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S. WALLIN ET AL
DAMPER DEVICE

2,836,191

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2 Sheets-Sheet 1

FIG. 1.

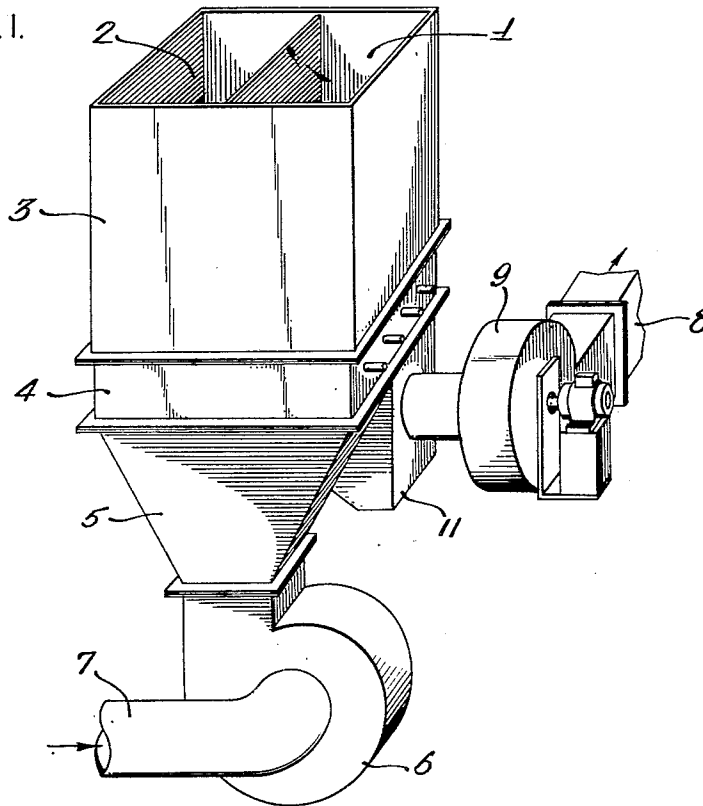
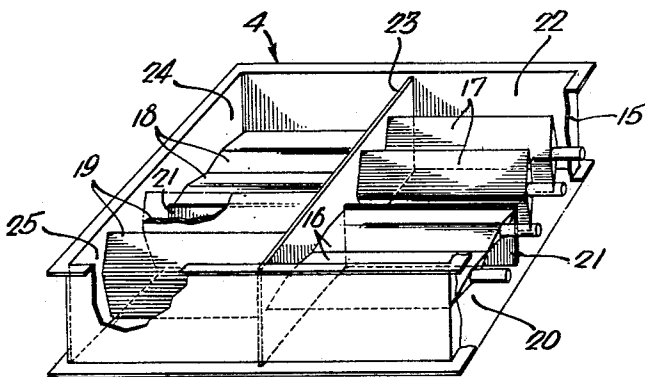


FIG. 2.



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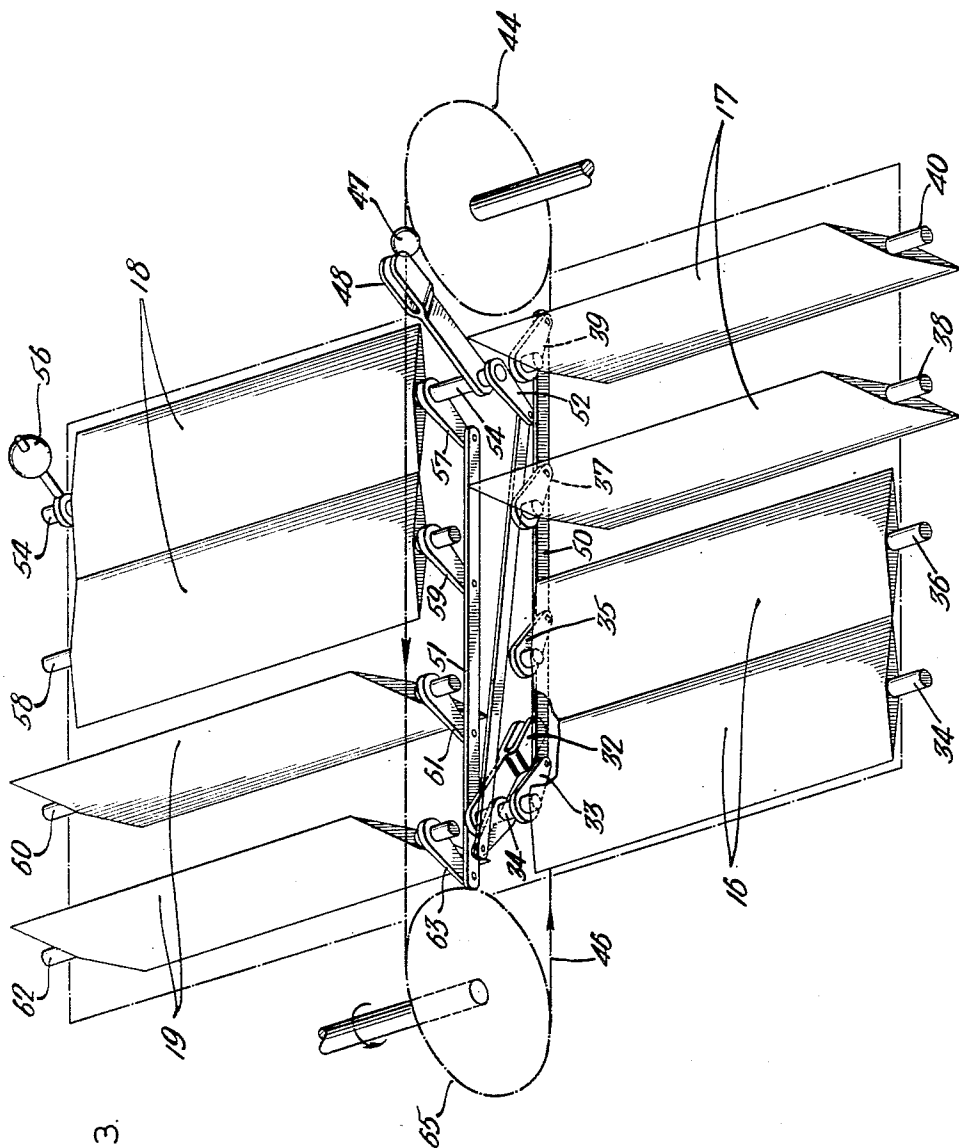


FIG. 3.

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DAMPER DEVICE

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3 Claims. (Cl. 137-311)

The present invention relates to an improved damper device for changing the flow of medium through two pairs of channels or ducts. The invention has particular application to ventilating plants employing a regenerative heat exchanger for changing the flow of medium through adjacent channels in the heat exchangers.

A primary object of the present invention is to provide a simple device for changing the flow of medium through channels or ducts.

More specifically, the present invention contemplates an arrangement wherein a generally rectangular passage-way is divided by a medial partition in one section to form one pair of ducts or channels and by a medial partition perpendicular to the first medial partition in another section to provide the second pair of ducts or channels. Thus, at the juncture of the two sections, the rectangular duct is divided into four symmetrical parts or quadrants. Damper means is provided in each quadrant to afford flow through the quadrant or block flow through the quadrant, and the damper means are interconnected so that diagonally opposite quadrants are opened and closed together, and one quadrant of each pair of adjacent quadrants is opened when the other quadrant is closed. The dampers may be mounted in a frame which includes duct sections having medial partitions which register with partitioned ducts of the ventilating plant or other installations, or the damper means may be mounted directly in the ducts of the plant which thereby serve as the frame of the damper device.

This invention also contemplates means for automatically operating the dampers in alternation at predetermined intervals. In one embodiment of the invention, an endless chain is employed to automatically effect operation of the dampers.

All of the objects and the construction and operation of the present invention are more fully set forth hereinafter with reference to the accompanying drawings wherein:

Fig. 1 is a perspective view of a plant embodying a damper device made in accordance with the present invention;

Fig. 2 is a perspective view partially broken away of the damper device shown in Fig. 1; and

Fig. 3 shows an automatic operating means for the dampers for operating them in alternation and in timed relation by an endless chain.

Referring now to Fig. 1, a ventilating plant is shown which has a regenerative heat exchanger 3 having a pair of adjacent channels 1 and 2 respectively. A fan 6 is provided to direct air from a ventilating duct 7 upwardly through the heat exchanger 3 by means of a hood 5. A fan 9 is provided to suck air downwardly through the heat exchanger 3 through a hood 11 and out through an outlet duct 8. A damper device 4, in accordance with the present invention, is mounted intermediate the heat exchanger 3 and the hoods 5 and 11 to effect communication between the channel 2 and the hood 5 when

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the hood 11 is connected to the channel 1, and vice versa, to connect the channel 2 with the hood 11 when the channel 1 is connected to the hood 5.

With reference to Fig. 2, the damper device 4 comprises a frame 15. The frame 15 is divided into four quadrants by partitions 21 and 23. The partition 23 is adapted to register with the partition between the channels 1 and 2 of the heat exchanger 3, and the partition 21 which is perpendicular to the partition 23 is adapted to register with the partition between the hoods 5 and 11. The quadrants formed by the partitions 23 and 21 are indicated at 20, 22, 24, and 25.

In accordance with the invention, damper elements 16, 17, 18 and 19 are mounted in the quadrants 20, 22, 24 and 25 respectively. Adjacent dampers are turned 90 degrees with respect to each other so that the diagonally opposite dampers operate in unison. Thus, when the dampers 16 and 18 are closed, as shown in Fig. 2, the dampers 17 and 19 are opened, and vice versa, when the dampers 16 and 18 are opened, the dampers 17 and 19 are closed. In the former case, the hood 5 communicates with the channel 2 and the hood 11 communicates with the channel 1; and in the latter case, the hood 5 communicates with the channel 1 and the hood 11 communicates with the channel 2.

Means is provided to operate said dampers in timed relation. For example, as shown in Fig. 3, a continuously moving endless chain 46 running around the sprocket wheels 44 and 65 is provided with catching means 47 to operate levers 48 and 32 to effect the timed operation of the dampers 16, 17, 18 and 19. The dampers 16 are operated by axles 34 and 36 and cranks 33 and 35. The dampers 17 are operated by axles 38 and 40 and cranks 37 and 39. The dampers 18 are operated by axles 54 and 58 and cranks 57 and 59 and the dampers 19 are operated by axles 60 and 62 and cranks 61 and 63. The cranks 33, 35, 37, and 39 are interconnected by a connecting rod 50 and the cranks 57, 59, 61, and 63 are connected by a connecting rod 51. The rods 50 and 51 are interconnected to operate in unison by means of a crank 52 on the shaft 54. The operating lever 48 is keyed to the shaft 54 and the operating lever 32 is keyed to the shaft 34 whereby the catching means operates all of the dampers simultaneously. In order to maintain the dampers in proper position, one of the axles, for example the axle 54 is provided with a counterweighted lever 56 which operates to dispose the dampers positively in the opened and closed positions. With reference to Fig. 3, it is apparent that as the chain 46 rotates continuously on the sprockets 44 and 65, the catching means 47 engages the levers 48 and 32 to operate the dampers. For example, as the catching means 47 moves to the left from the illustrated position, it rocks the lever 48 counter-clockwise to rotate the dampers to their opposite position from that shown in the drawing. Further travel of the catching means causes it to engage the lever 32 which is then in the opposite position and effects counter-clockwise rotation of the lever 32 to the illustrated position to return the dampers to the illustrated position. The speed of rotation of the chain determines the timing of the operation of the dampers.

Automatic operation of the dampers may also be performed by a timer-operated motor and levers interconnecting the dampers, if desired. Likewise a separate frame such as shown at 4 may be omitted if the hoods 5 and 11 connect directly with the heat exchanger 3, and the dampers are journaled in the structure at the junction.

While particular embodiments of the present invention have been herein illustrated and described, it is not intended to limit the invention to such disclosure, but

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changes and modifications may be made therein and thereto within the scope of the following claims.

We claim:

1. In a damper assembly, means defining a rectangular duct, a first medial partition in one part of said duct defining a first pair of channels in said duct, a second medial partition in an adjacent second part of said duct disposed perpendicular to said partition of said first duct to define a second pair of channels in said duct, each of said second channels communicating with both of the first channels of said duct, said partitions meeting at the junction of said first and second duct parts to form four passages each disposed in one corner of said duct and affording fluid communication between one of said first pair of channels with one of said second pair of channels, at least one damper in each passage reversible between an open position affording flow through said passage and a closed position interrupting flow through said passage, and operating means for said dampers operable at one limit to dispose the dampers in two opposite corner passages in their open position and the dampers in the other opposite corner passage in the closed posi-

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tion, and operable at the other limit to dispose said dampers respectively in their reverse position.

2. A device according to claim 1 having automatic alternate operation of the operating means between its two limits at predetermined intervals, characterized in that said operating means comprises a linkage interconnecting said dampers, lever means in said linkage, and a continuously running, endless chain carrying a catching means engageable with said lever means for actuating the same to effect said alternate operation of said operating means.

3. A device according to claim 2 including a counter balanced lever in said linkage for the fixing of the dampers alternately in the open and closed positions.

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