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F. J. KURTH
VENTILATING APPARATUS

2,252,264

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Fig. 1.

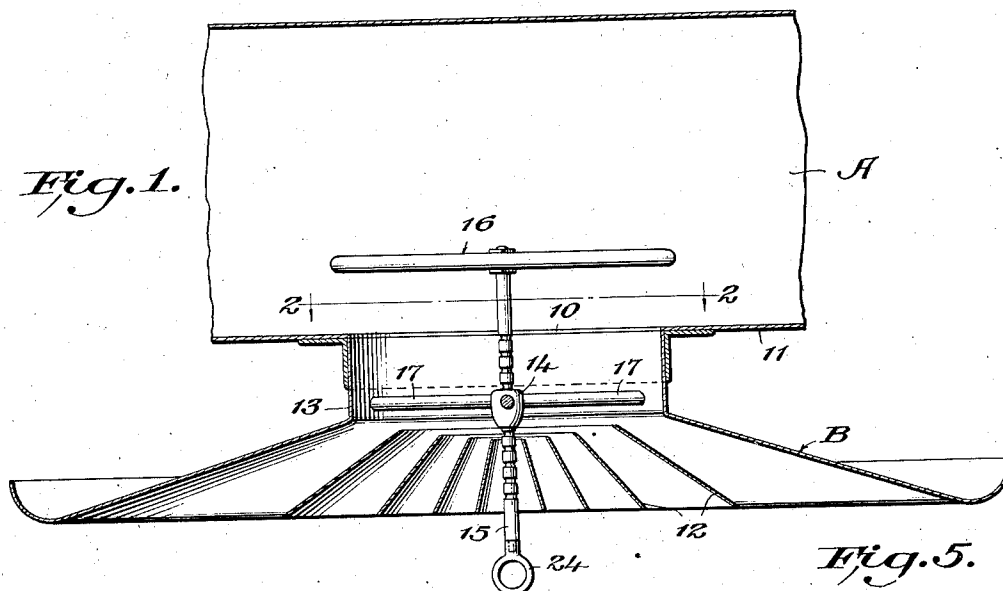


Fig. 4.

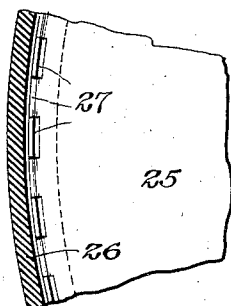


Fig. 2.

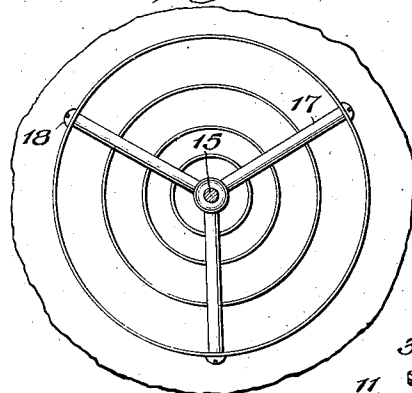


Fig. 5.

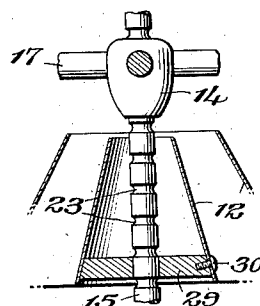


Fig. 6.

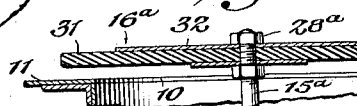
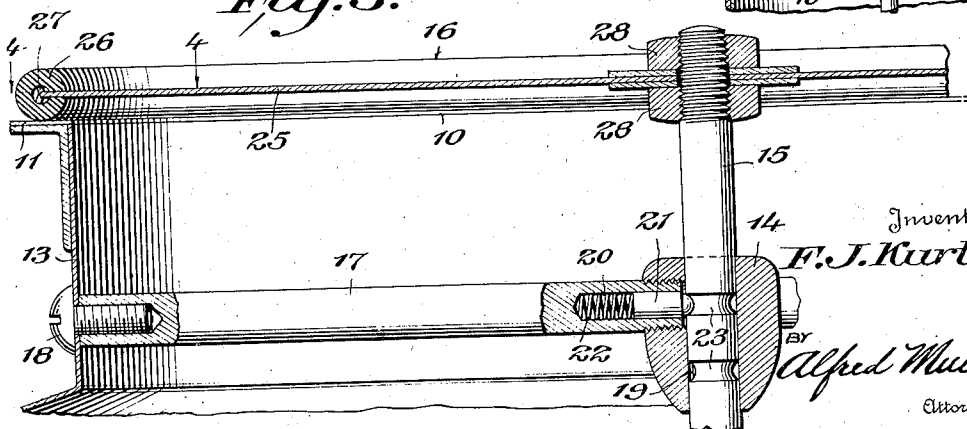


Fig. 3.



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UNITED STATES PATENT OFFICE

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VENTILATING APPARATUS

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5 Claims. (Cl. 98—40)

This invention relates to ventilating apparatus, and has particular reference to improvements in valve devices for regulating flow of air from air supply ducts to air outlet or distributing devices.

Generally speaking, the object of the invention is to provide a valve device for the purpose stated which is of simple, inexpensive construction, which is easy to install and to operate, which is thoroughly reliable and efficient in operation, which offers little interference to flow of air from a supply duct to an air outlet or distributing device, which is noiselessly adjustable, and which does not produce noise due to air flow over the parts thereof.

With the foregoing and other objects in view, which will become more fully apparent as the invention is better understood, the same consists in the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawing and defined in the appended claims.

In the accompanying drawing, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is a vertical section through an air supply duct and a related air distributing device, illustrating the operative association therewith of a valve device constructed in accordance with one practical embodiment of the invention.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is an enlarged, central, longitudinal section through the valve device.

Figure 4 is a detail sectional view on the line 4—4 of Fig. 3.

Figure 5 is an enlarged, fragmentary section similar to Fig. 1, illustrating an alternative embodiment of the invention; and

Figure 6 is a fragmentary sectional view illustrating an alternative form of valve disk.

Referring to the drawing in detail, A designates, generally, an air supply duct having an air outlet opening 10 in a wall 11 thereof, and B designates, generally, an air distributing or diffusing device connected with said supply duct A, to distribute or diffuse air delivered therefrom through the opening 10.

The air distributing or diffusing device B illustrated in the present instance is of a known type comprising a plurality of successively larger, open-ended, hollow, flaring members 12 disposed in spaced apart relationship, whereby air supplied to the device through a neck 13 constitut-

ing a rearward extension of the rear or smaller, open end of the larger or outermost flaring member 12, is divided into a plurality of separate streams which flow forwardly through the flaring passageways between said members 12 at reduced velocity, thereby being delivered from the device substantially draftlessly. Such a device is of proved efficiency in effecting substantially draftless distribution of air and, therefore, has been chosen for purposes of illustration in the present instance. Since however, the valve means comprising the present invention is not restricted to use in association with any particular air outlet or distributing device, but may be used equally as well in association with a variety of specifically different air outlet or distributing devices, it will be understood that the illustrated device B merely is representative of a number of specifically different air outlet or distributing devices which may be used in lieu thereof. According to the invention the flaring members 12 are fixed with respect to each other in any suitable manner as, for example, by means of struts as illustrated for example in my prior Patent No. 2,142,134 of January 3, 1939. The neck 13 is fixed with respect to the outermost flaring member and with respect to the duct A. Therefore, the flaring members 12 are fixed with respect to said duct when the device is operatively connected therewith.

In accordance with the invention, a bearing member 14 is suitably mounted within the device B, preferably centrally thereof, and in this bearing member is adjustably mounted a stem 15 which carries a valve 16 for regulating flow of air from the duct A through the outlet opening 10 and hence to the device B.

According to the specific example of the invention illustrated in the drawing, the bearing member 14 is mounted within the neck 13 of the device B by means of a plurality of radial arms 17 which, at their inner ends, are threaded into radial openings in said bearing member and, at their outer ends, are fastened to said neck by screws 18 which pass through openings in said neck and are threaded into openings in the outer ends of said arms. Alternatively, the bearing member 14 may be mounted within the device B in any other suitable manner. In any event, said bearing member is provided with a longitudinal bore 19 through which extends the valve stem 15, and in a bore 20 in the inner end of at least one of the arms 17 is slidably mounted a friction clutch element 21 which is constantly urged inwardly by a spring 22 for cooperation

with any one of a series of spaced recesses 23 in the stem 15 to hold the latter, and consequently the valve 16, in any one of a plurality of different positions.

The valve 16 may be either rotatable or longitudinally movable to accomplish its intended purpose of regulating flow of air from the duct A to the device B. In the former case, the recesses 23 are, of course, spaced circumferentially about the stem 15, while in the latter case, said recesses are, of course, spaced longitudinally along said stem. In the example illustrated in the present instance, the valve 16 is longitudinally adjustable and, therefore, the recesses 23 are spaced longitudinally along the stem 15. Moreover, said recesses preferably are in the form of annular grooves as shown so that the clutch element 21 may cooperate with the same regardless of the rotated position of the stem 15 relative to the bearing member 14.

The spring 22, which is disposed within the bore 20 between the clutch element 21 and the wall defining the inner end of said bore 20, exerts sufficient pressure against said clutch element to hold the same engaged in any given recess 23 against any force which normally may be exerted upon the stem 15. Consequently, the valve 16 is held in any adjusted position in which it may be placed as determined by engagement of the clutch element 21 with any one of the recesses 23. However, the stem 15 may readily be manually rotated or shifted longitudinally to effect disengagement of the clutch element 21 from any given recess and engagement thereof with any other recess to effect a desired adjustment of the valve 16. Accordingly, the valve 16 is readily adjustable to different operative positions and is effectively held against accidental displacement from any adjusted position in which it may be placed.

The stem 15 extends through the smaller flaring member 12 forwardly of the device B and at its forward end is equipped with a ring 24 or with a knob or handle of any other suitable type to facilitate its manipulation.

The valve 16 may have a variety of forms. As illustrated in Fig. 3 of the drawing, said valve 16 is in the form of a metal disk 25 of greater diameter than the opening 10, disposed within the duct A and marginally equipped with a rim 26 of soft rubber or other suitable soft material for engagement with the duct wall 11 outwardly of the opening 10 to close said opening when the valve is in its forwardmost position. Obviously, by adjusting the valve to positions spaced different distances from the wall 11 the amount of air which may flow from the duct A through the opening 10 may be regulated.

While the disk 25 may be provided with the rim 26 or its equivalent in any suitable manner, a preferred manner of attaching the rim to said disk is illustrated in Figs. 3 and 4 of the drawing. The rim is of split, tubular form and the marginal portion of the disk is formed with tongues 27 which are bent to extend alternately from opposite sides of said disk. In applying the rim the same is spread apart where it is split and then is slipped over the marginal portion of the disk and allowed to resume its normal form, which results in the tongues 27 engaging the interior wall of the rim and thereby retaining the same in assembly with the disk.

The disk 25 may be fastened to the stem 15 in any suitable manner. As illustrated in the present instance the rear or inner end of the

stem 15 is threaded and the central portion of the disk, which is apertured to accommodate the stem, is clamped between a pair of nuts 28 threaded on said stem. This construction has the advantage that it permits adjustment of the valve 16 longitudinally relative to the stem 15 to insure its proper seating when closed.

If desired, a second bearing or guide member for the stem 15 may be provided to relieve the bearing member 14 of undue stress due to lateral pressure which may be exerted against the stem 15 during manipulation of the same to adjust the valve 16. This second bearing or guide member may have any suitable form and may be mounted in any desired manner. As illustrated in Fig. 5 of the drawing said second bearing member, designated as 29, is in the form of a disk of frusto-conical shape, fitted within the smaller flaring member 12, fastened therein by screws 30 and having a central opening through which the stem 15 slidably extends.

Figure 6 illustrates an alternative form of valve designated generally as 16^a. This valve is in the form of a disk 31 of rubber or equivalent soft, pliable material medially stiffened and reinforced by metal disks 32 clamped against the opposite faces thereof by nuts 28^a by means of which it is fastened to the stem 15^a in the same general manner as set forth in connection with the first described form of valve. The metal disks 32 terminate inwardly of the marginal portion of the disk 31 whereby the said marginal portion of said disk 31 is free to flex slightly when engaged with the wall 11 of the duct A to securely close the opening 10. Obviously, the metal disks 32 may be eliminated if desired or said metal disks may be of very small diameter. In either case the metal disks 32 are of sufficiently smaller diameter than the opening 10 so that the disk 31 may be flexed for insertion and removal through said opening to and from its operative position in the duct A.

While the bearing member 14 may be of any desired shape, it preferably is rounded at its rear end and of tapered rounded form toward its forward end so as to offer little resistance to air flow over the same. As shown, said member 14 is disposed rearwardly of the rear end of the smaller flaring member 12 and acts to prevent supplied air from entering said innermost flaring member 12 and to deflect supplied air into the passageway between said smaller flaring member and the next larger flaring member. In this way there is caused a suction effect and a consequent inward flow of air through the smaller flaring member 12 and a mixing within the device B of a portion of the supplied air with air drawn from the room or other enclosure into which air from the device B is delivered if the second stem bearing or guide member 29 is not used or if said member 29 is provided with openings for flow of air therethrough.

Because the portion of the valve 16 or 16^a which contacts with the wall 11 is soft and pliable, and because of the neat, sliding fit of the stem 15 or 15^a in its bearing or bearings, the valve obviously is noiselessly operable. Moreover, because of the construction of the valve 16 or 16^a as shown and described, air flowing over the same does not result in producing undesirable humming noise.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that

changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

I claim:

1. Ventilating apparatus comprising an air supply duct having an outlet opening, an air outlet device connected with said duct in air receiving relationship to said opening, said device comprising a plurality of successively larger, open-ended, hollow, flaring members disposed in spaced apart relationship to provide a plurality of flaring air passageways therebetween, the larger ends of said members being disposed at the front of the device and said members being fixed with respect to each other and with respect to said duct, a bearing member mounted in said air outlet device, a valve stem adjustably mounted in said bearing member, and a valve carried by said stem and disposed within said duct to regulate flow of air from said duct through said opening to said air outlet device, said valve stem extending through said device and being exposed at the front thereof for manipulation to adjust said valve without disturbing the fixed relationship between said flaring members.

2. Ventilating apparatus comprising an air supply duct having an air outlet opening, an air outlet device connected with said duct in air receiving relationship to said opening, a bearing member within said air outlet device, mounting means for said bearing member comprising arms extending therefrom and connected to said air outlet device, a valve stem adjustably mounted in said bearing member, a valve carried by said stem and disposed within said duct for controlling flow of air from said duct through said opening, said valve stem having spaced recesses, one of said arms having a bore opening through its inner end into said bearing member, and a yieldable friction clutch element in said bore for cooperation with a selected recess of said stem to hold the stem and valve in a desired position of adjustment.

3. Ventilating apparatus comprising an air supply duct having an air outlet opening, an air outlet device connected with said duct in air receiving relationship to said opening, a valve stem extending through said air outlet device into said duct, means mounting said valve stem for adjustment, and a valve carried by said stem and disposed within said duct for controlling

flow of air from said duct through said opening to said air outlet device, said valve comprising a metal disk, a longitudinally slit tube of soft, pliable material engaged over the peripheral portion of said disk to seat against said duct in surrounding relationship to the air outlet opening therein, and tongues extending laterally from said disk and disposed within said tube to retain the latter in assembly with said disk.

4. Ventilating apparatus comprising an air supply duct having an air outlet opening, an air outlet device connected with said duct in air receiving relationship to said opening, a valve stem extending through said air outlet device into said duct, means mounting said valve stem for adjustment, and a valve carried by said stem and disposed within said duct for controlling flow of air from said duct through said opening to said air outlet device, said valve comprising a disk of soft, pliable material, and reinforcing and stiffening metal disks clamped against opposite sides thereof, said metal disks being of lesser diameter than said soft, pliable disk to leave the marginal portion of the latter free for seating cooperation with said duct in surrounding relationship to the air outlet opening therein, said metal disks also being of lesser diameter than said air outlet opening to permit insertion and removal of said valve through said opening to and from its operative position in said duct.

5. Ventilating apparatus comprising an air supply duct having an air outlet opening, an air outlet device connected with said duct in air receiving relationship to said opening, said air outlet device comprising a plurality of successively larger, open-ended, hollow, flaring members disposed in spaced relationship to provide a plurality of flaring air passageways therebetween, a bearing member mounted in said air outlet device in axial alinement with the smaller of said flaring members and rearwardly of the rear end thereof, a second bearing mounted within the smaller of said flaring members, a valve stem slidably mounted in said bearing members, friction clutch means for holding said stem in different positions of adjustment, and a valve carried by said valve stem and disposed within said duct for controlling flow of air from said duct through said opening to said air outlet device.

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