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Applicant: NORDISK VENTILATOR CO. A/S
DK-4700 Naestved(DK)

Inventor: Hougaard, Tage
Chr. Winthersvej 118
DK-4700 Naestved(DK)

Representative: Westwood, Edgar Bruce et al,
STEVENS, HEWLETT & PERKINS 5, Quality Court
Chancery Lane
London WC2A 1HZ(GB)

A ventilation damper assembly with a number of parallel and rotatable rectangular damper blades.

In a ventilation damper assembly in which a number of wing-shaped rectangular damper blades (7) are rotatably positioned with parallel axes of rotation between opposite frame members (1) in a rectangular damper frame, lateral tightening at the frame members is obtained without using particular tightening means, by forming each frame member (1) with a substantially convex cross-sectional shape with the minimum distance between the frame members aligned with the bearings (13) for the journals (12) of the damper blades (7), while each damper blade (7) comprises end portions (11) with a curved edge portion (11a) facing the frame members (1).

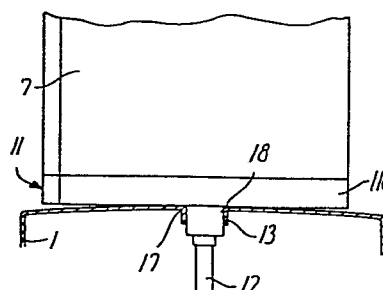


FIG. 3

A Ventilation Damper Assembly with a Number of Parallel
and Rotatable Rectangular Damper Blades.

This invention relates to a ventilation damper assembly to be mounted in a cabinet, a ventilation duct or a wall opening and comprising a number of substantially rectangular damper blades of wing-shaped cross-sectional profile mounted rotatably with parallel
5 axes of rotation between opposite frame members in a substantially rectangular damper frame, and wherein said opposite frame members are provided with bearings for journals secured in the damper blades, said journals
10 being in engagement with a drive mechanism by which the damper blades can be moved between a closing portion and an opening position.

Dampers of this type are used particularly as air volume control and damping means as well as
15 mixing dampers when mounted in ventilation ducts of rectangular cross-section or in wall openings or openings in side walls or end walls of cabinets, for instance for air conditioning control units in air conditioning systems. Beyond a reliable closing func-
20 tion with respect to tightness and a movement of the damper blades which as far as possible is free from play and noise it is a purpose to create a simple and sturdy design of such damper blades with the lowest possible costs of production.

25 To obtain sufficient tightness in the closing position known dampers of the above mentioned kind are usually provided - beyond tightening strips along the longitudinal edges of each damper blade - with special, lateral tightening members secured to
30 said frame members, such as disclosed in German Offenlegungsschrift No. 2,342,531 and in Canadian patent No. 804,873, but thereby the damper construction is

made considerably more complicated and expensive.

It is an object of the invention to provide for most applications a sufficiently reliable, lateral tightness in a simple manner without using particular tightening members without noticeably reducing the movability of the damper blades. According to the invention a damper assembly of the kind set forth is characterized in that the opposite sides of said frame members facing the flow passage area of the damper has a substantially convex cross-sectional shape with the minimum distance between the frame members aligned with the bearings of the journals of the damper blades, and in that the end portions of each damper blade comprise a curved edge portion facing the frame members.

By this construction each damper blade is in its closing position caused to tightly engage said frame members throughout the length of said end portions, while outside the closing position there is only a punctiform engagement between the end portions of the damper blade and said two frame members, the two engagement points being diametrically opposite on either side of the bearings for the journal of the damper blade. During the movement of the damper blade said engagement points follow a circular path around the bearing.

According to the invention the substantially convex cross-sectional shape may be obtained by providing the frame members with the slight bearings in relation to a plane along parallel bending lines delimiting a central strip of a width corresponding to the diameter of the bearings for the journals of the damper blades.

Tests have shown that in connection with ordinary, longitudinal tightening lobes on the damper blades the present invention provides for achiev-

ing in the closing position a leakage tightness of the same magnitude as that obtained by separate lateral tightening members on the frame members.

In the following the invention is explained
5 in detail with reference to the schematical drawings, in which

Figs 1 and 2 illustrate an embodiment of a ventilation damper assembly according to the invention, in a view perpendicular to the flow passage area and
10 in a perspective view, resp., while Figs 3 and 4 illustrate two longitudinal sections perpendicular to each other of the portion of a damper blade in the damper assembly in Figs 1 and 2 engaging a frame member in the damper frame.

15 The damper frame shown in Figs 1 and 2 is mounted in a rectangular, in the present case almost square damper frame comprising frame members 1 to 4 made from bent sheet profiles of a substantially flat, U-shaped cross-section, so that either frame member as
20 shown at 5 and 6 for the frame member 1 is provided with edge flanges to secure the damper frame either to a ventilation channel having the same flow passage area and cross-sectional shape, to a wall opening or to an opening in the side or end wall of a cabinet,
25 for instance a central unit in an air conditioning system in which one or more fans, air humidifiers, filters and/or heating members may be located.

In the illustrated embodiment four damper blades 7 to 10 of wing-shaped, cross-sectional profile
30 are rotatably mounted in the damper frame with parallel axes of rotation between the two opposite lateral frame members 1 and 2, a journal 12 being inserted in an end portion 11 at either end of each damper blade, said
4- journal being positioned with sliding fit in a bushing
35 13 drawn up in the sheet blank of the frame member as shown in Figs 3 and 4. To neutralize sheet deformation

around the drawn bushings, linings made from a hard plastic, for instance nylon, may be mounted in said bushings.

In Figs 1 and 2 the damper blades 7 and 10 are shown in a central position between a closing position in which the damper blades extend transverse to the flow direction and block the flow passage area, and an opening position in which they are substantially parallel to the flow direction.

The operation of the damper blades 7 to 10 is effected by means of an arm 14 secured to the journal 12 for one of the damper blades 7, and ten damper blades 7 to 10 are interconnected with respect to movability through a drive mechanism, including a coupling bar 15, a pivot arm 16 positioned behind the coupling bar 15 being rotatably connected with the coupling bar 15 and secured to one of the journals for each damper blade.

According to the invention, to obtain lateral tightness of the damper blades 7 to 10 in the closing position of the damper assembly the opposite sides of the lateral frame members 1 and 3 facing the flow passage area have a substantially convex cross-sectional shape as shown in Fig. 3 with the minimum distance between the frame members 1 and 3 aligned with the bearing bushings 13 for the journals 12 of the damper blades 7 to 10, in addition to which the end portion 11 of the damper blade has a curved edge portion 11a facing the frame members as best shown in Fig. 4. In the illustrated embodiment the substantially convex cross-sectional shape is obtained by slightly bending a plane frame member along parallel bending lines 17 and 18, delimiting a central striplike portion of a width corresponding to the diameter of the drawn bushings 13.

In the closing position illustrated in Fig.

4 the curved edge portions 11a of the end portions 11
tightly engage the central portion of the frame member
1 opposite the bearing bushings 13 so as to obtain
for most applications a sufficient security against air
5 passing through the end of the damper blades 7 to 10
and the frame members without using any particular
tightening means.

Said lateral tightness is simultaneously
obtained without considerably reducing the movability
10 of the damper blades, inasmuch as each damper blade
as soon as it has been slightly moved away from the
closing position as shown in Fig. 3 will get clear of
the frame member on the major part of the length of the
end member due to the convex cross-sectional shape
15 of the frame member. As a consequence of the curved
edge portion 11a of the end portion 11 there are
substantially only punctiform engagements between the
end portion 11 and the frame member 1 in the two engage-
ment points positioned diametrically opposite on either
20 side of the bearing bushing 13. During the movement of
the damper blade between its closing position and its
opening position said engagement points will follow a
circular path around the bearing bushing.

The above mentioned bendings 17 and 18
25 to obtain the substantially convex cross-sectional shape
of the frame member 1 may for instance be made so that
the clearance between the frame member and the end
portion 11 of the damper blade in its opening portion
varies from approximately 0 to 1 to 2 mms.

PATENT CLAIMS

1. A ventilation damper assembly to be mounted in a cabinet, a ventilation duct or a wall opening and comprising a number of substantially rectangular damper blades (7-10) of wing-shaped cross-sectional profile mounted rotatably with parallel axes of rotation between opposite frame members (1,3) in a substantially rectangular damper frame, and wherein said opposite frame members (1,3) are provided with bearings (13) for journals (12) secured in the damper blades (7-10), said journals being in engagement with a drive mechanism by which the damper blades (7-10) can be moved between a closing position and an opening position, characterized in that the opposite sides of said frame members (1,3) facing the flow passage area of the damper have a substantially convex cross-sectional shape with the minimum distance between the frame members (1,3) aligned with the bearings (13) of the journals (12) of the damper blades (7-10), and in that the end portions (11) of each damper blade comprise a curved edge portion (11a) facing the frame members (1,3).

2. A ventilation damper assembly according to claim 1, characterized in that the substantially convex cross-sectional shape is obtained by providing the frame members (1, 3) with slight bendings in relation to a plane along parallel bending lines (17, 18) delimiting a central strip of a width corresponding to the diameter of the bearings (13) for the journals (12) of the damper blades (7-10).

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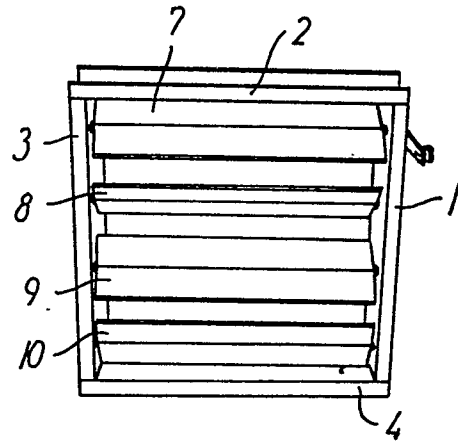


FIG. 1

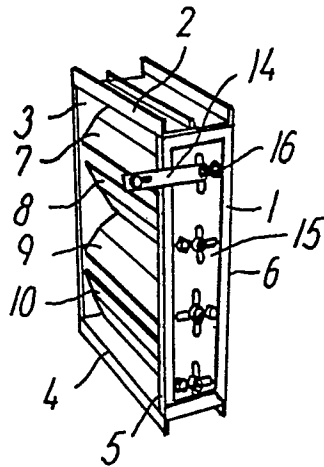


FIG 2

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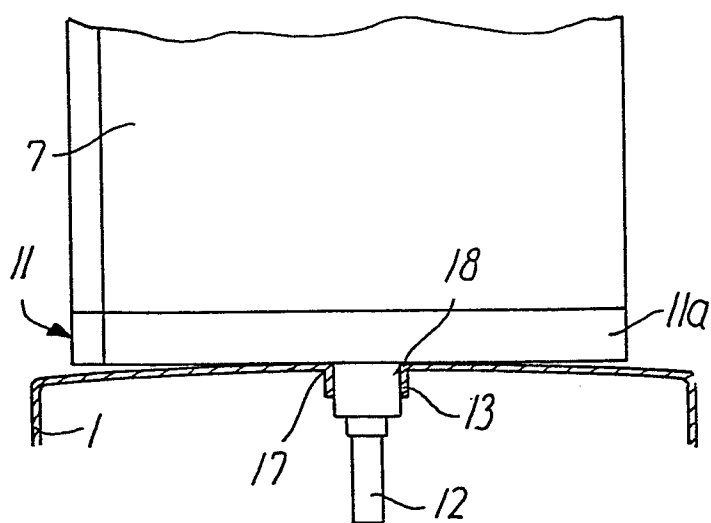


FIG. 3

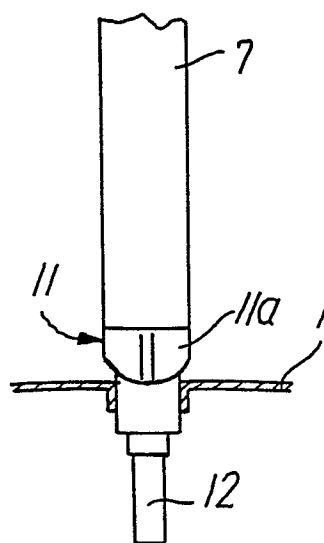


FIG. 4