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AIR PROPELLING MEANS

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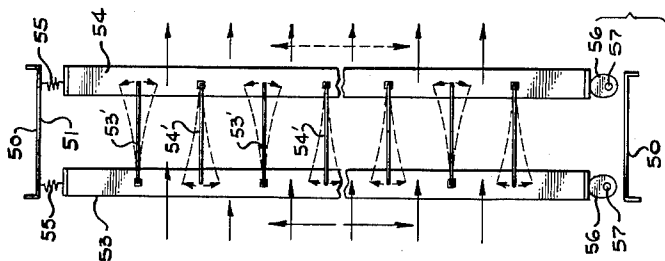


Fig. 3

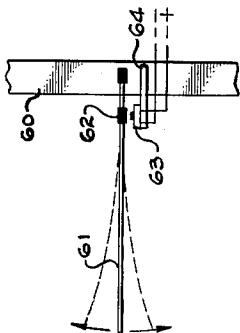


Fig. 4

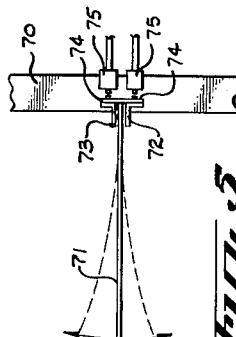


Fig. 5

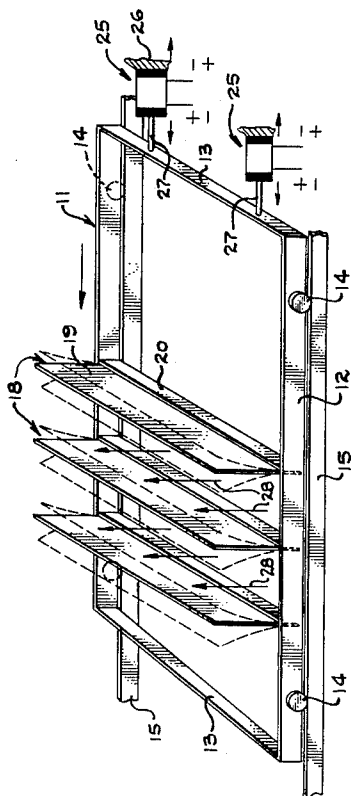


Fig. 1

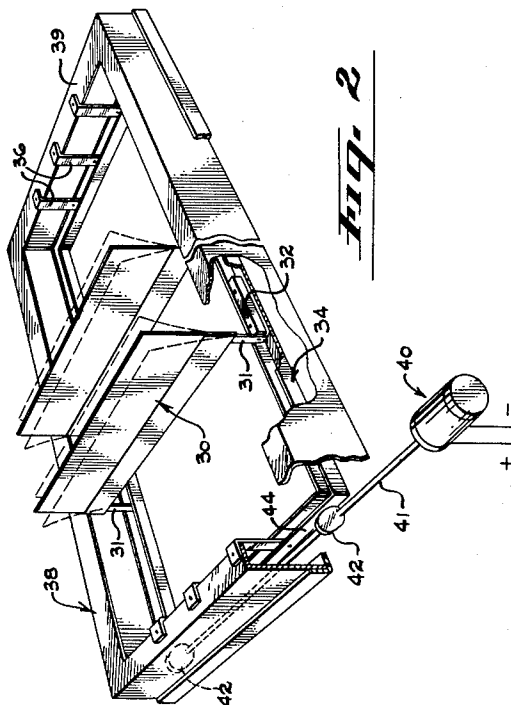


Fig. 2

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AIR PROPELLING MEANS

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This invention has to do generally with means for propelling air.

An object of the invention is to provide novel means for propelling air for the purpose of ventilating buildings, particularly a room of a building.

Another object is to provide a novel air-moving means which is adapted to take a rectangular form and is thus particularly suitable for mounting in buildings having conventional rectangular window openings.

A further object is to provide novel means for propelling air which includes a plurality of laterally spaced vanes capable of being oscillated in whole or in part laterally in an arcuate path, together with means for oscillating the vanes. In this connection it is an object to provide means which include a frame defining an opening with vanes mounted in the frame and extending across the opening in any desired direction, and means for oscillating the frame in order to impart oscillatory movement to the individual vanes. Another object in this connection is to provide novel means in the form of a stationarily mounted frame in which vanes are mounted therein and extend across the opening thereof together with means for oscillating the vanes individually.

Still another object is to provide means of the type indicated which is quiet in operation.

Another object is to provide a novel air-propelling structure for mounting in a window frame which may be used for moving air selectively in either direction through the opening defined by the frame.

These and other objects will be apparent from the drawing and the following description. Referring to the drawing:

FIG. 1 is a fragmentary perspective view showing air-propelling means embodying the invention;

FIG. 2 is a fragmentary perspective view of another embodiment of the invention;

FIG. 3 is a vertical sectional view through an upright structure embodying the invention;

FIG. 4 is a fragmentary sectional view showing means for oscillating a vane individually; and

FIG. 5 is a sectional view showing a modified form of vane mounting and oscillating means.

More particularly describing the invention, referring first to FIGS. 1-3, 11 generally indicates a rectangular frame which may be mounted within a window frame skylight, or other opening framing means of a building in a direction or plane normal to the axis of the opening.

The frame is shown comprised of side members 12 and end members 13 connecting the side members. Also, the frame is shown mounted upon rollers 14 adapted to run against track-like supports 15, however, any suitable conventional means may be employed to movably mount the frame.

Mounted across the frame and extending between the side members 12 are a plurality of vanes 18. These are preferably each formed of a thin, flexible body 19 of sheet metal, plastic, rubber laminate, or other material, provided with a stiff or substantially rigid mounting bar 20 secured thereto at one margin as by spot welds (not shown if the body is metal) or other means. The vanes may be secured at their ends to the side member 12 of frame 11 by any conventional means.

I provide means for oscillating the frame 11 longitudinally or in a direction normal to the longitudinal axes of the vanes 18, and while various mechanical, electric

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or fluid devices may be used for this purpose, by way of illustration, in FIG. 1 I have shown a pair of solenoids 25 mounted on supporting means 26 with their armatures 27 connected to the frame 11 at one end. These would be simultaneously alternately energized and deenergized with the polarity of the current being successively reversed at a desired frequency so as to cause the frame 11 to oscillate at a desired frequency and amplitude. Any conventional electrical means may be used for so energizing the solenoids. When the frame 11 is oscillated, the vanes will be bent or deflected alternately back and forth as indicated by the broken-line positions thereof shown in FIGS. 1 and 2. This movement of the vanes will induce a circulation of air through the opening bounded by the frame 11 in the direction of the arrows 28.

In place of providing flexible vanes such as those previously described I may provide somewhat more rigid vanes, designated 30 and mount these on spring straps 31. The latter are welded or otherwise secured to mounting blocks 32 in the channel of a frame 34 of channel-shape in cross section. The frame 34 is supported upon spring straps 36 which depend from a stationary frame 38 adapted to be mounted in the opening in a building. The straps 36 are attached by spot welding or other desired means to the upper flange 39 of frame 38 and to the frame 34.

With the construction described the entire frame 34 can be oscillated in turn produce an arcuate reciprocating motion of the vanes 30 such as indicated by the broken lines associated with the vanes thereby to induce the flow of air through frame 34. While any suitable means may be used for oscillating frame 34, one way of accomplishing this is to employ an electric motor 40 having a shaft 41 on which are fixed one or more cams or eccentrics 42 adapted to engage the end 44 of the frame 34.

In the case of either the construction shown in FIG. 1 or that shown in FIG. 2 the vanes may be made dependent from the frames or the entire structure inverted for the purpose of causing flow of air in the opposite direction.

In FIG. 3 I show a form of my invention for circulating air selectively in either direction through a stationary frame. Referring to this figure, an outer stationary frame 50 provides an opening 51 in which two inner frames, designated 53 and 54, are mounted. The frames are shown suspended on coil springs 55 and cams 56 on drive shafts 57 are provided for the purpose of oscillating the frames. It is contemplated that any suitable power means be provided for driving the shafts 57 selectively. Frame 53 has a plurality of vanes 53' which extend toward the other frame and frame 54 has a plurality of vanes 54' mounted therein and extending toward frame 53. It will be apparent that by selectively oscillating one of the frames 53 or 54 air may be moved in the desired direction through the opening 51 in the frame 50.

In FIG. 4 I show a means for oscillating an individual vane member. In this figure, numeral 60 designates a frame in which is shown mounted a vane 61 which is formed of flexible material. The vane is shown provided with a magnetic section 62 which is located adjacent a laterally disposed electromagnet 63 mounted on a bracket 64 carried on frame 60. Any conventional means may be provided for alternately energizing and deenergizing the magnet thereby to oscillate the vane.

In FIG. 5 I show still another means for oscillating a single vane and referring to this figure, numeral 70 designates a frame upon which a stiff vane 71 is pivotally mounted about an axis 72. The vane is provided with one or more rigid brackets 73 having end portions 74 of magnetic material disposed on opposite sides of the plane of the vane and respectively adjacent the poles of electromagnets 75. The latter are alternately successively energized and deenergized at a desired rate in order

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to alternately attract the end portions of the bracket and thereby oscillate the vane.

It will be understood that the volume of circulation of air depends upon the rate of oscillation of the vanes which will be a direct result of the flexibility of the material of the vanes and the rate of oscillation of the frame. In the case of the form of the invention shown in FIG. 2, the flexibility of the vane-mounting springs is a factor.

Although I have illustrated and described preferred forms of my invention, I contemplate that various changes and modifications can be made therein without departing from the invention, the scope of which is indicated by the following claims.

I claim:

1. In air-propelling means, a frame defining an opening through which air is to be moved, a plurality of vanes mounted in said frame in laterally spaced relation and extending across said opening, and means for oscillating said frame in a direction normal to the direction of extent of the vanes and normal to the axis of the opening, said vanes projecting widthwise axially of the opening in the frame and each being so constructed and arranged as to be capable of deflecting laterally at one marginal edge portion relative to the opposite edge portion.

2. A construction as set forth in claim 1, in which each of said vanes is laterally flexible and is rigidly mounted along said opposite edge portion.

3. A construction as set forth in claim 1 in which each of said vanes is substantially rigid and is secured to said frame along said opposite edge portion by a spring mounting means.

4. In air-propelling means, a frame defining an opening, a plurality of flexible vanes extending across said opening in laterally spaced relation, a rigid mounting bar secured to one marginal edge portion of each vane and mounted at its ends in said frame, and means for oscillating said frame in a direction normal to the axis of the opening through the frame and normal to the longitudinal axes of said vanes.

5. In air-propelling means, a frame defining an opening, a plurality of vanes extending across said opening in laterally spaced relation, said vanes each being of substantially rigid material, spring means secured to a lateral marginal portion of each vane and mounted on said frame

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whereby to permit pivoting of each vane about an axis adjacent said lateral marginal portion, and means for oscillating said frame in a direction normal to the pivotal axes of the vanes and normal to the axis of said opening.

6. In air-propelling means, an outer frame defining an opening, a pair of corresponding laterally adjacent inner frames mounted within said outer frame for limited movement independently of each other in a direction normal to the axis of said opening, each of said inner frames defining an opening, a plurality of vanes mounted in each inner frame and extending across the opening thereof and normal to the direction of movement of said frames, said vanes projecting widthwise axially of the opening and being so constructed and arranged as to be capable of deflecting laterally at one marginal edge portion relative to the opposite edge portion, the vanes in one inner frame facing oppositely to those in the other inner frame, and means for selectively oscillating either of said inner frames.

7. In air-propelling means, a stationary frame defining a first opening, a movable frame within said opening and defining a second opening, spring means mounting said movable frame in said stationary frame for limited movement in the general plane of the stationary frame, a plurality of vanes mounted in said movable frame in laterally spaced relation and extending across said second opening, and means for oscillating said movable frame in a direction normal to the longitudinal axes of the vanes and normal to the axis of said second opening, said vanes projecting widthwise axially of the second opening and each being so constructed and arranged as to be capable of deflecting laterally at one marginal edge portion relative to the opposite edge portion.

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