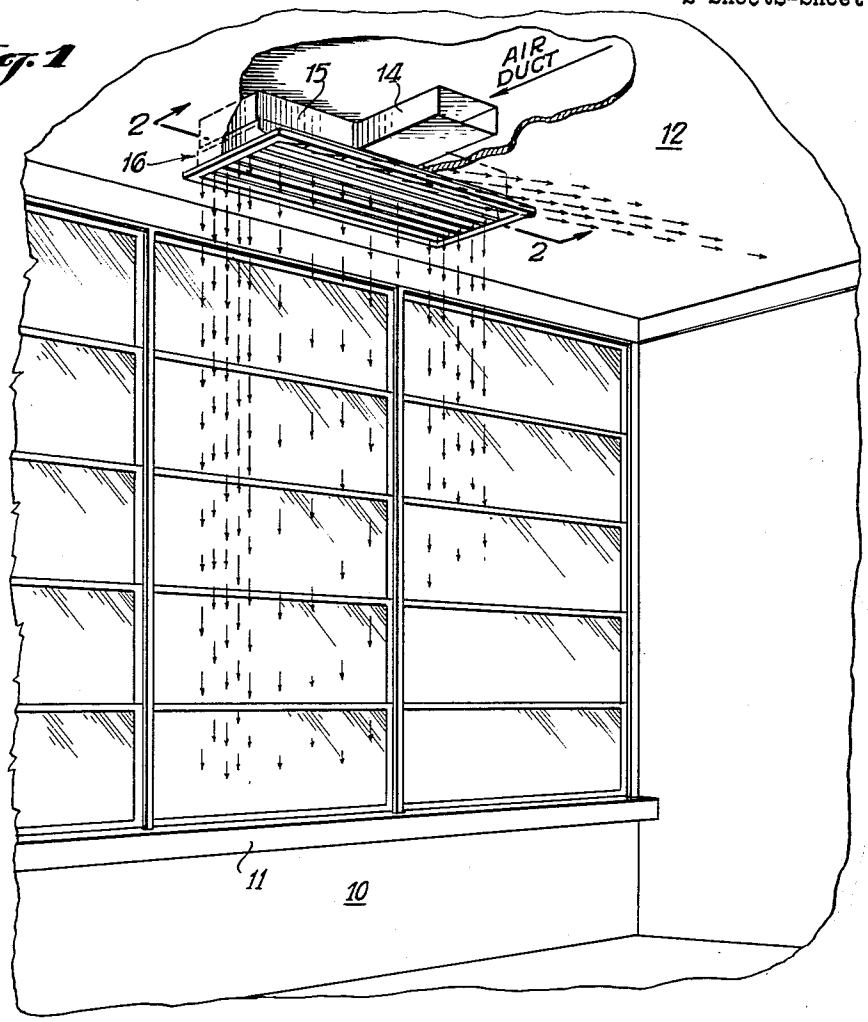
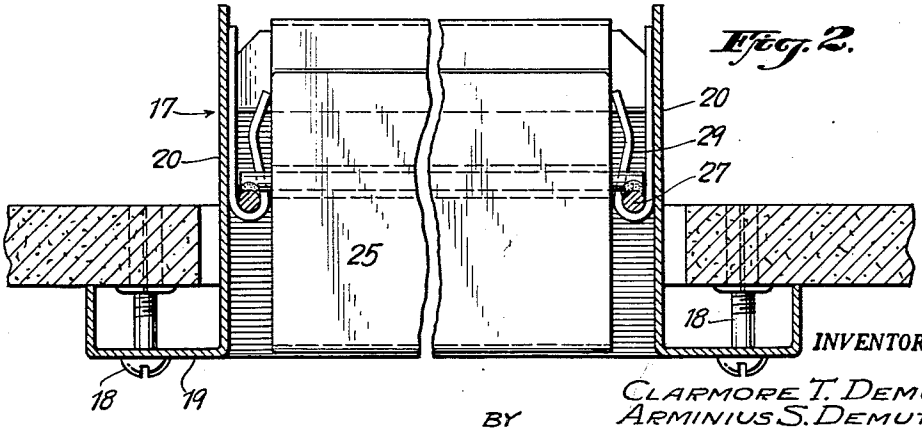


Fig. 2.



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Fig. 3.

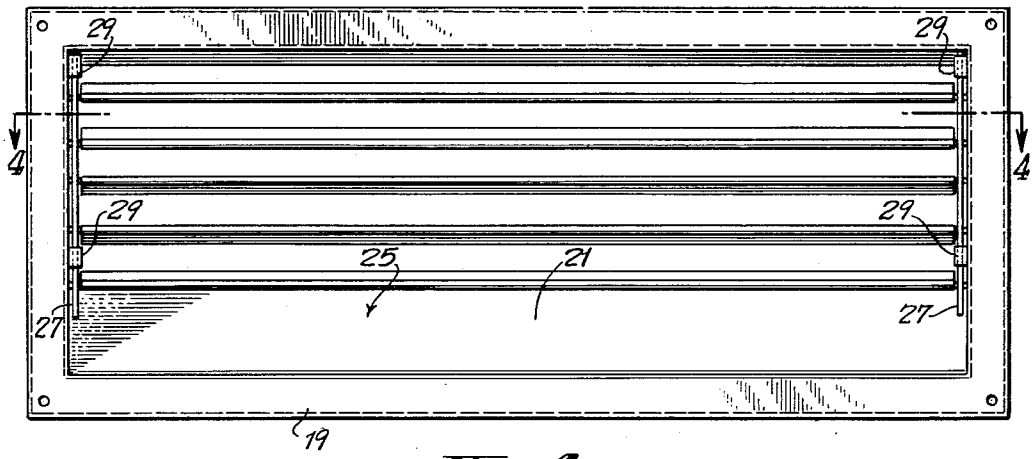


Fig. 4.

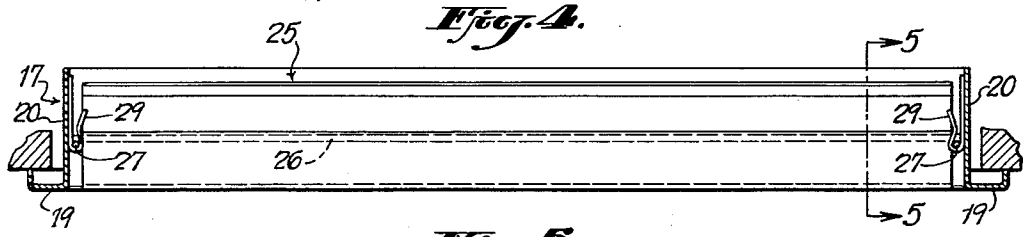
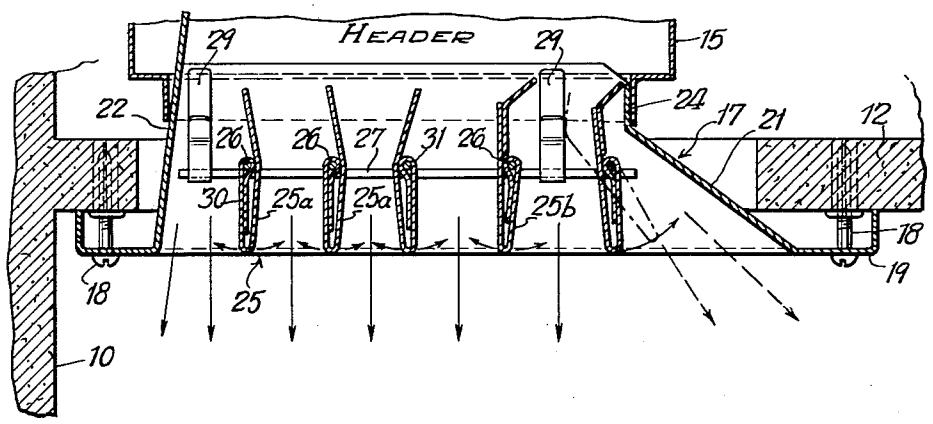


Fig. 5.



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AIR DIFFUSER

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This invention relates to apparatus for discharging and diffusing air, and more particularly, to such apparatus which discharges and diffuses air from a duct into a room for ventilating or air conditioning purposes, for example.

Heretofore, the use of air distributors and diffusers has been well known in the art. Such diffusers are usually located in the ceiling of a room either at its center or at least at a location remote from any of the walls so as to diffuse and discharge air into the room in all directions. However, present architectural trends render such apparatus considerably less effective for maintaining comfortable conditions. Thus, the more modern structures use a considerable amount of glass window area which provides relatively uninsulated surfaces so that the regions within a room adjacent such windows are usually warmer or colder than other regions in the room. Accordingly, a primary object of the present invention resides in the provision of apparatus for distributing and diffusing hot or cold air, as desired, in a manner to circulate substantially throughout the room, and also to direct a sheet of air along a wall or vertical surface of the room such as along a window area, for example.

As a feature of the invention, there is provided an air diffuser and distributor which is rectangular in configuration, and comprises a frame or take-off pipe for attachment to an air supply duct. The take-off pipe includes a first wall which flares outwardly and downwardly at a relatively sharp angle to the air supply duct, and a second wall opposite the first wall extending downwardly from the duct at a relatively abrupt angle. A pair of opposed, substantially vertical walls connect the respective ends of the first and second walls and a series of adjustable vanes extend between the pair of opposed substantially vertical walls. Such a diffuser may conveniently be mounted in a ceiling adjacent a window area with the second wall, that is the wall extending downwardly from the duct at a relatively abrupt angle closest to the window, while the first wall extending outwardly and downwardly at a relatively sharp angle to the duct is furthest from the window; and the vanes are adjustable so as to control the amount and direction of air supplied to the room. In consequence of such an arrangement, it will be appreciated that a sheet of air will be directed downwardly just in front of the window area, while the remaining air may also be directed downwardly or at varying angles into the room. The rectangular contour of such a diffuser blends well with the present architectural trend and also contributes to the appearance of uniformity where a plurality of such diffusers are utilized in a room in alignment with one another, as for example where a plurality of windows are in a room to be ventilated.

In accordance with a further feature of the invention, the vanes are generally V-shaped in cross-section and are individually adjustable about axes extending between the pair of opposed parallel walls and parallel to the ridge line of the vanes, respectively. The number of vanes may of course vary with the size of the particular diffuser which will depend upon the size of the space to be served thereby in relation to the conditions intended to be maintained therein. Preferably, the apices of at least two of the vanes are directed towards one another so that air entering the room may be directed generally towards the

center of the room and at the same time away from the center and towards the window area. In fact, in order to obtain maximum control, at least one or two of the vanes immediately adjacent the diffuser wall closest the window area are flatter, that is less acute, than those adjacent the opposite wall of the diffuser.

As a further feature of the invention, each vane is provided with a protrusion extending longitudinally thereof and within the angle thereof and parallel to the respective axes thereof to cause turbulence and aspiration of the room air with the ventilating air being supplied through the diffuser.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention, in order to prevent the appropriation of the invention by those skilled in the art.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings forming a part of the specification, wherein:

FIG. 1 is a fragmentary, perspective view of a portion of a room with the ceiling broken away and illustrating the position of a diffuser according to the present invention in relation to a window in the room;

FIG. 2 is an enlarged cross-sectional view, partly broken away, taken along the line 2—2 of FIG. 1;

FIG. 3 is a bottom plan view of the diffuser of FIG. 1;

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 3; and

FIG. 5 is a cross-sectional view taken along the line 5—5 of FIG. 4.

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a room comprising a wall 10, a window 11 mounted therein, and a ceiling 12 cut away to reveal an air duct 14 which may conveniently connect with a header 15 with which a diffuser 16 in accordance with the present invention in turn communicates. As shown in FIGS. 1 and 3, the diffuser is of the flush type and has a rectangular face exposed to the interior of the room with its longer sides parallel to the wall 10 in which the window 11 is mounted. The diffuser may be supported from the building structure by bolts 18, if desired.

As has been stated, the diffuser of the present invention includes a take-off pipe or frame which is designated generally by the reference numeral 17. Actually, as shown in FIGS. 2, 4 and 5, the take-off pipe is a short inward extension of a rectangular flanged facing 19 and connects with the header 15, although it will be understood that where the duct 14 is large enough, the take-off pipe may be connected directly to it without the need of a header. The take-off pipe has a pair of opposed vertical walls 20 connecting the ends of walls 21 and 22 which extend lengthwise of the diffuser.

As best shown in FIG. 5, the wall 21 is positioned further from the room wall 10 than is the wall 22, and flares outwardly and downwardly of the header 15, or duct where no header is used, at a relatively sharp angle such as about 40° to the plane of the ceiling, for example,

while the opposite wall 22 extends downwardly of the header at a relatively abrupt angle of the order of 90° for example. The upper end of the wall 21 has an integral vertical lip 24 for convenience in connecting same to the header.

A series of vanes 25 extends from one vertical wall 20 to the other and between the walls 21 and 22, as shown in FIGS. 2 and 4. The vanes are preferably generally V-shaped in cross-section (FIG. 5) and are supported on rods 26 which are connected at their ends as by welding, to rods 27 mounted on the walls 20, respectively, by clips 29 secured thereto. The vanes shown comprise two types, those designated 25*a* (FIG. 5) wherein the apices are adjacent the respective axes 26, and those designated 25*b* wherein the apices are spaced above the axes 26. As shown in FIG. 5, each vane 25 may have the lower leg thereof folded back upon itself as at 30, and then folded back about its respective rod 26 to frictionally engage the same so that the vanes are independently adjustable about the axes of rods 26 and also are provided with a protrusion 31 adjacent its rods 26 within the angle of the V for a purpose to be later described.

It will be seen that for maximum control and diffusion, several vanes nearest the wall 22 have their apices directed towards the wall 21 while the opposite is true for the remaining vanes. In this connection, it will be appreciated that the total number of vanes, as well as the directional disposition thereof relatively to the walls 21 and 22 and the angle of the apices thereof may be varied according to the particular needs of each installation. The several vanes adjacent the wall 21 may be so formed as to have their apices or ridge lines closer to their upper than to their lower ends thus to render them comparable in cross-section to the combined cross-sectional disposition of the wall 21 and its lip 24.

In operation, air moving through the duct 14 is directed downwardly in the header 15 and moves through the diffuser and into the room. The air may be directed substantially directly downwardly by setting the vanes as shown in solid lines in FIG. 5, the uppermost edge of the vane closest to the wall 21 cooperating with the lip 24 to prevent air from passing between that vane and the wall 21; or, the vanes may be independently adjusted pivotally about their respective axes 26 to direct the air as desired into the room. But in any case, a sheet of air will always flow downwardly between the wall 22, nearest the room wall 10, and the adjacent vane 25, and thus downwardly into the room and towards the window or other wall area at a slight angle thereto.

The protrusion 31 formed on each vane serves to create a turbulence in the air moving past it so that as the air enters the room it aspirates room air along with it and thus reduces to a minimum temperature variations in different parts of the room. It will be appreciated that it is within the scope of the present invention to form both walls 21 and 22 at a sharp or abrupt angle to the header, and that all of the vanes may take the form of those designated 25*a* or 25*b*, according to the particular effect desired.

From the foregoing description, it will be seen that the present invention contributes a diffuser capable of circulating air throughout a room and also of directing a sheet of air along a vertical surface such as a window for example. It will also be seen that the direction of the air streams may be controlled by independent adjustment of the vanes and that the rectangular configuration of the diffuser, in addition to rendering it admirably

suited for its intended purpose, also blends with present architectural concepts and contributes to the appearance of uniformity where several diffusers are used in the same room.

What is claimed is:

1. In a room air diffuser for placement in a ceiling adjacent a vertical partition and adapted to direct air from an air duct inwardly towards the center of a room and also downwardly along the face of a partition, a take-off pipe for attachment to an air duct, said pipe including a first wall extending outwardly and downwardly and adapted to extend at a relatively sharp angle to said ceiling, a second wall opposite said first wall and adapted to be located in a ceiling and adjacent a partition, said second wall extending downwardly from a duct and at a relatively abrupt angle to a ceiling, a pair of opposed substantially vetrical walls connecting the respective ends of said first and second walls to form a rectangular outlet for said take-off pipe and a series of adjustable vanes extending between said opposed substantially vertical walls, said vanes being generally V-shaped in cross-section and being individually adjustable about axes extending between said pair of opposed walls and parallel to the ridge lines of said vanes, respectively, and said vanes each having a protrusion extending longitudinally substantially the full length thereof within the angle thereof adjacent and parallel to the respective axis thereof to cause mixing of air passing through said diffuser with air in the room, said protrusions being formed of an extension of one leg of each vane folded back upon itself and then about its respective pivot rod.

2. In an air diffuser of the character described, a take-off pipe for attachment to an air duct, and a series of adjustable vanes extending between a pair of opposed parallel walls of said pipe, said vanes being generally V-shaped in cross-section and adjustable about respectively corresponding axes extending between said pair of opposed walls and parallel to the ridge line of said vanes, respectively, protrusions on each of said vanes adjacent the axis thereof and extending the full length thereof, each protrusion being formed of an extension of one leg of its respective vane folded back upon itself and terminating adjacent its said axis, said protrusions causing mixing of air passing through said diffuser with air in a room.

3. In an air diffuser of the character described, a take-off pipe for attachment to an air duct, and a series of adjustable vanes extending between a pair of opposed, parallel walls of said pipe, said vanes being generally V-shaped in cross-section and adjustable about respectively corresponding axes extending between said pair of opposed walls and parallel to the ridge line of said vanes respectively, the apices of at least two of said vanes being directed towards one another, protrusions on each of said vanes adjacent the axis thereof and extending the full length thereof, each protrusion being formed of an extension of one leg of its respective vane folded back upon itself and terminating adjacent its said axis, said protrusions causing mixing of air passing through said diffuser with air in a room.

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