April 6, 1965 C. N. O'DAY ETAL 3,176,603

ROTATABLE ELONGATED AIR DIFFUSER CONSTRUCTION

Filed Feb. 2, 1962 3 Sheets-Sheet 1

FIG. 1

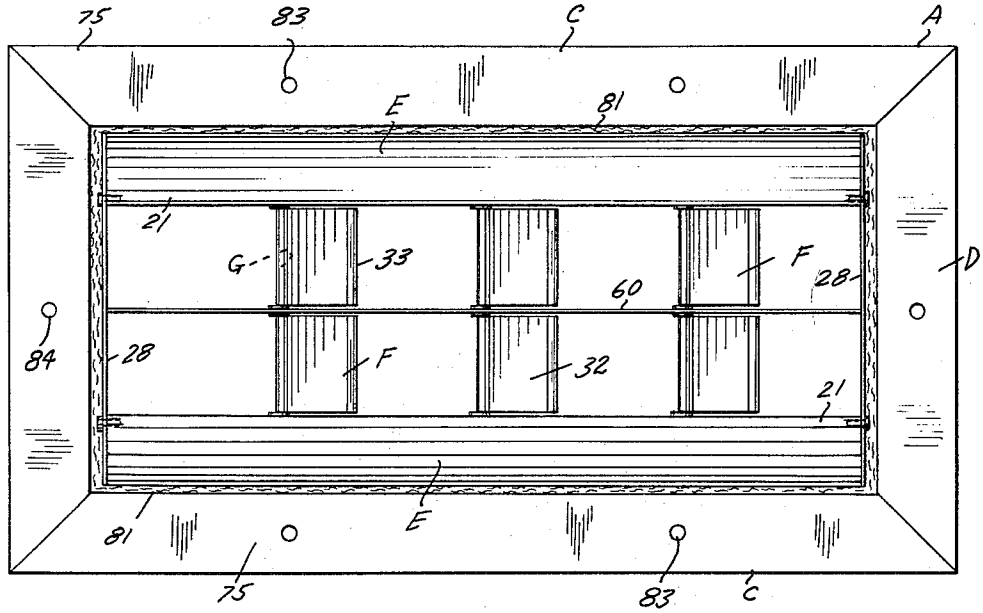
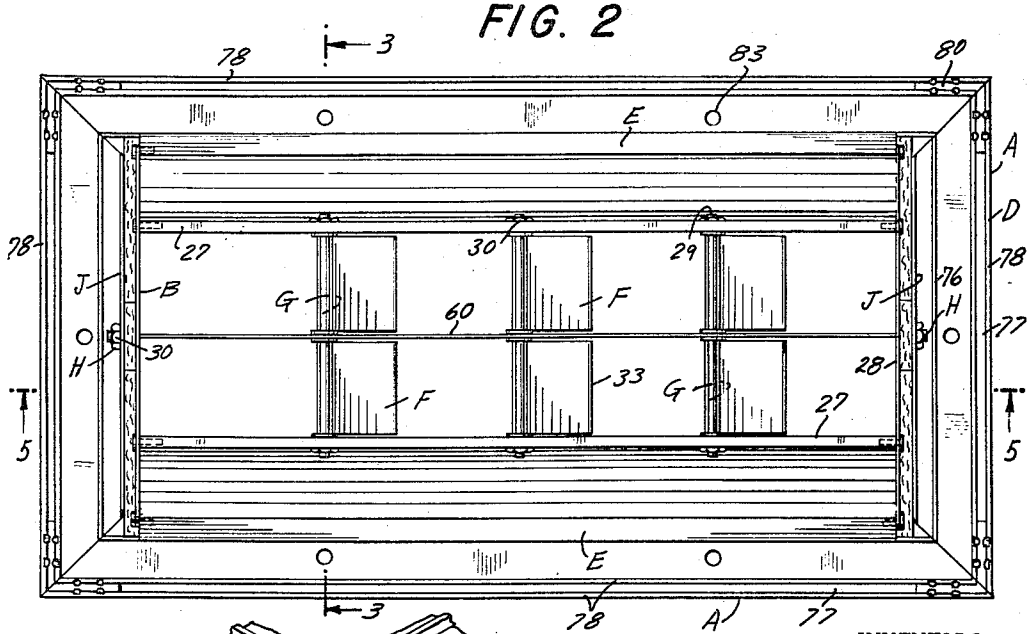


FIG. 2



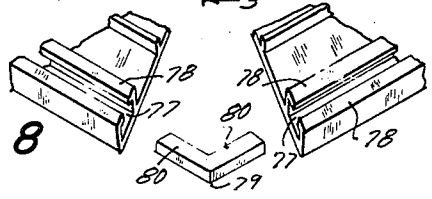


FIG. 8

INVENTORS
CORTLAND N. O'DAY
GEORGE J. SWEENEY
BY
ATTORNEY

April 6, 1965 C. N. O'DAY ETAL 3,176,603

ROTATABLE ELONGATED AIR DIFFUSER CONSTRUCTION

Filed Feb. 2, 1962 3 Sheets-Sheet 2

FIG. 3

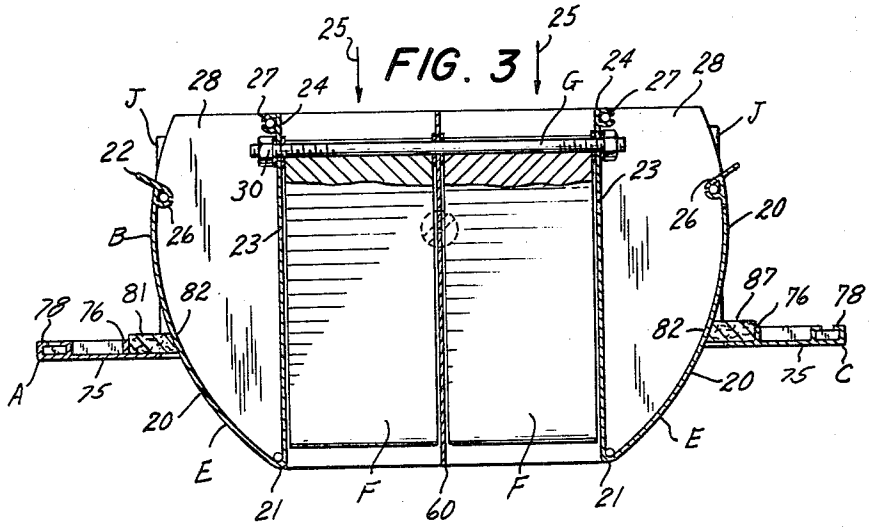
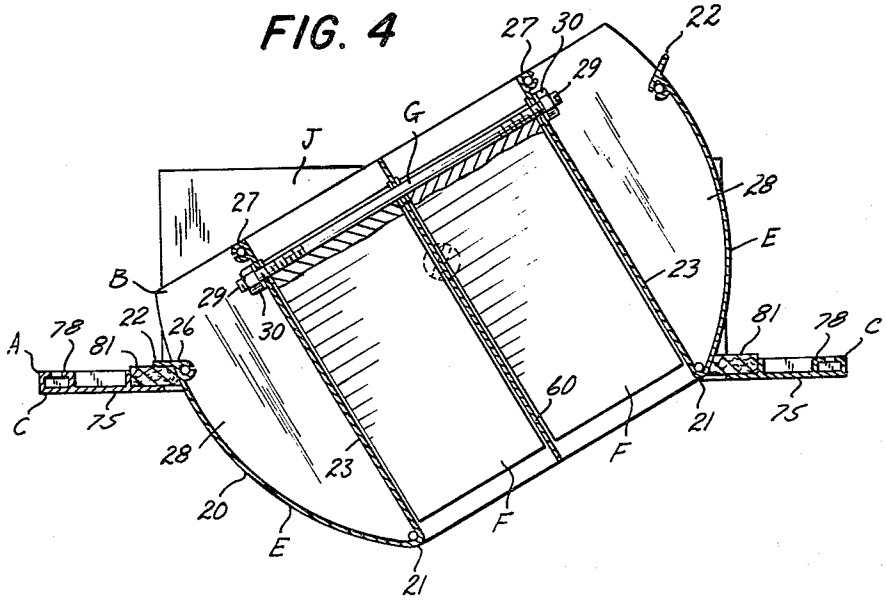


FIG. 4



INVENTORS
CORTLAND N. O'DAY
GEORGE J. SWEENEY
BY
ATTORNEY

April 6, 1965 C. N. O'DAY ETAL 3,176,603

ROTATABLE ELONGATED AIR DIFFUSER CONSTRUCTION

Filed Feb. 2, 1962 3 Sheets-Sheet 3

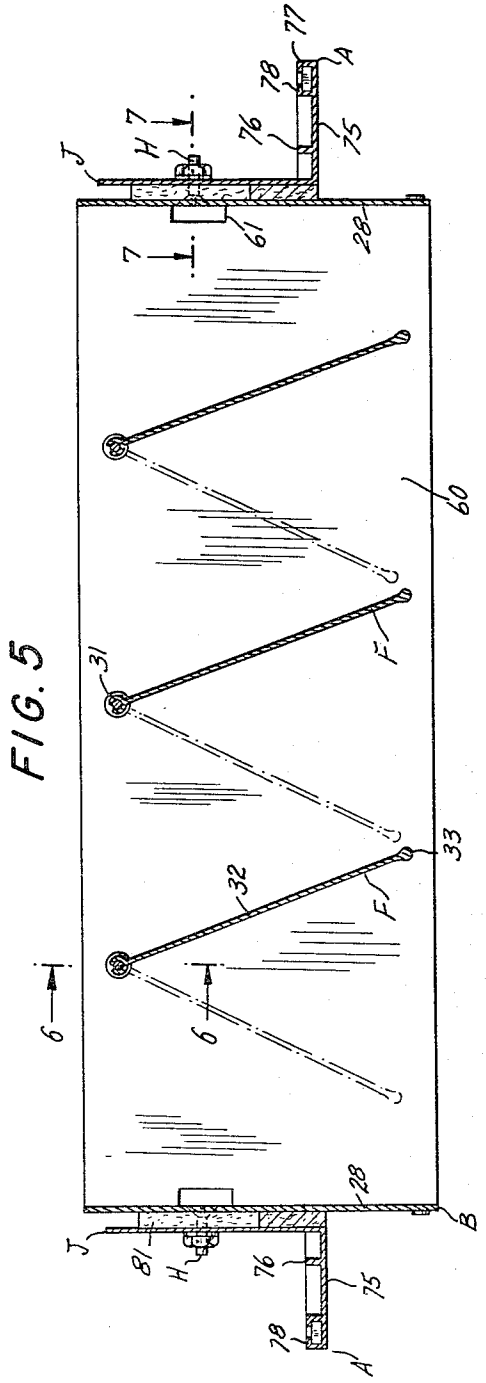


FIG. 5

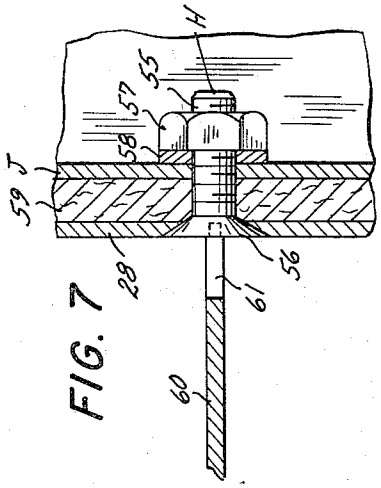


FIG. 7

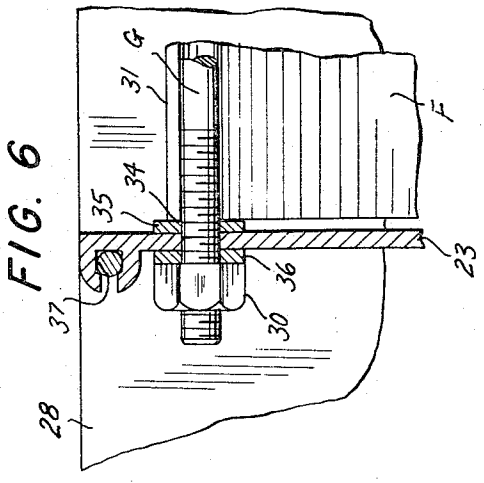


FIG. 6

INVENTORS
CORTLAND N. O'DAY
GEORGE J. SWEENEY

BY

ATTORNEY

United States Patent Office 3,176,603 Patented Apr. 6, 1965

3,176,603
ROTATABLE ELONGATED AIR DIFFUSER CONSTRUCTION

Cortland N. O'Day, Port Washington, and George J. Sweeney, Plandome, N.Y., assignors to Air Devices, Inc., New York, N.Y., a corporation of New York

Filed Feb. 2, 1962, Ser. No. 170,574
19 Claims. (Cl. 98—40)

The present invention relates to a rotatable elongated air diffuser construction and it particularly relates to a diffuser construction which will have adjustable direction, vertical as well as lateral.

It is among the objects of the present invention to provide a simple extruded air diffuser construction, which may be readily mounted in a wall, ceiling, sill or other part of a room, office, loft or enclosure to permit entry of conditioned or ventilating air and at the same time control the distribution or ventilating pattern of the incoming air, as the case may be.

Another object is to provide an elongated, universal air diffuser construction which will enable ready adjustment in the lateral as well as vertical distribution of the air pattern which is achieved.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

According to a preferred embodiment of the present invention it has been found most satisfactory to provide a rectangular frame structure which may be positioned flat against the periphery of a wall or ceiling, which will form a mounting for a barrel-type member having partially circular side bearing members and interior adjustable vane members.

Desirably, the side bearing structures are formed of elongated extrusions, while the interior vane elements are similarly formed of extrusion members and are positioned so that they will be held in any adjusted position.

The ends of the barrel structure are desirably pivotally mounted so that the barrel structure may be finally positioned at any desired adjusted position. The bearing structures desirably have interior flat straight walls and exterior curved bearing walls.

The exterior frame is also desirably formed of integrally elongated extruded light metal or aluminum elements which are joined together by corner angle connection members.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is an outside plan view of the barrel diffuser construction as it may be inserted in a wall or ceiling.

FIG. 2 is an interior plan view of the structure of FIG. 1 from the inside wall or ceiling.

FIG. 3 is a transverse sectional view upon the line 3—3 of FIG. 2, showing the barrel in central position.

FIG. 4 is a transverse sectional view similar to FIG. 3, with the barrel moved to one-stop position.

FIG. 5 is a transverse sectional view, upon the line 5—5 of FIG. 2, showing the adjustable interior vanes.

FIG. 6 is a transverse fragmentary sectional view upon an enlarged scale, upon the line 6—6 of FIG. 5, showing the individual vane hinge connection.

FIG. 7 is a transverse fragmentary sectional view, taken upon the line 7—7 of FIG. 5, showing the pivotal connection for the entire barrel.

FIG. 8 is a fragmentary separated perspective view, showing the manner of joining together the corners of the exterior frame construction so as to form a complete rectangular frame.

Referring to FIGS. 1 to 5, there is shown an exterior rectangular frame A and an interior rotatable barrel B.

The frame A may consist of the elongated side extruded member C and the short end members D.

The barrel structure is formed of the side bearing members E and the adjustable vane members F, which also may be extruded structures of a light metal, such as aluminum alloy.

The vane members are mounted by through rod hinge or pivot structures G, extending between the side barrel members E.

The entire barrel on the other hand has pivotal mounts on the end thereof as engaged at H, shown best in FIG. 7, upon the in-turned transverse side carrying structures J. (See particularly FIG. 5).

Referring particularly to FIGS. 3 and 4, the barrel structures E consist of integral extrusions having the one-quarter or one-fifth cylindrical portions **20**, which extend down to the corners **21** at one side and up to the outstanding stop flange elements **22** at the other side.

The inside flat walls **23** are extruded integrally with the one-quarter or one-fifth cylindrical walls **20**, and they extend upwardly as indicated at **24** to form the inside channel **25** through which the conditioning or ventilating air will pass through the interior conduit system into the room.

These walls may be provided with the in-turned channel structures **26** and **27** for receiving reenforcing means.

The side structures E are closed by the end walls **28** so as to form a closed end structure, and these end walls **28** may be held in position by rods or bolts extending through the channels **26** and **27**.

Between the walls **23** will extend the pivot bolts G, held in position by means of the threaded end portions **29** and the nuts **30**.

These pivot rods G may extend through the enlarged channel portions **31** at the edges of the vanes F, as is best shown in FIGS. 5 and 6, with the body **32** of the vane being relatively thin and flat and terminating in an enlarged end bead section **33**.

As is indicated between the edges **34** of the plates, there will be small washers **35** fitting around the rods G.

The nuts **30** will also hold the washers **36** in position. (See FIG. 6).

The rods **37** for holding the end walls **28** in position are also clearly shown in FIG. 6.

There will be two rows of these vanes F positioned in each channel **25** and they may be positioned as desired in any obliquity, to give the desired air distribution pattern.

The pivot mount for the entire barrel structure is best shown in FIG. 7 and it will be noted that there is a short bolt **55** having a fillister head **56** in the end plate **28** of the barrel structure.

This bolt will be held in position by the nut **57** having the washer **58**, which will clamp the upstanding flange J against the end wall **28** through the intervening stuffing, packing or sealing material **59**.

The middle wall **60** separating the two channels **25** is clearly shown in FIG. 7 and it will be noted that it is recessed at **61** adjacent the pivot connection H.

The side frame structure, as best shown in FIGS. 3, 4 and 5, has the outstanding flanges **75**, which carry the hinge plates J and also have the reenforcing elements **76**.

The frame structures B and C terminate in the channel elements **77** having the in-turned lips **78**, which may engage the right angular connectors **79** having the insert legs **80**, as shown best in FIG. 8.

The sealing is accomplished in respect to the frame A by means of sealing material which may be inserted in the channels **77** beyond the angle connector **79** in respect to the wall or ceiling.

In respect to the curved sides **20** of the barrel structure E, the sealing is achieved by putting in gasket or sealing material **81**, which will be held in position by the outstanding flanges **76** and which will press at its inside end **82** against the curved side walls **20** of the barrel structure.

This sealing material **81** will also act to stop the rotating movement of the barrel by contact with the flanges **22**.

The flange structure A is held in position by means of the bolt holes **83** and **84** in the side structures C and D. (See FIGS. 1 and 2).

It is thus apparent that the present invention has provided a simple, readily inserted, durable, extruded barrel-type air diffuser, of widespread and universal applicability, permitting a wide range of control over both lateral and vertical distribution of incoming ventilating and conditioning air.

As many changes could be made in the above rotatable elongated air diffuser construction, and many widely different embodiments of this invention could be made without departure from the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

1. A horizontal axis parallel ribbon jet barrel-type air diffuser comprising a rectangular frame for mounting against the periphery of a rectangular wall opening having elongated horizontal side members and short connecting end members, and L-shaped junction elements connecting the ends of said side and end members at the corners of the frame to hold said frame together, and a rotatable elongated cylindrical barrel pivotally mounted therewithin, pivotal mounts at the ends of said barrel on said end members and having partial cylindrical outside bearing walls, said bearing walls forming the outside of said barrel and contacting and bearing against the inside edges of said side members and flat parallel inside vane carrying walls, said carrying walls consisting of a central wall extending along and being positioned in the horizontal axis of the rotatable barrel and two outside walls spaced on each side of said central wall and creating separate parallel channels through which the air may be projected in a series of jets in the same or opposite directions on opposite sides of said central wall, said walls extending the full length of said barrel parallel to the axis of said barrel, and a plurality of adjustable rows of vanes within the space between said vane carrying walls, said vanes having enlarged pivotal end portions and pivot rods extending through said pivot end portions and through said carrying walls permitting each of said vanes to be independently adjusted, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

2. A horizontal axis parallel ribbon jet barrel-type air diffuser comprising a rectangular frame for mounting against the periphery of a rectangular wall opening having elongated horizontal side members and short connecting end members, and L-shaped junction elements connecting the ends of said side and end members at the corners of the frame to hold said frame together, and a rotatable elongated cylindrical barrel pivotally mounted therewithin, pivotal mounts at the ends of said barrel on said end members and having partial cylindrical outside bearing walls, said bearing walls forming the outside of said barrel and contacting and bearing against the inside edges of said side members and flat parallel inside vane carrying walls, said carrying walls consisting of a central wall extending along and being positioned in the horizontal axis of the rotatable barrel and two outside walls spaced on each side of said central wall and creating separate parallel channels through which the air may be projected in a series of jets in the same or opposite directions on opposite sides of said central wall, said walls extending the full length of said barrel parallel to the axis of said barrel, and a plurality of adjustable rows of vanes within the space between said vane carrying walls, said outside bearing walls and inside vane carrying walls being integrally extruded and said vanes being also integrally extruded and said frame having transverse extensions pivotally carrying said rotatable barrel, said vanes having enlarged pivotal end portions and pivot rods extending through said pivot end portions and through said carrying walls permitting each of said vanes to be independently adjusted, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

3. A horizontal axis parallel ribbon jet barrel-type air diffuser comprising a rectangular frame for mounting against the periphery of a rectangular wall opening having elongated horizontal side members and short connecting end members, and L-shaped junction elements connecting the ends of said side and end members at the corners of the frame to hold said frame together, and a rotatable elongated cylindrical barrel pivotally mounted therewithin, pivotal mounts at the ends of said barrel on said end members and having partial cylindrical outside bearing walls, said bearing walls forming the outside of said barrel and contacting and bearing against the inside edges of said side members and flat parallel inside vane carrying walls said carrying walls consisting of a central wall extending along and being positioned in the horizonaal axis of the rotatable barrel and two outside walls spaced on each side of said central wall and creating separate parallel channels through which the air may be projected in a series of jets in the same or opposite directions on opposite sides of said central wall, said walls extending the full length of said barrel parallel to the axis of said barrel, and a plurality of adjustable rows of vanes within the space between said vane carrying walls, said rectangular frame consisting of short end and long side extruded members having inside and outside faces and inside and outside edges and having outer channels on the inside faces at the outside edges of the members, corner connections engaging said outer channels to hold together the members to form said frame, and said side members on their inside faces at their inside edges having inside channels and gaskets in said inside channels sealing the inside edges of the side members to the partially cylindrical outside bearing walls, said vanes having enlarged pivotal and portions and pivot rods extending through said pivot end portions and through said carrying walls permitting each of said vanes to be independently adjusted, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending

through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

4. A horizontal axis parallel ribbon jet barrel type rotatable double adjustable vane diffuser for insertion in a rectangular opening comprising a rectangular outside flush frame consisting of extended flat short end and long side plates, each having oblique end abutment edges and an outside smooth face and an inside channeled face positioned against the periphery of the opening; said inside faces having outer channels, L-shaped corner connections in said outer channels connecting said abutment edges and said inside faces of the long side plates having inner channels, gaskets in said inner channels and said short end plates having inwardly directed right angular flanges adjacent their inside edges on their inside faces serving as pivotal mounting plates, short adjustable pivot studs on said horizontal axis mounted on said pivotal plates, and a rotatable barrel type diffuser having a top side and a bottom side and having outside partial cylindrical walls, inside separated straight parallel spaced walls and a central transverse partitioning straight wall parallel to and equally spaced between said separated parallel walls and end transverse walls at the ends of and mounted on said cylindrical and straight walls, said transverse walls being closely spaced parallel to and slightly inside of said right angular flanges, a flat gasket between said transverse walls and flanges, pivotal connections between said transverse walls and flanges and a plurality of pairs of adjustable vanes positioned between said straight walls and elongated threaded rods extending through the edges of said vanes and through the edges of the straight walls serving as pivots for said vanes, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

5. The diffuser of claim 4, said vanes having enlarged beads at their top edges and bottom edges and transverse openings through said top edges for carrying said rods.

6. The diffuser of claim 4, said connections including right angular members having legs inserted in said outer channels to hold said abutment edges together.

7. The diffuser of claim 4, said pivotal connections and said rods being threaded and having end nuts on said threaded portions to enable variation in the tensioning of the pivotal connections and the rods serving as said pivots.

8. The diffuser of claim 4, said gaskets in said inner channels projecting inside of the long side plates and pressed against the outside faces of said cylindrical walls.

9. The diffuser of claim 4, said cylindrical walls having obliquely projecting outstanding flanges to contact said gaskets and act as stops.

10. The diffuser of claim 4, said cylindrical walls extending between one-fourth and one-fifth of the circumference of a cylinder.

11. The diffuser of claim 4, said straight spaced walls being extruded integrally with said partial cylindrical walls and said walls being each provided with enlarged edged portions to reinforce the same.

12. An adjustable rotatable double vane horizontal axis parallel ribbon jet barrel type diffuser including rectangular mounting frame having long side frame members and short end frame members secured to the periphery of a ceiling air discharge opening therein, corner connections between said side and end frame members at the corners of the mounting frame positioned at the periphery and outside of the mounting frame, said frame members being of extruded sections and each having a base portion disposed parallel to the supporting surface and having on their inside faces inner and outer channel wall extensions on the inside face perpendicular to the base portion, said inner extensions on said short end members projecting into said openings, sealing means carried by the inner extensions of said side and end frame members within the said outer flanges thereof for sealing engagement with the barrel and nozzle assembly unit of said diffuser; and a central barrel within said frame consisting of double side, middle and end walls, said side walls each having an outer cylindrical segment wall portion and an inner plane straight wall portion, said side, middle and end walls being connected together at the ends of the barrel and said side and middle walls being in parallel spaced relation to form an air passage in combination with said end walls, the inner wall portions of each side wall merging with the outer cylindrical segment wall portion thereof at the outlet side of said passage; adjustable threaded pivotal means positioned in said horizontal axis securing said nozzle assembly to the frame between the said inner flanges of the frame end members for pivotal movement on a central longitudinal axis in the plane of said middle wall, pairs of transverse adjustable vanes between said side and middle walls extending the height of the side and middle walls, an elongated transverse adjustable pivot means mounted upon said side and middle walls and extending through the inside ends of said vanes and through the inside edges of said vanes; said sealing means being carried along the inner edges of each side frame member for engagement with the cylindrical segment wall portions of the nozzle assembly; and said sealing means interposed between the end frame inner extensions and the barrel end wall; and stop means on the side walls for engagement with the frame side members for limiting movement of the nozzle assembly about the pivotal axis thereof, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

13. An adjustable horizontal axis parallel ribbon jet barrel type diffuser having a rectangular frame consisting of pairs of side and end members secured to a supporting surface around the periphery of a ceiling opening therein; a barrel assembly consisting of pairs of parallel side and end walls and an intermediate parallel wall, said side walls each having an outer cylindrical wall portion and inner parallel wall portions, the side and end walls together with the intermediate wall being connected together in spaced parallel relation and forming two elongated rectangular air passages, the inner and outer wall portions of each side panel being in spaced apart relationship at the inlet side of said diffuser and joining together at the outlet side thereof; pivotal studs securing said assembly to said frame for turning movement on an axis longitudinal of the frame, midway between the side frame members and the outer cylindrical segment wall portions; flat inwardly projecting sealing means between said side frame and end members and said assembly, and pairs of independent adjustable transverse vanes between said side and intermediate walls and sealing strips carried by the inside face of said frame for engagement with the outer cylindrical wall portions, whereby said diffuser projects a series of separated laterally elongated oblique jets of air in the same or different directions on each side of the horizontal axis thereof, which jets are centrally separated from each other in a plane extending through said horizontal axis and which may be in the same and in opposite directions or opposite sides of said plane extending through said horizontal axis.

14. A diffuser according to claim 12 further charac-

terized angular connector means engageable with said outer extensions for retaining said side and end frame members in assembled relation.

15. A directionally adjustable air outlet according to claim 12 wherein the said means for connecting the side and end walls of the nozzle assembly comprise connecting elements engageable in each end of one of the side walls at three points defined by extruded apertures formed in the side walls at the intersection between the inner and outer wall portions thereof, at the discharge end of the air passage in the nozzle unit and at the end of each of said wall portions which lies at the inlet side of said air passage.

16. An elongated adjustable cylindrical horizontal-axis air diffuser of the type creating parallel laterally elongated rectangular ribbons of air to flow into an enclosure directed by a plurality of independently adjustable vanes covering the distribution of each ribbon of air so that each ribbon will consist of a plurality of obliquely disposed rectangular cross-section jets which may flow into the enclosure in opposite or similar directions, said diffuser being designed for mounting into a laterally elongated rectangular opening in a vertical wall and having an outside fixed rectangular frame with outwardly extending short end flanges and outwardly extending laterally elongated side flanges, said flanges having smooth exposed outside faces away from the wall and recessed inside faces against the wall around and contacting the periphery of said opening, said inside faces having channels forming said recesses extending along the inside and outside edges thereof and said flanges being obliquely cut off adjacent the corners of the frame and the end and side flanges abutting each other at the corners of the frame along diagonals of the frame, rectangular pivotal mounting flanges extending inwardly into the opening from the inside edges of the short end flanges and a rotatable cylindrical unit mounted to rotate on a horizontal axis between said pivotal flanges and between the inside edges of the side flanges, thick rectangular cross-section gaskets in the inside channels of the side flanges kept inside of said outside smooth faces, said unit having flat transverse end walls and parallel longitudinal walls, one extending through and along the horizontal axis and the others spaced on each side of the axis and also having parallel cylindrical walls contacting said gasket, a flat gasket positioned between said flat end walls and said pivotal flange and independently adjustable rectangular swinging vanes extending between but slightly spaced from each of said parallel longitudinal walls leaving narrow spaces between the edges of the vanes and the longitudinal walls so that the vanes will direct the flow of air between the narrow spacings at the sides thereof, means in the outside channels to hold the corners of the frame together, and adjustable pivotal mountings for the unit on the pivotal flanges and for the vanes on the longitudinal walls adjustable to control the friction of pivotal movement of said unit and said vanes.

17. The diffuser of claim 16, spacers being provided between the side edges of the vanes and said longitudinal walls and said pivotal connections including rods extending through the spacers, the inside ends of said vanes, and through all of said longitudinal walls.

18. The diffuser of claim 16, said vanes being adjustable so that the said vanes in one ribbon may be turned obliquely in one direction and so that the vanes in the adjacent ribbon may be turned obliquely in the opposite direction.

19. The diffuser of claim 16, said means in the outside channel consisting of L-shaped members fitting in said channels adjacent and limited to said corners, said L-shaped members having legs of the same length on each side of each corner and indentations on the inside faces of said outside channels to hold said legs in position.

References Cited by the Examiner

UNITED STATES PATENTS

2,301,985	11/42	Vagliani	98—40
2,696,087	12/54	Luecke	98—40
2,755,729	7/56	Galbraith	98—40
2,861,659	11/58	Hagerty	98—114
2,987,985	6/61	Johnson	98—121
3,012,494	12/61	Drummond	98—40

ROBERT A. O'LEARY, *Primary Examiner.*

CHARLES E. O'CONNELL, *Examiner.*