March 7, 1939. J. D. McKNIGHT 2,149,976

VENTILATION CONTROL

Filed May 8, 1935

FIG.1.

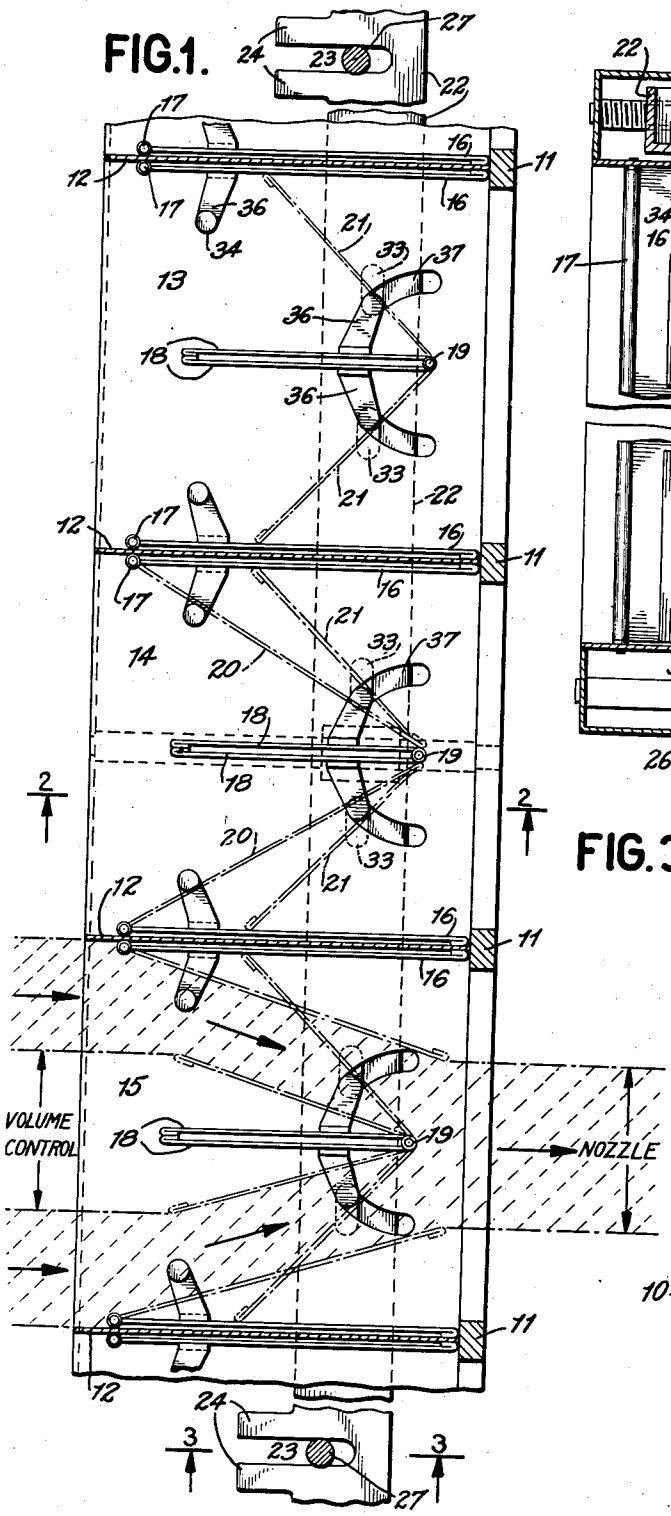


FIG.2.

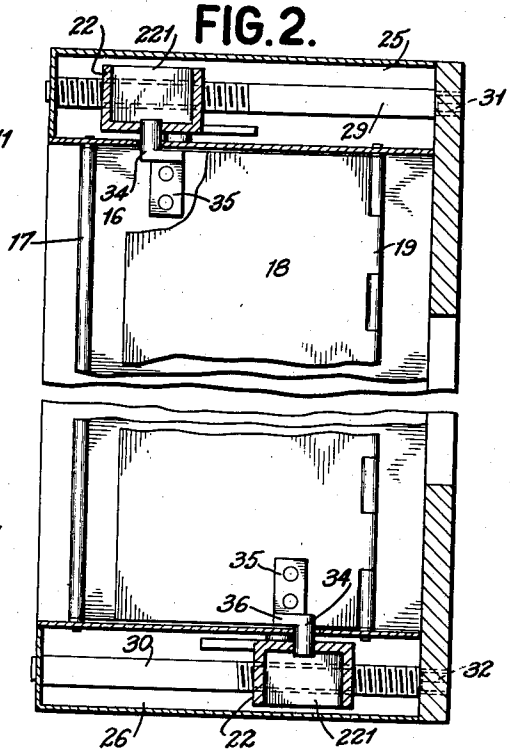


FIG.3.

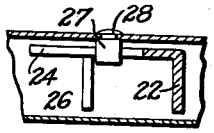
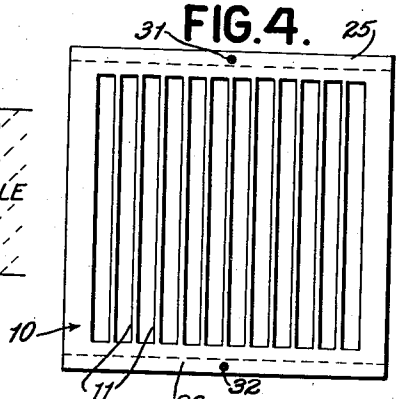


FIG.4.



INVENTOR.
JAMES D. McKNIGHT
BY H. C. Dieserud
ATTORNEYS.

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2,149,976

VENTILATION CONTROL

James D. McKnight, New York, N. Y.

Application May 8, 1935, Serial No. 20,306

7 Claims. (Cl. 98—101)

This invention relates to adjustable dampers which may be used in connection with heating, ventilating, and other types of air conditioning registers. It is particularly suitable for use in large ventilating systems where hot or cold air is to be blown into a large room or auditorium without producing drafts or other undesirable conditions in the vicinity of the room. The type of louvres which are commonly used in registers of this sort have very little effect upon the volume of air delivered until they approach a substantially closed condition. They ordinarily serve merely to deflect the air and to increase its velocity as the vanes are moved toward the closed position.

In supplying heated or otherwise conditioned air to a large auditorium it has been found desirable to produce relatively high velocity jets well over the heads of the persons present. These jets tend to induce circulation of the air already in the room by drawing the nearby portions into the stream. This has several desirable effects. It serves to temper the incoming air before it reaches the people for whom it is intended and it serves to prevent the accumulation of stale air at different points.

By my invention an independent, accurate, and simple control of both volume and velocity of the fluid supplied to the room may be obtained. My volume control obviates the necessity of long drawn out balancing of heating or cooling systems, by simple regulation at each register which is readily accessible from the room. At the same time I provide for the production of high velocity jets in a desired direction to induce circulation of the air in the room.

A general object of my invention is to provide a register having an adjustable damper system which is free from the objectionable features that are now commonly found in such devices.

According to my invention the register has two separate controls, one for volume and one for velocity, which can be operated entirely independently of each other or which can be operated in conjunction with each other to produce combined effects as desired. Thus, as previously stated, if a register is located in a large room, such as an auditorium, it will be found desirable to have a series of spaced jets of air introduced thereby near the ceiling. My invention provides for the regulation of the velocity of such jets simply by the application of a key or crank to the register face. On the other hand, if it should be desired to cut down the volume of air entering the room while keeping the velocity constant, this may also be easily accomplished. Or both volume and velocity may be varied in any desired way. In short any desired combination of volume and velocity control is readily available.

A further object of my invention is to provide a simple and efficient means for regulating the vanes or louvres of a register and keeping them in any adjusted position.

Numerous other advantages and features of my invention will be apparent from the more detailed description which follows in conjunction with the accompanying drawing in which:

Figure 1 is a horizontal sectional view through a register embodying my invention.

Figure 2 is a vertical sectional view on the line 2, 2, of Figure 1 and looking in the direction of the arrows.

Figure 3 is a sectional view through the locking bar and adjacent portions of the frame, taken on line 3, 3 of Figure 1, and

Figure 4 is a face view of the register.

In a register containing the preferred embodiment of my invention the face 10 is preferably provided with gratings 11 which extend only in one direction, that is, horizontally or vertically although, if desired, a checker work grating might be provided. Relatively thin fixed partitions 12 extend back from the register face and serve to divide the register into a number of passages 13, 14 and 15. These passages may be connected to a source (not shown) of hot or cold air or air conditioned in other respects. The number of passages will vary depending upon the size of the register and the spacing of the partitions. Ordinarily it will be found desirable to place the partitions about two inches apart although a greater or less spacing might be adopted.

Immediately adjacent the partitions 12 the louvres 16 are hinged about vertical axes 17 at points removed some distance from the register face.

In approximately the center of the passages 13, 14 and 15 additional louvres 18 are provided, these being hinged at points 19 relatively close to the register face. The louvres may, of course, be disposed either horizontally or vertically and may be hingedly supported in any suitable way. I prefer to employ simply a pin passing through a tubular portion formed at one edge of each vane because of its ease of operation and construction.

In some cases one set of louvres may be fixed while the other set is movable.

Preferably the louvres 16 and 18 are substantially the same length as the fixed partitions and they are pivoted at such points that either set

of louvres may be used to completely close the register, as indicated by their dotted line positions 20 and 21 (Fig. 1). The hinges may be arranged in various other positions as long as they do not interfere with the principle of operation to be described later. Louvres 16, in the construction shown, are of substantially the same depth, from front to rear of the register, as the fixed partitions but the central louvres 18 are preferably of slightly less depth although the relative size of the louvres may, of course, be varied.

Each set of vanes or louvres is preferably operated by a bar mechanism consisting of a lock bar 22 having transverse slots 23 therein which may be extended by suitable fingers 24. As illustrated, these bars are adapted to move bodily in a horizontal plane toward and away from the register face, being carried in upper and lower auxiliary compartments 25 and 26 above and below the main, partitioned compartment. Each bar is maintained substantially parallel to the register face by guide pins 27 acting in the slots 23. These pins may be fixed to the register frame in any suitable way, as by riveting, as shown at 28.

Each of the bars is preferably of channel form and is provided at points intermediate its ends with one or more transversely extending nuts or blocks 221 having threaded apertures. If the register is small each bar will retain only a single block about midway between the ends but larger registers may have two or more blocks for each bar suitably spaced to provide a balanced action. Screw threaded rods 29 and 30, one for each of the blocks 221, are rotatably supported at each end by the frame work of the register and have a square or other irregular shaped head at or near the register face, as indicated at 31 and 32. Thus, these rods may be turned by applying a key or other turning means to the rod heads at the register face to move the lock bars toward or away from the register face. It will be understood that each bar may be shifted independently of the other although, if desired, the bars might be connected for movement in synchronism.

At points intermediate the ends of each bar and corresponding to each vane of its set, there may be provided longitudinally elongated slots, such as shown in dotted lines at 33 (Fig. 1). These slots are adapted to receive pins 34 (Fig. 2), which are preferably rigidly attached to the louvres by riveting or other means as at 35, but may be adjustably connected thereto, if desired. The portions of the pins that engage the slots 33 preferably carried by a laterally projecting section 36 to obtain greater leverage and easier adjustment in opening and closing the louvres.

Arcuate slots 37 are cut on the lower and upper walls of chambers 25 and 26, respectively, to permit the arcuate movement of the pins 34 that extend through these walls to contact the slots in the lock bars.

Various modifications may be made without departing from the scope of my invention. Thus while I have shown only relatively few passages, a single one or any number of passages may be employed either immediately adjacent each other or at spaced intervals. For example, passages, each two inches wide, might be spaced two, four, or more inches apart by blanked-off portions of the register face. The vanes, furthermore, could be inter-changed, that is, the volume controlling louvres 18 could be pivoted adjacent the fixed partitions with the velocity controlling louvres in the center. Also, each passage might contain a single volume control vane and a single velocity control vane, each adapted to extend across the space between the fixed partitions. It is within the scope of my invention to eliminate the fixed partitions 12 entirely since louvres 16 may serve the same function in the open or even the partly closed positions. In this form of the invention the main purpose of the fixed partitions is to lend rigidity to the frame. The register might also contain only one screw threaded rod carrying both lock bars, or one lock bar might be used to regulate both sets of vanes simultaneously. If necessary, the vanes or portions of each set of vanes may be individually controlled. The lock bars are shown as channel members but may, of couse, be of any desired cross section.

By my improved construction an assembly is thus provided in which the air coming into a chamber may be regulated in either or both of two different ways. If it is desired to completely close the register it may be closed by either set of louvres. If a smaller volume of air is desired at the same velocity the louvres 18 are simply moved toward the closed position to make this regulation. If any particular velocity of jet is desired, this may be accomplished by simply moving the louvres 16 to provide the proper nozzle. If, on the other hand, some particular regulation is desired to provide a certain volume of air at a certain velocity the volume may be first regulated by adjusting louvres 18 and then the velocity of this volume controlled by simply adjusting louvres 16 or the adjustments may be made in the reverse order or simultaneously. The manner in which the volume regulating louvres 18 function without substantially changing the velocity is described in detail in my Patent No. 1,931,263 issued October 17, 1933.

It will be readily apparent that my improved damper regulator has all the advantages of the devices described by said patent and in addition thereto a great many other advantages and possibilities.

By my improved vane operating mechanism, a positive and exact control of the louvres is possible. It is easily accessible, easy to operate, and holds the louvres firmly in place, reducing rattling to a minimum.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but recognize that various modifications are possible within the scope of the invention claimed.

What I claim is:

1. In apparatus of the class described, a conduit, and damper regulating means in said conduit comprising a plurality of pivoted vanes, extending from their pivots in the general direction of flow of the medium in said conduit and arranged to control the velocity thereof, and a plurality of pivoted vanes extending from their pivots in a general direction opposite to the flow of said medium in said conduit arranged to control the volume thereof, said last mentioned vanes being disposed between said first mentioned vanes.

2. In apparatus of the class described, a conduit, and damper regulating means in said conduit comprising a plurality of pivoted vanes, extending from their pivots in the general direction of flow of the medium in said conduit and arranged to control the velocity thereof, and a plurality of independently adjustable pivoted vanes

extending from their pivots in a general direction opposite to the flow of said medium in the said conduit arranged to control the volume thereof, said last mentioned vanes being disposed between said first mentioned vanes.

3. In apparatus of the class described, a register having a face and a frame extending rearwardly therefrom, vanes mounted therein which are pivoted about one of their edges with their pivots remote from the register face and other vanes mounted therein which are pivoted about one of their edges, with their pivots proximate said register face, said other vanes being positioned between said first mentioned vanes and arranged to cooperate therewith.

4. In combination with a conduit adapted to carry a gaseous medium, fixed partitions dividing a portion of said conduit into a plurality of passages, vanes in said passages pivoted to extend in the direction of flow of the gaseous medium, and other vanes in said passages pivoted to extend in a direction opposite to the flow of the gaseous medium.

5. In combination with a conduit adapted to carry a gaseous medium, fixed partitions dividing a portion of said conduit into a plurality of passages, vanes in said passages pivoted to extend in the direction of flow of the gaseous medium, and vanes pivoted to extend in a direction opposite to the flow of the gaseous medium, said first mentioned vanes being positioned adjacent the said fixed partitions.

6. In apparatus of the class described, a register having a face and a frame extending rearwardly therefrom for attachment to a conduit, vanes pivotally mounted in said frame with their pivots remote from the register face for increasing the velocity of air passed therethrough and other vanes pivotally mounted in said frame with their pivots proximate said register face for decreasing the volume of air passed therethrough, each set of vanes being independently adjustable from the register face, and said first mentioned vanes being in side by side relationship to said second mentioned vanes.

7. A register comprising a frame, a pair of louvers mounted in said frame and movable towards each other to form a nozzle for air passing therebetween, and a second pair of louvers disposed between said first mentioned louvers for regulating the volume of said air independently of the adjustment of said nozzle forming louvers.

JAMES D. McKNIGHT.