Feb. 26, 1952 A. W. SCHACH 2,586,997

DAMPER

Filed May 26, 1947

Fig. 1.

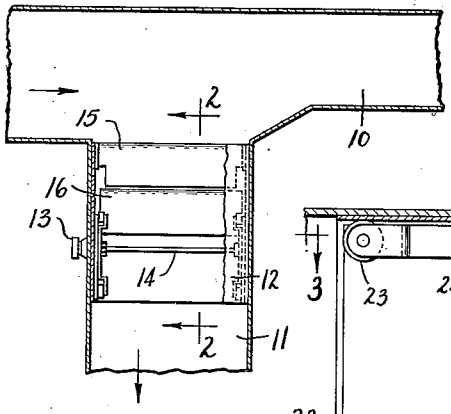


Fig. 2.

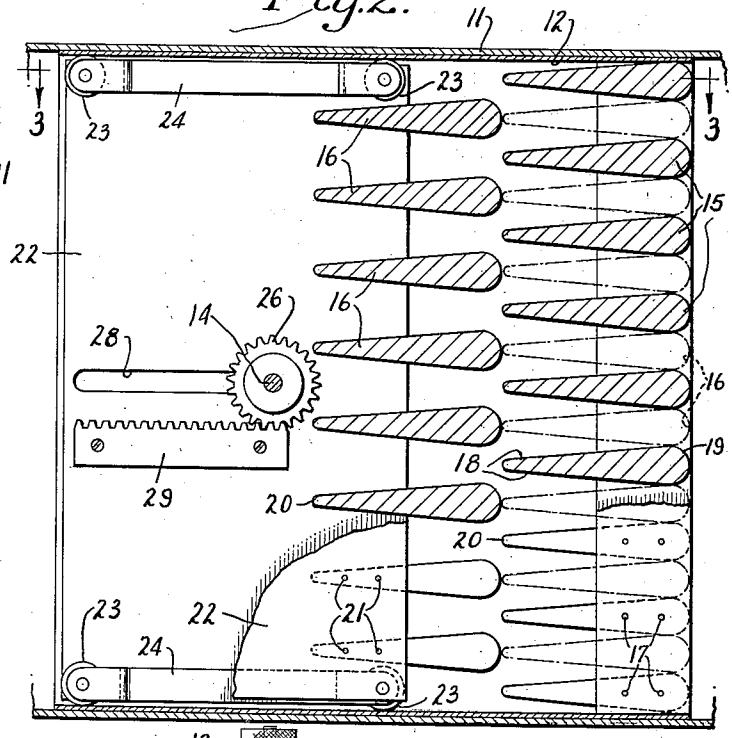


Fig. 3.

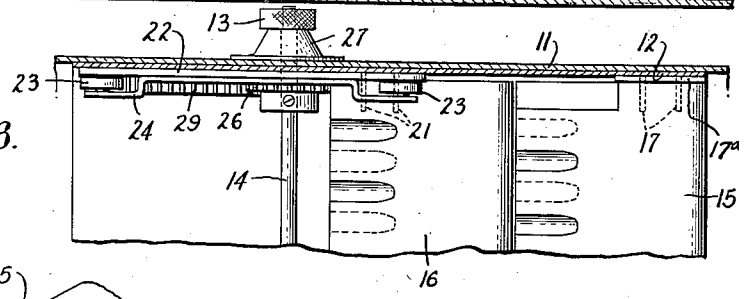
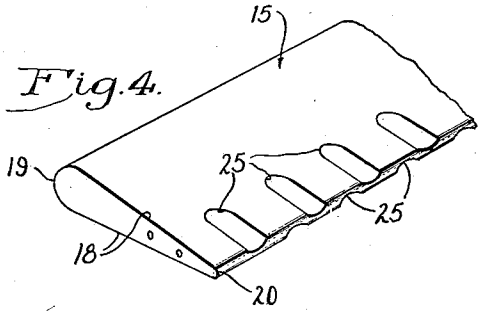


Fig. 4.



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Patented Feb. 26, 1952

2,586,997

UNITED STATES PATENT OFFICE

2,586,997

DAMPER

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Application May 26, 1947, Serial No. 750,616

4 Claims. (Cl. 277—1)

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This invention relates to a damper for regulating the flow of air through a passage, and the general object is to provide a damper which is adapted for controlling the flow of air under relatively high pressure, and which avoids the creation of any substantial noise as the damper approaches closed position.

A more detailed object is to provide a damper in which the air flow is adjusted by relative movement between two sets of vanes both presenting air foil cross sections in all degrees of opening of the damper.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a cross-sectional view of an air duct equipped with a damper embodying the novel features of the present invention.

Fig. 2 is a cross section taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross section taken along the line 3—3 of Fig. 2.

Fig. 4 is a perspective view of one of the damper vanes.

For purposes of illustration, the improved damper is shown in the drawings as a means for controlling the flow of air through a duct 11 branching off from a main supply duct 10. The damper is a self-contained unit mounted within a rectangular frame 12 received in and secured to walls of the branch duct and selectively adjustable by turning a knob 13 on the outer end of an operating shaft 14 which projects through one wall of the frame and branch duct.

In the form shown, the damper comprises two separate sets 15 and 16 of vanes of air foil cross section mounted in staggered relation for movement of the vanes of one set edgewise into and out of the spaces intervening between the vanes of the other set to vary the width of such spaces and thereby control the flow of air through the duct 11. Herein, the vanes 15 are stationary each having its opposite ends secured by pins 17 to supporting plates 17a which are fixed to the frame 12 so that the vanes are held in uniformly spaced parallel relation with the space intervening between the thickest section of the vane being substantially equal to such thickness. To provide the desired air foil cross section, the opposite side surfaces 18 of each vane are substantially flat and converge toward each other from the wider semicircular edge 19, substantially intersecting at the other thin edge 20 the width of each vane being several times the thickness thereof. The outermost vanes of each set lie against the sides of the frame 12.

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The vanes 16 are of the same cross section and similarly spaced apart in parallel relation with their tail portions secured by pins 21 to the side plates 22 slidable in the frame 12. Brackets 24 secured to the plates 22 carry spaced rollers 23 engageable with the walls of the frame 12 so that the unit slides readily within the latter frame. The thicker edge portions of the vanes 16 project from the plates 22 and the ends of the vanes 15 are spaced from the frame 12 so that by movement of the plates 22, the vanes 16 may be moved in between the vanes 15 to the position shown in phantom in Fig. 2 in which the thicker edges of the two sets of vanes lie in a common plane and the movable vanes completely fill the spaces intervening between the stationary vanes 15 thereby completely interrupting the flow of air through the duct 11.

As the plates 22 and the vanes 16 are retracted from this position, the spaces between the vanes 15 are widened progressively permitting a corresponding increase in the flow of air through the damper. Maximum opening of the damper is achieved when the vanes 16 reach the position shown in full in Fig. 2. In all degrees of opening of the damper, the vanes of both sets present so-called air foil cross sections to the passing air thereby avoiding turbulence in the latter and offering minimum resistance to the air flow. As a result, the damper is adapted to control the flow of air maintained at relatively high pressures.

It has been found that the noise incident to the flow of air through the damper may be substantially eliminated by providing shallow recesses 25 in opposite sides of the vanes 15 at the narrow edges thereof, the recesses extending edgewise and partially across the vanes. To permit the vanes 15 and 16 to be duplicates, similar recesses are formed on the movable vanes 16.

Various operating means may be provided for adjusting the frame 24 axially of the duct 11 to thereby vary the degree of damper opening. Herein the operating means comprises a gear 26 fast on the shaft 14 which is journaled in bearings 27 on the frame 12 and projects through a slot 28 in one of the plates 22. This gear meshes with a rack 29 secured to the inner side of the plate 22. Thus, by turning the knob 13, the gear causes the rack to move back and forth along the stationary rack correspondingly moving the plates 22 carrying the vanes 16.

I claim as my invention:

1. A damper comprising two sets of spaced parallel vanes of an air foil cross section having thick edges rounded to a contour substantially equal to a semicircle and flat sides tapering sub-

stantially to a point from the diameter of said semicircle, the width of each vane being several times its maximum thickness adjacent its thicker edge, and means supporting the vanes of the respective sets in staggered relation and for relative edgewise movement in unison to bring the vanes of one set into the spaces between the vanes of the other set wherby to vary the effective area of the air passage through the two sets of vanes, the vanes of both of said sets being arranged with their wider edges facing in the same direction.

2. An air flow control damper comprising a plurality of uniformly spaced parallel vanes of air foil transverse cross section having thick edges rounded to an approximately semicircular contour and generally flat sides tapering substantially to a point, the width of each vane being several times its maximum thickness, a second similarly arranged set of vanes of similar air foil cross section and substantially equal maximum thickness, and means supporting said second vanes for bodily edgewise movement in unison into and out of the spaces between said first vanes, said rounded edges of the vanes of both sets facing in the same direction and the vanes of each set being spaced apart distances substantially equal to the thickest parts of the vanes of the other set so as to effect a complete closure of said spaces when the rounded edges of all of the vanes are disposed substantially in a common plane.

3. A damper comprising two sets of spaced parallel vanes of air foil cross section having sides tapering from a thick rounded edge to a

thin edge, certain of said vanes being formed with laterally opening recesses spaced along opposite sides of said thin edges and extending partially across the width of said vanes, and means supporting the vanes of the respective sets in staggered relation for relative endwise movement in unison to bring the vanes of one set into the spaces between the vanes of the other set whereby to vary the effective area of the air passage through the two sets of vanes, all of the vanes being arranged with their thicker edges facing in the same direction.

4. A damper comprising two sets of spaced parallel vanes of air foil cross section, each having substantially flat sides tapering from a thick rounded edge to a thin edge, means supporting the vanes of one of said sets for bodily edgewise movement in unison into and out of the spaces between the vanes of the other set, certain of said vanes being formed with laterally opening recesses spaced in a staggered relation along opposite sides of the vanes at said thin edges and extending partially across the width of said vanes.

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