

Dec. 16, 1952

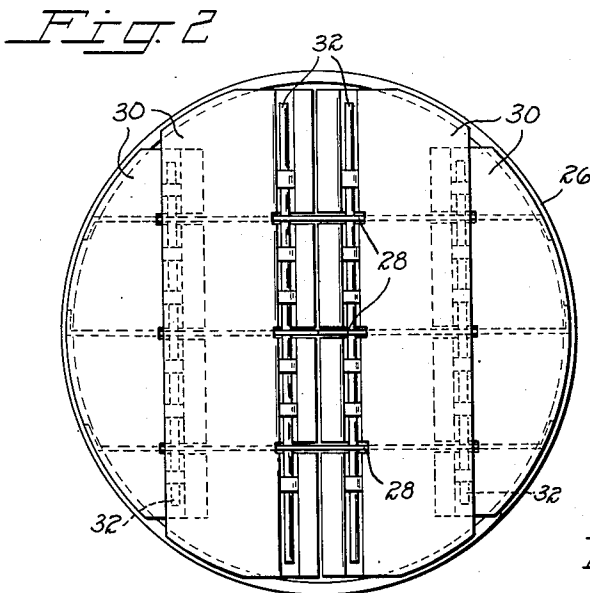
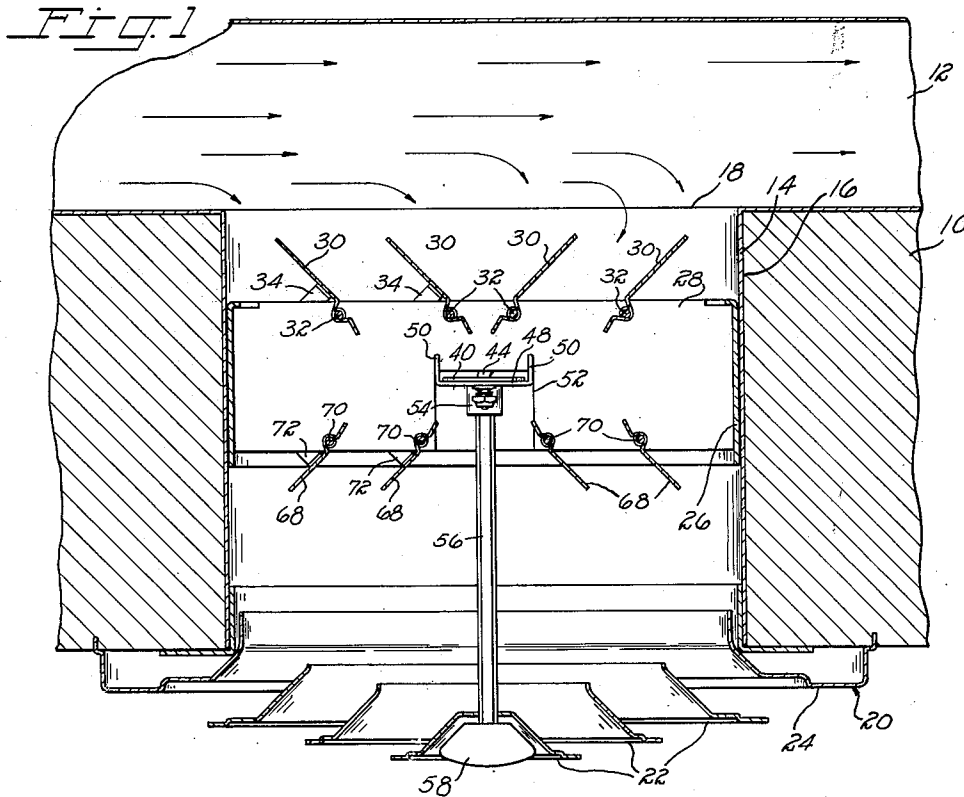
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2,621,579

DAMPER

Filed Aug. 25, 1949

2 SHEETS—SHEET 1



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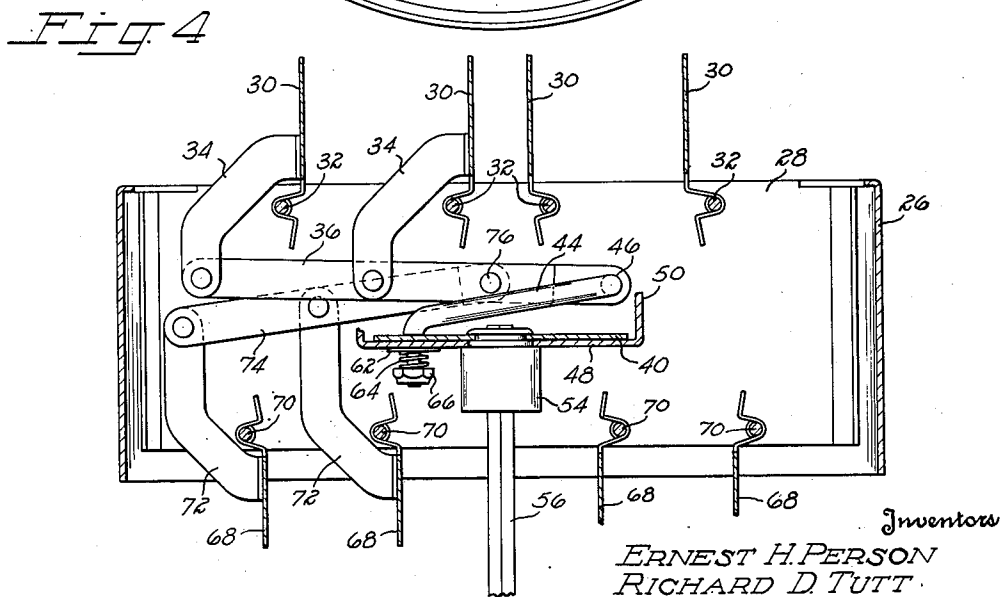
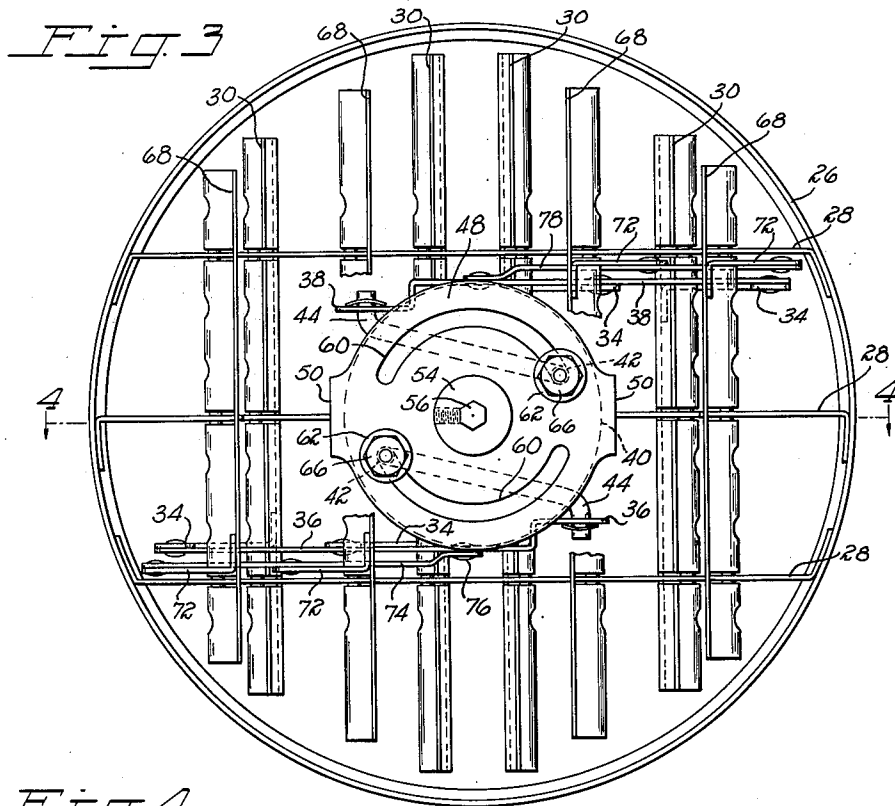
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2 SHEETS--SHEET 2



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UNITED STATES PATENT OFFICE

2,621,579

DAMPER

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Application August 25, 1949, Serial No. 112,198

6 Claims. (Cl. 98—40)

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This invention relates to improvements in air distribution apparatus and, more particularly, to apparatus arranged to control the flow of air between a source of supply and a diffuser which distributes air into a room for heating, cooling, or air conditioning the room in any desired manner.

One well known difficulty encountered in admitting air to a room from a source of supply lies in directing a uniform, evenly distributed flow of air to a diffuser through which air may be admitted into a room without creating eddy currents and drafts in various lower parts of the room when, for example, the diffuser is positioned in the ceiling of the room. Said difficulty occurs especially in ducts of relatively short length between the source of supply and a diffuser.

It is an object of the present invention to overcome such difficulties by providing an air distribution means for use in a duct between a source of supply and a fixed air diffuser at the exit end of said duct, whereby the diffuser is facilitated in discharging air into a room in evenly distributed streams which, due to the nature of the diffuser, for example, extend substantially transversely to the axis of the duct, the duct containing damper means which are adjustable to vary the flow of air through the duct and also insure diffusion of the air across the duct before it exits therefrom through the aforementioned fixed diffuser at the exit end of the duct.

It is another object of the invention to provide, for use in an air distributing duct, damper means comprising pivotally mounted damper vanes which control the volume of air passing through the duct and also, on the exit side of the damper vanes, pivotally mounted deflector vanes which will insure diffusion and distribution across the duct of the air which passes through the damper vanes.

It is a further object of the invention to provide actuating means for the damper and deflector vanes which is operable to simultaneously adjust the damper and deflector vanes from fully closed position to fully open position, or vice versa, as well as any intermediate positions between these extremes for purposes of varying the volume of air flowing through the duct and also diffusing and evenly distributing it across said duct.

Details of these objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the drawings forming a part thereof.

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In the drawings—

Figure 1 is a sectional view of an air distribution system embodying the present invention and showing a branch duct which connects a supply duct and a fixed air diffuser.

Fig. 2 is a top plan view of a damper assembly comprising part of the present invention, the vanes shown herein being illustrated in fully closed position.

Fig. 3 is a bottom plan view in larger scale of the damper assembly shown in Fig. 2 but illustrating the damper vanes in fully open position.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

Referring to the drawings, there is illustrated in Fig. 1 an air distribution system mounted, for example, in the ceiling of a room. It is to be understood, however, that this illustration is not to be considered restrictive since it is conceivable that the present invention could be applied to air ducts entering the walls of rooms. In Fig. 1, the ceiling 10 is shown in vertical section. A horizontal supply duct 12 extends along the upper surface of said ceiling wall. The ceiling has an aperture 14 through which a branch duct 16 extends and communicates at one end with an aperture 18 in one wall of the supply duct 12.

Connected to the exit end of the branch duct 16 adjacent the lower surface of the ceiling wall 10 is a fixed air diffuser 20 comprising a plurality of concentric annular deflecting members 22 which are connected to each other and to a base ring 24 by any suitable means, not shown, such as a plurality of radially extending bars or rods. The assembled deflecting members 22 and base rings 24 are so shaped that they deflect air exiting from the branch duct 16 from a path axial of said branch duct into paths extending radially from the axis of said branch duct. The specific nature of the details of the fixed air diffuser 20 is evident from Fig. 1.

As is well understood, air flowing through the supply duct 12 in the direction of the arrows shown in Fig. 1 will expand when it reaches the branch duct 16 and some of the volume of air in the supply duct will then flow downwardly into the branch duct. This is due to the fact that the air flowing through the supply duct 12 has a static pressure.

In order that the amount of air flowing through the branch duct 16 from the supply duct 12 may be controlled and varied, the present invention contemplates the use of a damper assembly, details of which are shown in all of the figures. Assuming that the branch duct 16 is cylindrical, the

damper assembly comprises a cylindrical collar 26 which closely conforms to the inner surface of branch duct 16 and is secured thereto intermediate the ends of the branch duct. Extending horizontally across the collar 26 in vertical planes parallel to each other are a plurality of spaced, flat plates comprising damper braces 28, the ends of which are fixed to the inner surface of the collar 26, as shown particularly in Figs. 3 and 4.

Pivotally mounted adjacent the upper end of the collar 26 are a plurality of damper vanes 30. Each vane is fixed to a horizontal shaft 32 which extends through suitable aligned bearing apertures in the damper braces 28. All of the shafts 32 are parallel to each other. The vanes 30 are preferably flat and elongated and the ends thereof, as well as the edges of the vanes farthest from the center of the braces 28, are shaped to conform to a circular outline when the vanes are all disposed in a common plane, as shown in Fig. 2, in which position the damper vanes are in fully closed position.

When the damper vanes are moved from fully closed position to either fully open or any open position intermediate their extreme positions, it is preferred that the damper vanes on one side of a central longitudinal plane in the branch duct 16 pivotally move in one direction and those damper vanes on the other side of said plane move in an opposite direction, as is clearly shown in Fig. 1.

The damper vanes 30 each have attached thereto one end of an actuating arm 34, as shown in Figs. 3 and 4, and the free ends of said arms attached to the damper vanes on one side of the aforementioned central longitudinal plane are interconnected by a link 36, the link being pivotally connected to the free ends of the arms 34 by suitable rivets, as shown in Fig. 4. The damper vanes on the other side of said central longitudinal plane also have the free ends of the actuating arms 34 thereof interconnected by a similar link 38, shown in Fig. 3.

The links 36 and 38 are arranged to be operated in opposite directions relative to each other and substantially transversely to the longitudinal axis of the collar 26 by actuating means comprising a disk 40 which is disposed transversely to the longitudinal axis of the collar 26 intermediate the ends thereof. The disk 40 is rotatable about the central axis of the collar 26, said axis coinciding with the axis of the branch duct 16.

The disk 40 is provided with a plurality of diametrically opposed bearing apertures 42 shown in Fig. 3, said apertures each pivotally receiving one end each of the operator arms 44. Said ends of said operator arms are bent so that they extend vertically through the apertures 42 in disk 40 and the other ends of the arms extend horizontally through bearing apertures 46 in the inner ends of the links 36 and 38. The disk 40 is supported by a horizontal member or plate 48 fixed to the central damper brace 28 by any suitable means, such as diametrically opposed parallel ears 50 which are bent transversely to the plate 48. To permit attachment of plate 48 thereto, the central brace 28 is provided with a notch 52, shown in Fig. 1, extending upward from the lower edge thereof to receive the plate 48. The ears 50 are directly attached to said central brace 28 by any suitable means such as welding.

The disk 40 slides during its rotational movement relative to the upper surface of plate 48. Disk 40 is provided with a hub 54 which extends through an opening on plate 48. Fixed to and depending from said hub 54 is an operator shaft 56.

The lower end of said shaft preferably extends through the central deflecting member 22 of fixed diffuser 20 and a manually operable knob 58 is secured to the lower end of said shaft, whereby the disk 40 may be rotated from the exterior of the fixed diffuser 20 for purposes of actuating the vanes of the damper assembly within the branch duct 16.

In order that any desired adjustment of the damper vanes 30 may be maintained, either in fully opened, fully closed, or any intermediate position between these extremes, friction means are provided. Said means are carried by the vertically extending ends of operator arms 44 which extend through the apertures 42 in disk 40. Said ends of arms 44 also extend through suitable arcuate slots 60 formed in fixed plate 48. Attached to said depending end of each arm 44 is a washer 62 which slidably engages the lower surface of plate 48 and is resiliently biased into functional engagement therewith by a helical spring 64 which surrounds the depending end of each arm 44. A nut 66 is threaded onto said end of the arm 44, so as to permit adjustment of the tension of spring 64.

It will thus be seen that, as the disk 40 is rotated in opposite directions by knob 58, the interconnecting means comprising operator arms 44 and links 36 and 38 will cause the damper vanes 30 on opposite sides of the aforementioned central longitudinal plane in duct 16 to be pivotally moved in opposite directions to either closed or open positions.

As has been stated above, the damper vanes on opposite sides of the central longitudinal plane of the branch duct 16 are moved in opposite directions when adjusted toward either closed or open positions. However, such arrangement will cause uneven concentrations of air in the branch duct and, in order that such uneven concentrations will not reach the fixed diffuser 20, the present invention also contemplates the use of deflector vanes 68 which are mounted similarly to the damper vanes 30 relative to the collar 26. Said vanes are supported on shafts 70 which are parallel to shafts 32 of the damper vanes 30 and are disposed in a plane spaced below and parallel to the plane in which the shafts 32 of the damper vanes are disposed.

The deflector vanes 68 are preferably narrower than the damper vanes 32, but the width of deflector vanes 68 is ample to suitably deflect the air passing therebetween in such a way that it will be evenly distributed within the lower portion of the branch duct 16 and thus be evenly distributed to the fixed deflector 20.

The shafts 70 are supported in suitable bearing apertures provided in the lower portions of the damper braces 28 and each deflector vane 68 has attached thereto one end of an actuating arm 72. The free ends of the arms 72 of the deflector vanes 68 on one side of said central longitudinal plane in the duct 16 are interconnected by a link 74, the link and arms 72 being pivotally connected by rivets as shown in Fig. 4. The end of link 74 nearest the center of the collar 26 is pivotally connected by rivet 76 to the link 36 which connects the arms 34 of the damper vanes 30 disposed on the same side of said central longitudinal plane. Thus, as the damper vanes 30 on one side of the aforementioned central longitudinal plane are pivotally moved in one direction by rotation of disk 40, the deflector vanes 68 on the same side of said plane will be pivotally moved simultaneously in the opposite direction. However, the

operation of the damper and deflector vanes is such that, if the damper vanes 30 are moved, for example, from fully closed to open position, the deflector vanes 68 substantially aligned therewith longitudinally of the branch duct will be simultaneously moved from fully closed to open position, but such movement will be in the opposite angular direction to that in which the aligned damper vanes 30 are moved.

As can be readily seen from Fig. 3, the deflector vanes 68 on the opposite side of the central longitudinal plane of the duct from the deflector vanes which are interconnected by link 74 are interconnected by their actuating arms 72 being pivotally connected at the outer ends thereof to a link 78 by suitable rivets. The end of link 78 nearest the center of the collar 26 is also pivotally connected to link 38 which also interconnects the arms 34 of the damper vanes 30 on the same side of the plane as said deflector vanes 68. Thus, the damper vanes 30 which are interconnected by link 38 and the deflector vanes 68 which are interconnected by link 78 will be simultaneously pivotally moved when the link 38 is actuated by its operator arm 44 and disk 40, but such movement of the damper and deflector vanes will be in opposite angular directions.

It will thus be seen that the pivotally movable damper and deflector vanes supported by collar 26 within the branch duct 16 are simultaneously adjustable to either fully closed or fully open as well as intermediate positions by a readily accessible and easily operated knob 58. The damper vanes on opposite sides of the central longitudinal plane of the branch duct 16 will be rotated in opposite directions to each other and likewise with the deflector vanes on opposite sides of said plane. Further, the damper and deflector vanes on the same side of said plane will be moved in opposite angular directions so that any deflection imparted to the air by the angular disposition of the damper vanes 30 will be counteracted by the deflector vanes 68 disposed in spaced relationship to the damper vanes 30 on the exit side thereof, whereby air passing through said branch duct 16 from the supply duct 12 will be distributed substantially evenly to the various annular spaces between the concentric deflecting members 22 of the fixed diffuser 20.

While the invention has been illustrated and described in its preferred embodiment and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

We claim as our invention:

1. A damper for use in an air duct comprising a plurality of damper vanes pivotally mounted in the duct for movement between a closed position transversely of the duct and a fully open position longitudinally of the duct, a plurality of deflector vanes correspondingly mounted in the duct in longitudinally spaced relation to the damper vanes, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement oppositely to each other and oppositely to their counterparts on the other side of the plane, linkage means interconnecting the damper and deflector vanes on each side of said plane for simultaneous swinging movement to closed and open positions, actuating means movably supported in said duct and connected to said

linkage means, said actuating means being arranged to shift said linkage means and thereby pivotally adjust said damper and deflector vanes, and means releasably retaining said actuating means in any adjusted position.

2. A damper for use in an air duct comprising a plurality of damper vanes pivotally mounted on generally parallel spaced apart axes extending transversely across the duct, the damper vanes being mounted for movement between a closed position transversely of the duct and a fully open position longitudinally of the duct, a plurality of deflector vanes correspondingly mounted in the duct in longitudinally spaced relation to the damper vanes, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement oppositely to each other and oppositely to their counterparts on the other side of the plane, linkage means interconnecting the damper and deflector vanes on each side of said plane for simultaneous swinging movement to closed and open positions, said linkage means comprising an arm on each of said damper and deflector vanes, a pair of links disposed respectively on opposite sides of said plane and means pivotally connecting the arms on each side of said plane to the links disposed on the same side of the plane, support means transversely secured in said duct, actuating means rotatably mounted by said support means and connected to said links, said actuating means being arranged to shift said links generally transversely of said duct to pivotally adjust said damper and deflector vanes, and friction means releasably retaining said actuating means in any adjusted position.

3. A damper for use in an air duct comprising a support collar transversely secured in said duct, a plurality of damper vanes pivotally mounted on generally parallel spaced-apart axes extending transversely across the collar, the damper vanes being mounted for swinging movement between a closed position transversely of the collar and a fully open position longitudinally of the collar, a plurality of deflector vanes correspondingly mounted in the collar in longitudinally spaced relation to the damper vanes, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement oppositely to each other and oppositely to their counterparts on the other side of said plane, linkage means interconnecting the damper and deflector vanes on each side of said plane for simultaneous swinging movement, said linkage means comprising an arm on each of said damper and deflector vanes, a pair of links disposed respectively on opposite sides of said plane, and means pivotally connecting the arms on each side of said plane to the links disposed on the same side of the plane, actuating means rotatably supported by said collar, arms pivotally connecting said links and said actuating means, said actuating means being arranged to shift said links generally transversely of said duct to thereby pivotally adjust said damper and deflector vanes, and friction means carried by said last-mentioned arms for releasably retaining said actuating means in any adjusted position relative to said collar.

4. An air distributing apparatus comprising an air duct arranged to communicate at one end with a source of air supply, an air diffuser connected to the other end of said duct, a

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damper assembly mounted within said duct and comprising, in combination, a plurality of damper vanes pivotally mounted in the duct for movement between a closed position transversely of the duct and a fully open position longitudinally of the duct, whereby to control the volume of air passing through the duct to said diffuser, a plurality of deflector vanes correspondingly mounted in the duct in longitudinally spaced relation to the damper vanes on the exit side thereof, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement oppositely to each other and oppositely to their counterparts on the other side of the plane, linkage means interconnecting the damper and deflector vanes on each side of said plane for simultaneous swinging movement to closed and open positions, actuating means movably supported in said duct and connected to said linkage means, said actuating means being arranged to shift said linkage means and thereby pivotally adjust said damper and deflector vanes, and means releasably retaining said actuating means in any adjusted position.

5. An air distribution apparatus comprising an air duct arranged to communicate at one end with a source of air supply, an air diffuser connected to the other end of said duct and comprising a plurality of associated vanes spaced transversely across said other end of said duct, a damper assembly mounted within said duct and comprising, in combination, a plurality of damper vanes pivotally mounted in the duct for movement between a closed position transversely of the duct and a fully open position longitudinally of the duct, a plurality of deflector vanes correspondingly mounted in the duct in longitudinally spaced relation to the damper vanes, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement oppositely to each other and oppositely to their counterparts on the other side of the plane, linkage means interconnecting the damper and deflector vanes on each side of said plane for simultaneous swinging movement to closed and open positions, support means transversely secured in said duct, actuating means movably mounted on said support means and connected to said linkage means, said actuating means having an operating member extending longitudinally of said duct through said fixed diffuser whereby said actuating means

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is rotated to shift said linkage means and thereby pivotally adjust said damper and deflector vanes, and means interengaging said actuating means and said support means to releasably retain said actuating means in any rotated position relative to said duct.

6. A damper for use in an air duct comprising a plurality of damper vanes pivotally mounted in the duct for movement between a closed position transversely of the duct and a fully open position longitudinally of the duct, a plurality of deflector vanes correspondingly mounted in the duct in longitudinally spaced relation to the damper vanes, the damper vanes and deflector vanes on one side of a central longitudinal plane through the duct being arranged for swinging movement in opposite directions to each other and oppositely to their counterparts on the other side of said plane, support means transversely secured in said duct, actuating means movably mounted on said support means within said duct, motion transmitting means interconnecting said actuating means and said damper vanes and said deflector vanes, an operating arm on said actuating means extending externally of said duct for shifting said actuating means to adjust simultaneously the positions of said damper vanes and said deflector vanes, and means releasably retaining said actuating means in adjusted positions relative to said support means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,696,922	Nielsen	Jan. 1, 1929
1,931,156	Persons	Oct. 17, 1933
2,077,175	Kornbau et al.	Apr. 13, 1937
2,217,479	Guyer	Oct. 8, 1940
2,317,798	Otto	Apr. 27, 1943
2,336,765	Adams	Dec. 14, 1943
2,403,291	Kurth	July 2, 1946
2,456,312	Paget	Dec. 14, 1948
2,479,773	Piehl	Aug. 23, 1949

FOREIGN PATENTS

Number	Country	Date
2,759	Great Britain	1891