June 11, 1968 Q. R. THOMSON 3,387,550

AIR DISTRIBUTOR VALVE

Filed May 26, 1966

FIG. 1

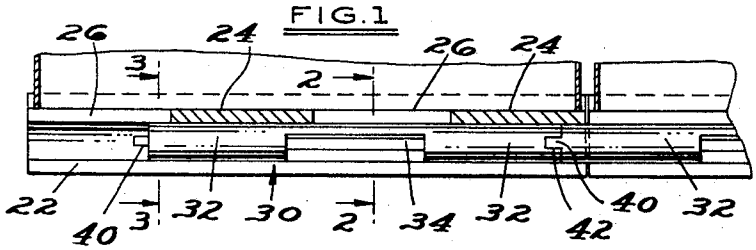


FIG. 2

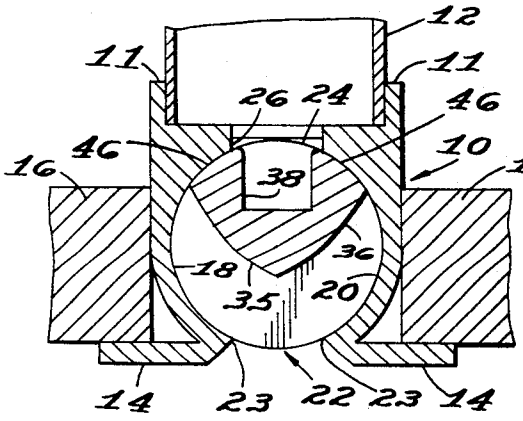


FIG. 3

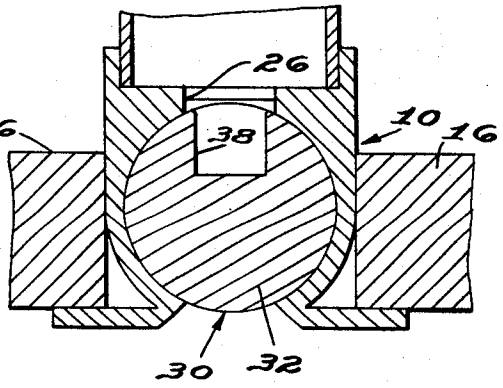
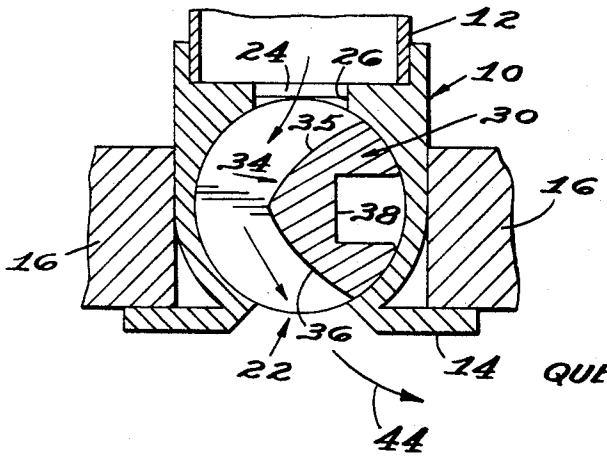


FIG. 4



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AIR DISTRIBUTOR VALVE

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This invention relates to an improved construction for an air distributor valve, such as is employed in air conditioning and heating systems for discharging air into a room, with improved regulation over both the direction and volume of air discharged.

U.S. Patent 3,099,949 discloses an air distributor valve which affords control over the direction of flow of air discharged therefrom. The present invention provides a similar construction for regulating the direction of flow of air discharged, and additionally provides a self-contained valve construction in which the volume of air discharged may be precisely regulated while maintaining a desired flow pattern. Most installations for supplying conditioned air to the rooms of a building require adjustment after installation in order to achieve properly balanced conditions from room to room or within a single room, and the object of the present invention is to provide an air distributor valve construction which permits both the direction and volume of air discharged to be precisely adjusted, without the necessity of employing auxiliary air flow controlling devices, such as baffles, in the air distributing system; with the control of direction and volume being independent of one another in the sense that volume may be regulated while maintaining a desired directional setting and vice versa.

An air distributor valve constructed in accordance with the invention has an elongated housing with longitudinally extending transversely spaced side walls forming a chamber; longitudinally extending air inlet and outlet passages provided in the housing, at least one of these passages being formed by a series of alternate baffle sections which extend between the side walls and slotted sections which open to the housing chamber; a valve member having alternate flow directing and flow obstructing sections mounted in the housing chamber for rotating and longitudinal movement relative thereto whereby the valve member may be moved longitudinally of the chamber to selectively position the sections of the valve member relative to the air passage sections of the chamber; the flow directing sections of the valve member permitting air flow between the inlet and outlet passages of the housing for discharge through the outlet passage in a direction controllable by rotating the valve member in the chamber, and the flow obstructing sections of the valve member restricting air flow between the inlet and outlet passages of the housing independently of the rotational position of the valve member in the chamber to the extent that the flow obstructing sections are aligned with the slotted sections of the one air passage by longitudinal movement of the valve member in the chamber.

Preferably, the baffle and slotted sections of the air passage and the flow directing and flow obstructing sections of the valve member are all of equal length, and the length of the valve member is less than that of the chamber in an amount substantially equal to the length of one of these sections. Hence the valve member may be moved longitudinally of the chamber between a position in which the slotted sections of the air passage and flow directing sections of the valve member are completely aligned with each other for maximum flow in a desired direction, and a position in which the flow obstructing sections of the valve member are completely aligned with the slotted sections of the air passage to fully restrict air flow through the valve. In any position of the valve member intermediate these two extremes the direction of air flow may be controlled for a given volume setting or vice versa.

Other features and advantages of the invention will appear from the following description of the representative construction disclosed in the accompanying drawings in which:

FIGURE 1 is a sectional side elevation of the air distributor valve installed at the end of an air duct including a portion of a second longitudinally aligned valve;

FIGURES 2 and 3 are respectively enlarged transverse sectional views taken as indicated by the lines 2—2 and 3—3 of FIG. 1; and

FIGURE 4 is a transverse sectional elevation similar to FIG. 2 showing the valve member rotated to a different position for air directional control.

The valve member is preferably formed with an extruded housing **10** having an inner portion equipped with side flanges **11** for registry with the end of an air supply duct **12** and an outer portion with laterally projecting flanges **14** for engaging the edges of an aperture in a wall or ceiling **16** in which the valve housing is mounted. The housing includes transversely spaced side walls **18** and **20** which in the construction illustrated are arcuate in section, being formed about a common center. A continuous discharge passage **22** extends along the outer side of the housing between the downstream longitudinal edges **23** of the side walls **18** and **20**. An inlet air passage is provided in the inner portion of the valve and is formed by a series of alternate baffle sections **24** and slotted sections **26**, these sections all being approximately equal in length.

A valve member **30** is mounted in the housing chamber for longitudinal and rotating movement, the valve member being formed with alternate generally cylindrical flow obstructing sections **32** which slidably engage the arcuate sides **18** and **20** of the housing chamber as best shown in FIG. 3, and with flow directing sections **34**. The flow directing sections are each substantially in the form of a cylindrical segment with arcuate faces **35** and **36** spaced from the arcuate side walls **18** and **20** of the housing. A continuous longitudinal notch **38** may be formed in the valve member to reduce the amount of material therein, and the valve member may be additionally provided with a projecting tang **40** at either end or with a tang at one end and similarly dimensioned slot or spline **42** at the other end to receive the tang **40** of an adjacent valve as shown in FIG. 1, so that all valve members may be moved in unison where a plurality of valves are installed in line.

In the preferred construction shown the flow obstructing sections **32** of the valve member and flow directing sections **34** thereof are equal in length and also equal in length to the slotted and baffle sections **26** and **24** of the inlet air passage; and the length of the valve member **30** is less than that of the housing **10** by the length of one section. Four sections are shown in the air passage of the valve in FIG. 1, three sections in the valve member thereof, but in this respect this construction is illustrative only. As an example of actual practice, the valve housing **10** may have a length of thirty-six inches, the valve member **30** a length of thirty-three inches with a three-inch length for each section of the air passage and valve member.

Moving the valve member **30** longitudinally of the housing **10** permits the flow directing and flow obstructing sections of the valve member to be selectively positioned relative to the slotted and baffle sections of the inlet air passage. As shown in FIG. 4, the flow directing sections **34** of the valve member permit the air flow through the discharge passage **22** to be controlled in direction, the flow in FIG. 4 being to the right as indicated by the arrows **44**. Rotating the valve member **30** one hundred eighty degrees

would produce an opposite condition in which the flow would be directed to the left. When a desired direction of flow has been set, the volume of air discharged can be regulated by longitudinal movement of the valve member in the chamber, air flow being restricted to the extent that the flow obstructing sections 32 of the valve member are aligned with the slotted section 26 of the air passage as shown in FIG. 3. Likewise, the direction of flow may be changed without affecting a volume control setting.

FIGURE 2 illustrates that the flow directing sections 34 of the valve member may be formed so that the arcuate faces 46 thereof which engage the arcuate side walls 18 and 20 of the housing chamber form a portion of the valve member having a transverse dimension greater than that of the inlet passage 26, thereby permitting air flow through the valve to be restricted or blocked without disturbing an overall volume control setting obtained by the relative longitudinal position of the valve member in the chamber. Alternately, the flow directing sections 34 of the valve may be formed with a straight through passage as illustrated in U.S. Patent 3,099,949 for further control over the directional pattern of air discharged from the valve.

While preferred embodiments have been described above in detail, it will be understood that numerous modifications might be resorted to without departing from the scope of the invention as defined in the following claims.

I claim:

1. An air distributor valve having an elongated housing with longitudinally extending transversely spaced side walls forming a chamber;

longitudinally extending air inlet and outlet passages provided in the housing adjacent the upstream and downstream longitudinal edges respectively of the side walls, at least one of said passages being formed by a series of alternate baffle sections which extend between the side walls and slotted sections which open to the chamber;

a valve member having alternate flow directing and flow obstructing sections mounted in the housing chamber, the flow obstructing sections supporting the valve member for rotating and longitudinal movement relative to the housing chamber whereby the valve member may be moved within the chamber to selectively position the valve member sections relative to the air passage sections;

the flow directing sections of the valve member permitting air flow between the inlet and outlet passages of the housing for discharge through the outlet passage in a direction controllable by rotating the valve member in the chamber, and the flow obstructing sections of the valve member restricting air flow between the inlet and outlet passages of the housing independently of the rotational position of the valve member in the chamber to the extent the flow obstructing sections are aligned with the slotted section of the one air passage by longitudinal movement of the valve member in the chamber.

2. An air distributor valve as claimed in claim 1 wherein the flow obstructing sections of the valve member are at least equal in length to the slotted sections of the air passage.

3. An air distributor valve as claimed in claim 1 wherein the flow directing sections of the valve member are at least equal in length to the slotted sections of the air passage.

4. An air distributor valve as claimed in claim 1 wherein the baffle and slotted sections of the air passage are substantially equal in length, and wherein the flow directing and flow obstructing sections of the valve member are substantially equal in length to the sections of the air passage.

5. An air distributor valve as claimed in claim 3 wherein the length of the valve member is less than the length of the chamber in an amount substantially equal to the length of one section of the air passage.

6. An air distributor valve as claimed in claim 1 wherein the side walls of the housing are arcuate in section formed about a common center, the flow obstructing sections of the valve member being of cylindrical form to slidably support the valve member in the chamber of the housing.

7. An air distributor valve as claimed in claim 6 wherein the flow directing sections of the valve member are each formed as a cylindrical segment.

8. An air distributor valve as claimed in claim 7 wherein the cylindrical flow obstructing sections of the valve member and cylindrical segment flow directing sections of the valve member are substantially equal in length, and the baffle and slotted sections of the air passage being substantially equal in length to the valve sections.

9. An air distributor valve as claimed in claim 8 wherein the length of the valve member is less than the length of the housing chamber by an amount substantially equal to the length of one section of the valve member.

10. An air distributor valve as claimed in claim 1 wherein the flow directing sections of the valve member each have a portion with a transverse dimension greater than that of one of said passages whereby air flow through the valve chamber may be restricted by rotational movement of the valve member in the housing chamber without affecting the overall volume control setting established by the position of the flow obstructing section of the valve member relative to the slotted air passages in the housing.

11. An air distributor valve as claimed in claim 1 wherein means are provided on at least one end of the valve member for detachably connecting the valve member of a second air distributor valve thereto in end-to-end relation.

12. An air distributor valve as claimed in claim 1 wherein the valve member is provided with a longitudinally projecting tang at one end thereof and with a complementary inwardly directed slot at the other end thereof engageable by the tang of the valve member of a second air distributor valve when the valves are positioned in longitudinally aligned end-to-end relation.

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