April 9, 1963 E. KAHN ET AL 3,084,405

DAMPER ASSEMBLY

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FIG. 3

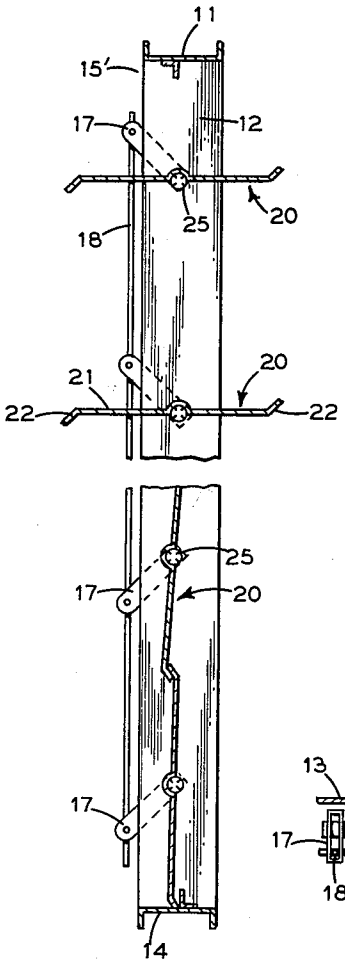


FIG. 1

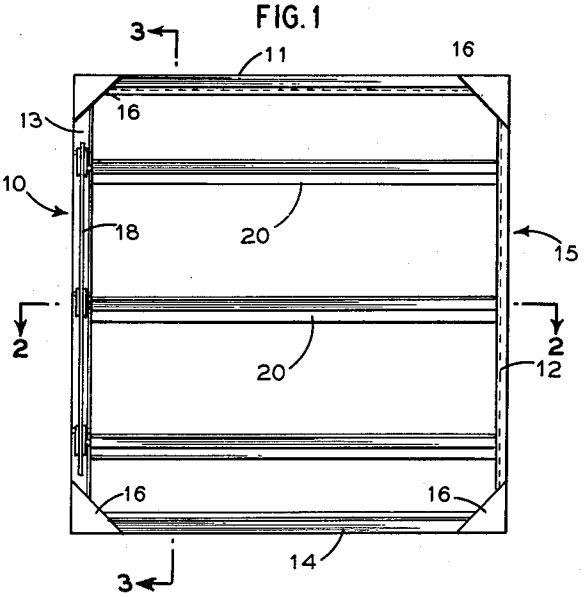
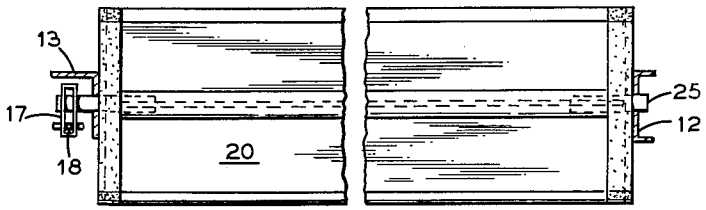


FIG. 2



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FIG. 4

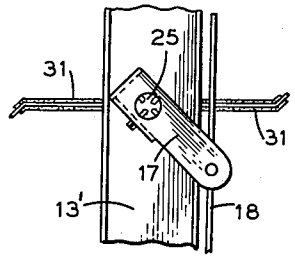


FIG. 5

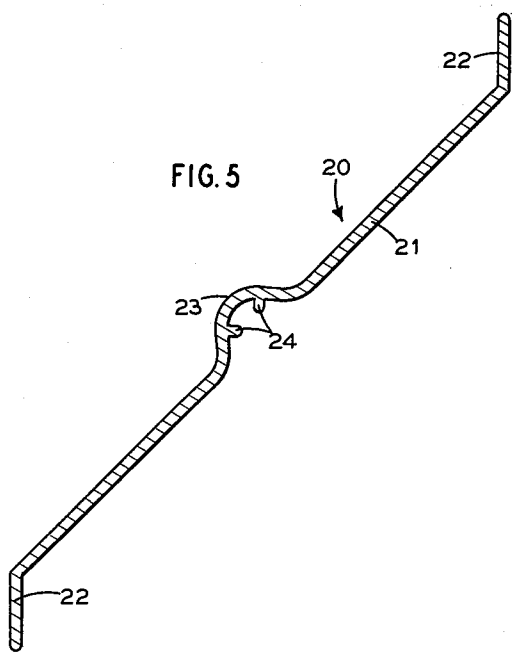


FIG. 6

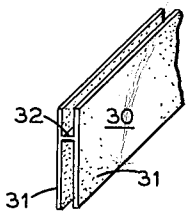
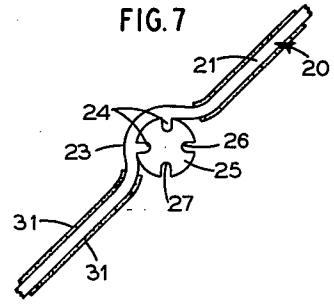


FIG. 7



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DAMPER ASSEMBLY

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4 Claims. (Cl. 20—62)

This invention relates to air or gas flow controlling means such as adjustable dampers and, more particularly, to a novel damper including novel louver or damper blades which interlock in the closed position and which are provided with novel weather stripping means along their end edges cooperable with the damper frame. The present application is a continuation in part of copending application Serial No. 56,470, filed September 16, 1960, for "Damper Assembly," now Patent No. 3,047,914, issued August 7, 1962.

In such copending application, there is described a novel louver blade or damper blade construction involving a hollow air foil section blade made of interfitting parts which are readily adaptable to provide varying widths of blades and in which the center portions of the blades are assembled with a supporting or operating shaft by means of ribs on the blades fitting in angularly related grooves in a cylindrical shaft, the center portions of the blade being slid longitudinally of the shaft to interlock the center portions with the shaft.

One of the problems encountered in damper construction is the provision of an effective seal between edges of adjacent blades in the closed position. Various arrangements have been tried in practice to provide such a seal, usually involving flexible sealing means on the blade edges interengageable with similar means on an adjacent blade or directly engageable with an edge of the adjacent blade. Such arrangements have not proven entirely satisfactory in practice, for various reasons.

Another factor involved in design of an efficient damper assembly is that of the deflection of air or gas flow therethrough, as for the purpose of preventing direct drafts. A further problem has been the provision of proper seals between the ends of the movable blades and the associated frames.

In accordance with the present invention, these difficuties are resolved by providing a damper blade having a novel cross-sectional area whereby it may readily interlock with adjacent blades in the closed position of the damper assembly to prevent air or gas flow therethrough, and further including novel weather stripping means on the end of each blade cooperable with the adjacent frame to provide a seal therewith, particularly in the closed position of the damper assembly.

To this end, the louver or damper blade of the present invention comprises a solid cross-section member of extruded aluminum, aluminum alloy or the like. This blade includes a substantially flat longitudinally extending central section, and a pair of longitudinal edge sections, each extending from a different edge of the central section. The edge sections are offset angularly, at an angle of less than 90°, with respect to the central section, and the two edge sections extend angularly in opposite directions from the central section. Thereby, in the closed position of the damper assembly, the edge sections of adjacent blades will overlap and interlock in a novel manner to provide an effective seal against air or gas flow through the damper assembly.

Each blade is formed, at the center line of its midsection, with an arcuately offset circular portion from the inner surface of which ribs extend at an angle to each other, these ribs constituting radii of the circularly offset arcuate portion. Preferably, there are two of these ribs which extend in 90° outwardly converging relation toward each other. The ribs are arranged to slidably interfit with corresponding grooves in a generally cylindrical operating shaft, the grooves in the operating shaft being arranged at a 90° angular spacing with respect to each other. Thereby, each blade may be assembled to its operating shaft by sliding the same longitudinally thereof with the ribs on the blade engaging in the grooves or slots in the operating shaft and, when once assembled, the blade may be disassembled from the operating shaft only by such longitudinal sliding movement and may not otherwise be disengaged from the shaft.

The ends of the several operating shafts are somewhat longer than the associated blades, to provide bearings for engagement in the damper assembly frame. The damper assembly frame may comprise welded or otherwise integrally united structural members, preferably channels extruded of aluminum, aluminum alloy or the like. In the case of a damper assembly in which operation is to be effected from one face or the other of the damper assembly, all four members of the substantially rectangular frame are made of a channel cross-section. However, where the operating mechanism is to be concealed along one side of the frame, that side of the frame which carries the operating and interconnecting means for the blades is preferably an extruded angle whose leg extending outwardly from the frame has a greater width than the flanges of the channels forming the remainder of the frame.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings. In the drawings:

FIG. 1 is a front elevation view of one form of damper assembly embodying the invention;

FIG. 2 is a transverse sectional view of the damper assembly of FIG. 1, taken on the line 2—2 of FIG. 1;

FIG. 3 is a transverse vertical sectional view through another form of damper assembly embodying the invention, the blades in the upper half of the figure being shown in the open position and those in the lower half of the position being shown in the closed condition;

FIG. 4 is a side elevation view of a portion of the assembly shown in FIG. 3;

FIG. 5 is an end elevation view of a damper blade embodying the invention;

FIG. 6 is a partial perspective view of novel weather stripping employed with the damper or louver blades; and

FIG. 7 is an end elevation view of the assembly of a blade, its weather stripping, and its operating shaft.

Referring to FIGS. 1 and 2, a louver or damper assembly unit 10 is illustrated as including louver or damper blades 20 mounted in a substantially rectangular frame 15 including top member 11, side members 12 and 13, and bottom member 14. The blades 20 are oscillatable about the axes of blade shafts 25, described more fully hereinafter, which are rotatably supported in suitable bushings, such as nylon bushings, set in uniformly spaced apertures in side frame members 12 and 13. The frame members are braced by suitable gussets 16 at each corner of the frame. Each shaft may have a link or crank 17 secured thereto whereby the blades may be interconnected by a suitable operating rod 18. One of the blades may be operated by a crank or the like, which has not been illustrated, whereby all of the blades may be operated in unison.

In the arrangement shown in FIGS. 1 and 2, the operating mechanism for the louver blades or dampers is adapted to be concealed. In such case, the top and bottom members 11 and 14, as well as one side member 12, are formed of a channel cross-section, whereas the other side member 13 is formed of an angle cross-section, as

best seen in FIG. 2. The extent of one leg of the angle projecting outwardly of the frame is greater than the depth of the flanges of the channel 12, for example.

If desired, instead of there being a shaft 25 extending completely across the frame at each louver position, the shaft 25 may be divided into a pair of short stub shafts, as indicated in FIG. 2. In this case, each stub shaft is assembled to the blade before the latter is mounted within the frame, or the stub shafts and blade may be assembled by positioning the blade between the side frame members and then pushing the stub shafts inwardly to engage into the blade in a manner described more fully hereinafter.

In the arrangement shown in FIGS. 3 and 4, the entire frame is constructed of channel members, including the operating side member 13'. In this case, the operating rod 18 is accessible from the front or rear of the frame 15 and, preferably, the links or cranks 17 are made somewhat longer.

Referring to FIG. 5, the blade 20 includes a center section 21 and end sections 22. Center section 21 is flat and substantially uniplanar except for a circularly arcuate offset 23 to one side, whose center of curvature is in the plane of the opposite side. This arcuate offset 23 has ribs 24 extending inwardly therefrom at substantially right angles to each other and displaced angularly 90° from each other. The prolongation of the ribs will intersect at a center point or axis which is midway between the opposite surfaces of the planar portions of the center sections 21. The end sections 22 are offset angularly with respect to the general plane of the center section 21, these end sections being offset in opposite directions from the center section at the respective edges of the section 21. Preferably, the end sections 22 extend at an angle of 45° to the general plane of the center section 21. Blade 20 is extruded from an aluminum or aluminum alloy, and the outer edges of sections 22 are preferably rounded off.

Blades 20 are assembled with shafts 25 by relatively longitudinal sliding movement to form the assembly illustrated in FIG. 7. As stated, there may be either a single shaft 25 extending the full length of the blade or the blade may have two stub shafts 25 at either end thereof. Shaft 25 is an extruded or otherwise formed aluminum or aluminum alloy cylindrical rod having formed therein four slots 26 with an angular spacing of 90° from each other, the slots 26 having rounded inner ends 27 and preferably rounded outer corner edges. It will be noted that, when ribs 24 are engaged in slots 26, the blade 20 is locked to the shaft 25 and can be removed therefrom only by relative longitudinal sliding movement but not otherwise.

To complete the assembly shown in FIG. 7, weather stripping 30, as best shown in FIG. 6, is added at each end of the blade 20. This weather stripping 30 may be a suitable plastic composition material, such as one of the vinyl plastic compositions, and has a generally H-shaped cross-section including side walls 31, 31 interconnected by a cross-web 32 which is much nearer to one edge of each wall 31 than to the other edge thereof. A pair of strips 30 are slid onto each edge of each blade 20, so that they overlap the end sections 22 and the center section 21 except for the arcuate section 23. Each weather stripping member 30 is positioned on an end of a blade 20 in such a fashion that the shorter channel of each weather stripping section extends outwardly from the end of the blade, as best illustrated in FIG. 2.

Referring again to FIG. 3, and the closed position of the blades illustrated at the bottom of this figure, the end sections 22 overlap and interfit with each other, thus

forming an interlocking relation between the adjacent blades to prevent air or gas flow through the damper or louver assembly. In the open position of the blades, as illustrated in the upper part of FIG. 3, the end sections 22 act as diverters so that there is no direct draft through the damper assembly, the end sections 22 acting to deflect the air or gas therethrough in an upward or downward direction relative to the damper or louver assembly 10.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A louver or damper blade unit comprising, in combination, a relatively elongated blade member including a central section which is substantially flat and lies substantially in a first plane, and a pair of longitudinal edge sections each substantially flat and extending at an angle to such first plane, said edge sections extending in opposite directions from said first plane; said central section having a circularly arcuate offset extending along its longitudinal centerline and centered at an axis midway between the opposite surfaces of said central section and cylindrical operating shaft means for said blade member extending along substantially the longitudinal center line of said central section; said central section and said shaft means having cooperating interlocking formations interlocked by relative longitudinal movement of said blade member and said shaft means; said cooperating interlocking formations comprising at least a pair of angularly related ribs extending radially from the inner surface of said circularly arcuate offset, and at least a pair of angularly related slots in said cylindrical shaft means each receiving one of said ribs upon relative longitudinal movement of said blade member and said shaft means; said edge sections, when said unit is mounted in a frame between adjacent blade units also mounted in said frame, overlapping and interlocking with the corresponding edge sections of the adjacent blade units to provide a tight seal against air or gas flow through the assembly of the frame and the blade units.

2. A louver or damper blade unit, as claimed in claim 1, in which said pair of ribs are spaced 90° from each other and said pair of slots are spaced 90° from each other.

3. A louver or damper blade unit, as claimed in claim 2, including weather strips extending along each edge of said blade member; each weather strip comprising an extrusion of plastic composition material having an H-shape cross-section providing a pair of channels; one channel of each strip receiving an end edge portion of said blade member; there being two strips on each end edge of said blade member, conjointly embracing the entire length of said end edge except for said arcuate offset.

4. A louver or damper blade unit, as claimed in claim 3, in which the cross-web of said H-shape section is substantially closer to one edge of the weather strip than to the other edge thereof.

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