Feb. 28, 1956 R. D. TUTT ET AL 2,736,255

AIR DIFFUSER

Filed Jan. 29, 1952

FIG. 1

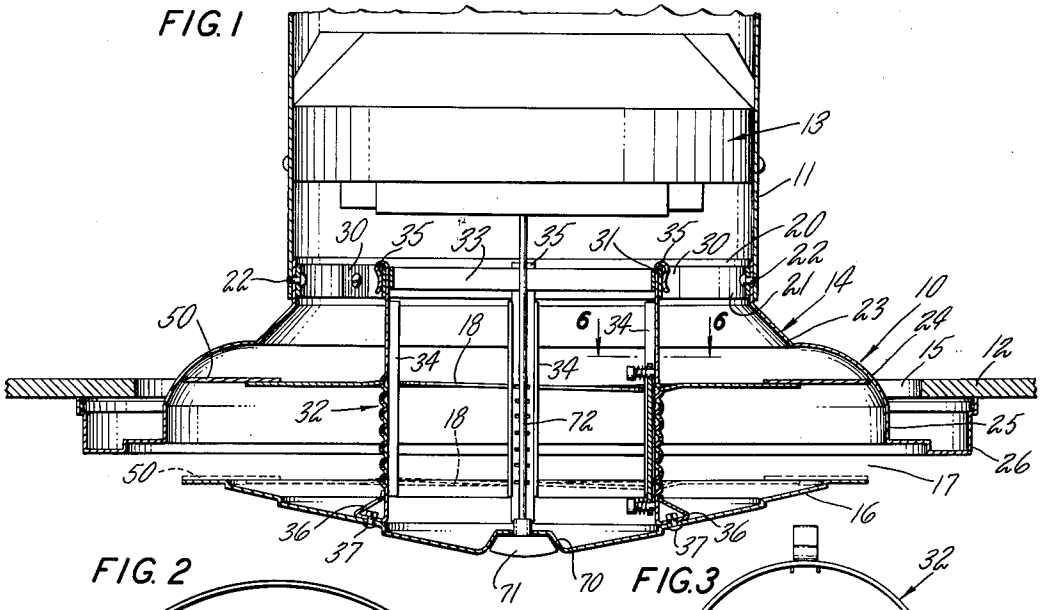


FIG. 2

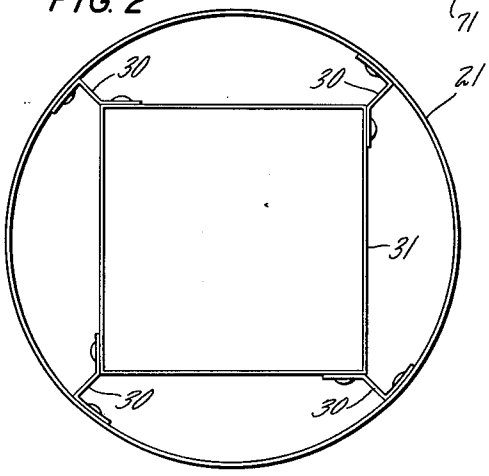


FIG. 3

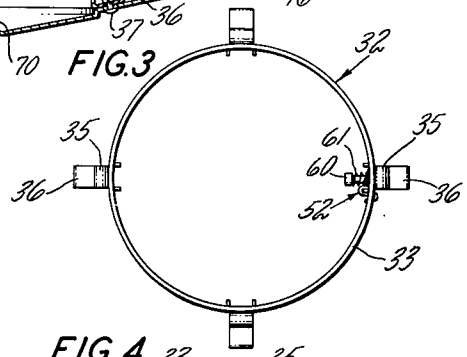


FIG. 4

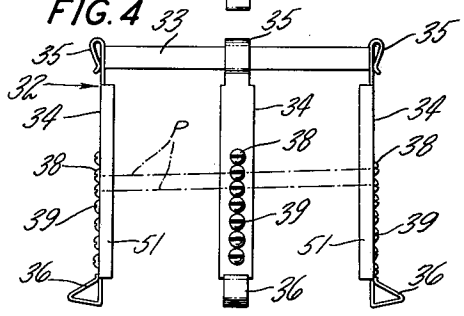


FIG. 5

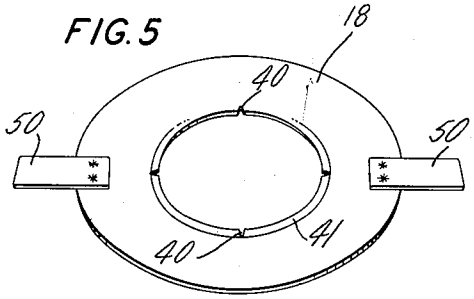
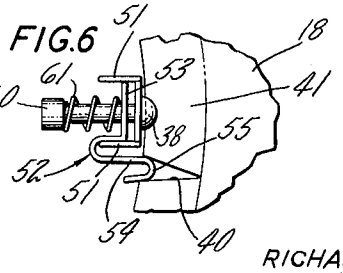


FIG. 6



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AIR DIFFUSER

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7 Claims. (Cl. 98—40)

This invention relates to diffuser constructions for air distributing and ventilating systems and, more particularly, to a diffuser construction incorporating means for selectively controlling the path of a substantially constant volume of air passing therethrough whereby the air can be discharged from the diffuser substantially horizontally or at an angle to the horizontal.

It is a distinct advantage to include in a diffuser construction adjustable means for controlling the path of air whereby the discharge pattern may be selected to suit the diffuser to the needs of the particular installation. For most installations the discharge pattern need not be frequently varied, but it is desirable to change the pattern of discharge to suit the air distributing system to the various seasons. For example, during the summer season, when the air distributing system is utilized to circulate cold air, it is desirable to discharge the air from a ceiling diffuser in a horizontal pattern for optimum distribution and diffusion of the cold air. During the winter season, when the air distributing system is utilized to circulate hot air, it is desirable to discharge the air in a conical pattern.

Means have been included in some conventional air diffusers for adjusting or altering the discharge flow path and pattern, but such means have been subject to certain disadvantages. For example, the means heretofore utilized have been cumbersome and are not readily and easily adjustable, and all of such means with which we are familiar have functioned as dampers. That is, the means have undesirably dampened or otherwise altered the volume of flow during adjustment of the discharge pattern.

It is the general aim of the present invention to provide a diffuser which may be easily and quickly adjusted to discharge air in any preselected direction ranging from a horizontal discharge to an angular discharge approaching the vertical. Included in this aim is the object to provide a diffuser having the foregoing operating characteristics and which will not materially dampen or otherwise alter the volume of air passing therethrough when the diffuser is adjusted to vary the discharge flow path and pattern.

Another object of the invention is to provide a diffuser assemblage of simple construction and which comprises elements which may be easily and economically fabricated and compactly arranged in sub-assemblies which may be readily detachably mounted in the assemblage.

A further object of the present invention is to provide a diffuser of ornamental appearance for installation in the ceiling surface of a room and which may be adjusted to discharge the air in varying directions as above described and which in any adjusted condition will have the same decorative appearance.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a longitudinal cross-sectional view of a diffuser assemblage constructed in accordance with the present invention;

Fig. 2 is a top plan view of the supporting bracket or frame utilized in the assemblage to detachably mount a sub-assembly which includes the adjustable means for controlling the air discharge path and pattern;

Fig. 3 is a top plan view of the support means or hanger for the sub-assembly referred to above;

Fig. 4 is a side view of the hanger shown in Fig. 3;

Fig. 5 is a perspective view of the movable ring which is utilized to adjust or vary the discharge flow path; and

Fig. 6 is a fragmentary transverse sectional view of the assemblage taken as indicated by the line 6—6 of Fig. 1.

Referring to Fig. 1 in greater detail, the same illustrates an exemplary installation of an air diffuser **10** which embodies the principles of the present invention and which is associated with an air duct **11** adjacent a ceiling **12**.

The duct **11** is included in a conventional air distributing system wherein said duct may be, for example, a branch duct extending from a supply duct (not shown) disposed above the ceiling. In accordance with conventional practice, a damper indicated generally by the reference numeral **13** is disposed within the duct **11** to control the volume of air passing from the supply duct through the branch duct into the diffuser. As will be explained in detail hereinafter, the damper can be adjusted by means supported by the diffuser in a manner to be readily accessible to an operator.

The diffuser **10** comprises generally an outer deflector ring **14** disposed in a ceiling opening **15** adjacent the duct **11**, a deflector plate **16** disposed below the ring **14** and in spaced relation to the ceiling, thereby to define an annular discharge opening **17** between the plate and the deflector ring **14**. There is also included an inner deflector ring **18** arranged for movement between the outer deflector ring and the deflector plate.

The outer deflector ring **14** is provided with a generally cylindrical portion **20** which is fitted within the discharge end of the duct **11** and which receives a supporting ring **21** comprising a part of the frame construction shown in Fig. 2. The ring **21** and the deflector ring **14** are secured to the discharge end of the duct **11** as by screws **22**. The deflector ring **14** is provided adjacent the cylindrical portion **20** with a frusto-conically shaped section **23** which adjoins an annular concave section **24** in the wall of the ring. The concave section **24** adjoins a generally cylindrical wall **25** formed in the ring and which is provided with a radially outwardly extending flange **26** which overlies and engages the ceiling adjacent the opening **15**. The aforedescribed configuration of the outer deflector ring **14** is provided to direct air flowing from the diffuser toward the discharge opening **17** in a direction substantially normal to the ceiling **12**.

The deflector plate **16** and the inner deflector ring **18** are included in a sub-assembly which is detachably mounted in the discharge end of the duct **11** so that the plate **16** and ring **18** will be transversely disposed relative to said duct. The means for detachably receiving the sub-assembly comprises the structure shown in Fig. 2 which includes the supporting ring **21**, the brackets **30**, and the generally square frame **31**. As previously mentioned, the supporting ring **21** is secured to the duct **11** at the discharge end thereof. The brackets **30** are fixed to the ring **21** and to the frame **31** so as to retain the frame in concentric relation to the ring and in a transverse position relative to the duct.

The sub-assembly referred to above is supported by a

hanger 32 which is arranged to be detachably mounted on the frame 31. The hanger includes a ring 33 to which is affixed, as by welding or the like, a plurality (4 shown) of legs 34. The legs are externally fixed to the ring in circumferentially spaced relation and the top portion of each of the legs is formed into a loop or hook 35 arranged to be hooked over the frame 31 in the manner shown in Fig. 1. The bottom portions of the legs are formed into brackets 36 which engage the inner surface of the deflector plate 16 to secure the same as by nuts and bolts 37.

The intermediate portion of each of the legs has external thread means comprising longitudinally spaced extrusions or indentations 38 which are provided with a pitched, generally transverse slot 39 to define female thread members. The extrusions or indentations in adjacent legs vary in elevation so as to define a thread pitch indicated by the broken lines P in Fig. 4 about the plurality of legs 34. The inner deflector ring 18 is provided with a plurality of circumferentially spaced notches 40 about its inner periphery and the inner marginal portions 41 between said notches are bent or deflected to conform to the thread pitch lines P whereby the deflector ring 18 will threadably engage the hanger legs 34 within the extrusion notches 39 as shown in Fig. 1. Thus, rotation of the deflector ring 18 will effect vertical adjustment thereof along the hanger legs whereby to adjust the position of the ring relative to the deflector plate 16 and the outer deflector ring 14.

To facilitate rotation of the ring 18, a pair of radially outwardly extending ears 50 are fixed to the ring in diametrically opposed positions. The ears 50 extend toward the outer deflector ring 14 and are disposed adjacent the annular discharge opening 17. An operator can insert his finger through said opening to rotate the inner ring when the sub-assembly is secured to the assemblage as shown in Fig. 1.

Means are provided for releasably retaining the deflector ring 18 in adjusted positions, said means comprising elongated strips or flanges 51 formed on the longitudinal edges of the legs 34 to accommodate a spring biased detent 52 which engages the inner edge of the ring 18. The detent 52 comprises an elongated web 53 disposed within the channel formed by the leg 34 and flanges 51 and a generally S-shaped appendage 54 (Fig. 6) which includes the nose 55 engageable with the deflector ring. The web 53 is secured within the afore described channel for limited pivotal movement therein by cap screws 60 threaded into the legs 34 in longitudinally spaced positions and which are loosely fitted through apertures provided in the web. A coil spring 61 surrounds each of the screws 60 and is compressed between the head of the screw and the web 53 so as to urge the detent nose outwardly toward the deflector ring. The detent nose 55 may engage within one of the notches 40 on the deflector ring, as shown in Fig. 6, or the nose may engage the inner edge of the ring, and in this last mentioned position, the detent will be pivoted clockwise, as viewed in Fig. 6, about the screws 60. In either position of the detent, the frictional engagement between the detent and the deflector ring 18 will retain the ring in position and will prevent vibration of the ring caused by air being discharged through the diffuser, thus preventing a raise in the noise level due to vibration. It should be understood that the aforedescribed detent can be associated with each of the hanger legs, but in most instances one such detent will be sufficient.

The aforedescribed sub-assembly comprising the deflector plate 16 and inner deflector ring 18 supported by the hanger 32 is detachably mounted in the diffuser assemblage by inserting the hanger within the square frame 31 with the hanger legs 34 adjacent the corners of the frame. The hanger and sub-assembly is then rotated ninety degrees and drawn downwardly to hook the loops 35 in the legs over the sides of the frame 31. In the mounted position of the sub-assembly the deflector plate 16 is disposed transversely of the duct 11 and in outwardly spaced relation to the ceiling 12 as shown in Fig. 1. Due to the dished configuration of the plate, air flowing from the duct 11 and striking the plate will be deflected radially outwardly through the diffuser discharge opening 17 in a direction substantially parallel to the wall or ceiling.

Air striking the solid portion of the inner deflector ring 18 will also be directed radially outwardly and when the inner ring is disposed adjacent the plate 16 as shown by the broken lines in Fig. 1; all of the air passing from the diffuser will be discharged in a substantially horizontal pattern parallel to the ceiling. When the inner ring 18 is elevated a greater portion of the air coming from the duct will flow through the central opening than will flow therethrough when the deflector ring is in the lowermost position. However, in elevated positions of the inner ring, the air deflected horizontally thereby will strike the outer deflector ring which tends to discharge the same vertically downwardly. Thus, it will be seen in the elevated positions of the inner ring that air will be discharged horizontally and vertically causing a conically shaped air discharge from the diffuser at some vector angle which approaches the vertical as the inner ring is raised toward the duct. However, in the uppermost position of the deflector ring 18, as shown by the solid lines in Fig. 1, the air will still be discharged in a conical pattern since some of the air so discharged is directed horizontally by the plate 16. Adjusting the position of the inner deflector ring will not dampen the flow of air through the diffuser since the air flow will be accommodated in any position of the inner ring in a substantially unrestricted manner.

As will be apparent from the foregoing description, adjustment of the inner deflector can be effected easily and expeditiously without removal of the sub-assembly and without altering in any way the outward appearance of the diffuser. In addition, control of the branch duct damper can be effected by means accessible through the diffuser without effecting any change in the appearance or operation of the diffuser. To accommodate said means, the deflector plate 16 is provided with a centrally disposed indentation 70 which receives a damper control knob 71 secured to the damper control spindle or shaft 72. The plate is provided with a suitable central aperture so that the end of the shaft 72 will extend therethrough and so that the control knob 71 may be affixed thereto. Thus, the assemblage provides readily accessible control means for the damper as well as the aforedescribed readily accessible means for controlling the air flow path and discharge pattern.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

We claim as our invention:

1. A ceiling diffuser for varying the direction of discharge from an air duct outlet substantially without throttling comprising in combination, a downwardly and outwardly inclined outer deflector ring disposed between the duct and the ceiling surface, said outer ring having an annular downwardly directed concave portion adjacent its outer edge arranged to discharge air from the diffuser in a direction substantially normal to the ceiling surface, support means disposed adjacent the duct out-

let, a deflector plate secured to said support means transversely of the duct and in outwardly spaced relation to the ceiling surface, said plate being constructed and arranged to discharge air in a direction substantially parallel to the ceiling surface, and a flat inner deflector ring rotatably mounted on said support means for axial movement thereon between an upper position directing air against said outer ring for increased downward discharge thereby and a lower position adjacent said plate, permitting increased horizontal discharge thereby.

2. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface comprising in combination, a downwardly and outwardly inclined outer deflector ring disposed between the duct and the ceiling surface, said outer ring having an annular downwardly directed concave portion adjacent its outer edge arranged to discharge air from the diffuser in a directional substantially normal to the ceiling surface, support means including a frame transversely secured in the duct and a hanger detachably mounted on the frame, a deflector plate secured to said hanger transversely of the duct and in outwardly spaced relation to the ceiling surface, and a substantially flat inner deflector ring rotatably mounted on said hanger for axial movement thereon selectively between an upper position directing air against said outer ring for increased downward discharge thereby and a lower position adjacent said plate permitting increased horizontal discharge thereby.

3. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface comprising in combination, an outwardly and downwardly inclined outer deflector, means supporting said outer deflector between the duct and the ceiling surface, said outer deflector having an annular downwardly directed concave portion adjacent its outer edge to discharge air from the diffuser in a direction substantially normal to the ceiling surface, support means comprising a frame transversely secured in the duct and a hanger detachably mounted on the frame, said hanger having a plurality of outwardly extending legs, thread segments on said legs, a deflector plate secured to the free ends of said legs transversely of the duct and in outwardly spaced relation to the ceiling surface, said plate having a diameter substantially equal to said outer deflector to discharge air from the diffuser in a direction substantially parallel to the ceiling surface, and a flat deflector ring threadedly mounted on said legs for axial movement selectively between said outer ring and said plate, said inner ring being arranged transversely of the duct outlet to admit air through its opening toward said plate and to direct air about its outer periphery toward said outer ring.

4. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface comprising in combination, an outer deflector ring disposed between the duct and the ceiling surface and arranged to discharge air from the diffuser in a direction substantially normal to the ceiling surface, support means comprising a frame transversely secured in the duct and a hanger detachably mounted on the frame, said hanger including a plurality of circumferentially spaced outwardly extending legs, the inner ends of said legs having hook means for connecting the hanger to said frame, and an intermediate portion of said legs being formed with external thread means, a deflector plate secured to the other ends of said legs transversely of the duct and in outwardly spaced relation to the ceiling surface, said plate being constructed and arranged to discharge air from the diffuser in a direction substantially parallel to the ceiling surface, and a flat inner deflector ring surrounding said legs and threadable thereon for axial movement selectively between said outer ring and said plate, said inner ring being arranged to direct air through its opening towards said plate and about its outer periphery towards said outer ring.

5. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface comprising in combination, an outer deflector ring disposed between the duct and the ceiling surface and arranged to discharge air from the diffuser in a direction generally normal to the ceiling surface, support means comprising a frame transversely secured in the duct and a hanger detachably mounted on the frame, said hanger including a plurality of circumferentially spaced outwardly extending legs, the inner ends of said legs having hook means for connecting the hanger to the frame, a deflector plate secured to the other ends of said legs transversely of the duct and in outwardly spaced relation to the ceiling surface, said plate being constructed and arranged to discharge air from the diffuser in a direction substantially parallel to the wall surface, a flat inner deflector ring surrounding said legs and movable selectively therealong, said inner ring being arranged to direct air through its opening toward said plate and to direct air about its outer periphery toward said outer ring, and detent means carried by said legs engageable with said inner deflector ring to releasably retain the same in selected positions therealong.

6. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface and comprising in combination, an outer deflector ring, means for supporting said outer deflector ring between the duct and the ceiling surface, said outer deflector ring having a downwardly inclined portion arranged to discharge air in a direction substantially normal to the ceiling surface, a transverse deflector plate, means for supporting said deflector plate below said outer deflector ring to discharge air in a direction substantially parallel to the ceiling surface, a substantially flat inner deflector ring, means supporting said inner deflector ring between said outer deflector ring and deflector plate, and means for moving said inner deflector ring between an upper position directing air against said outer ring for increased discharge thereby normal to the ceiling and a lower position directing air discharge parallel to the ceiling.

7. A ceiling diffuser for use with an air duct outlet adjacent the ceiling surface and comprising in combination, an outer deflector ring, means for supporting said outer deflector ring between the duct and the ceiling surface, said outer deflector ring having an annular downwardly concave portion inclined to discharge air in a direction substantially normal to the ceiling surface, a transverse deflector plate substantially equal in diameter to said outer deflector ring, means for supporting said deflector plate below said outer deflector ring to discharge air in a direction substantially parallel to the ceiling surface, a substantially flat inner deflector ring, and means supporting said inner deflector ring for axial movement from a lower position adjacent said deflector plate to an upper position within said concave portion for increasing discharge of air by said outer deflector ring normal to the ceiling.

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