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AIR CONDITIONING

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Fig. 1

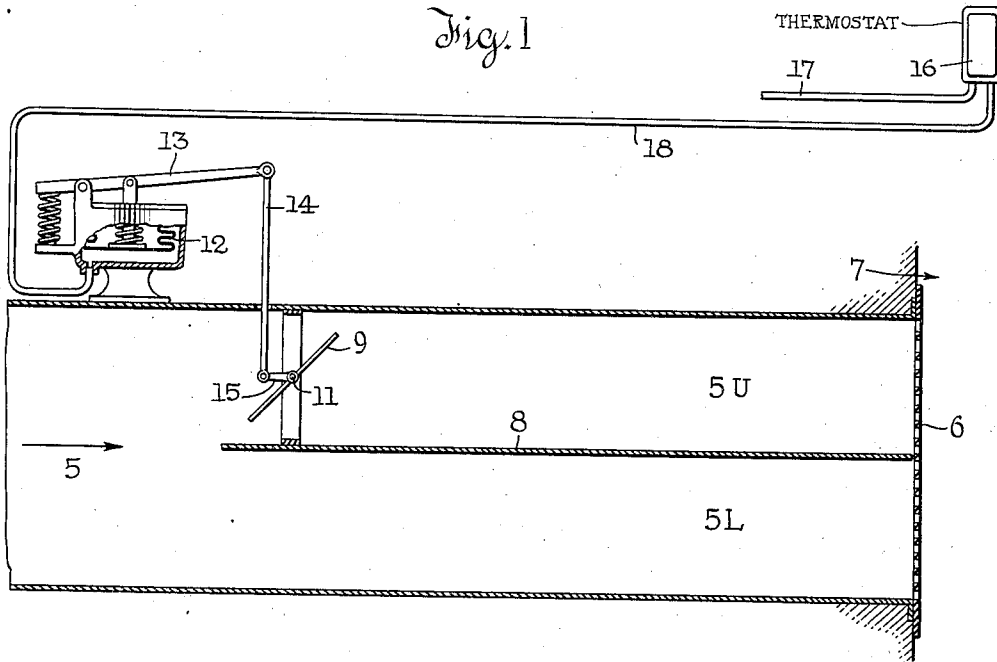
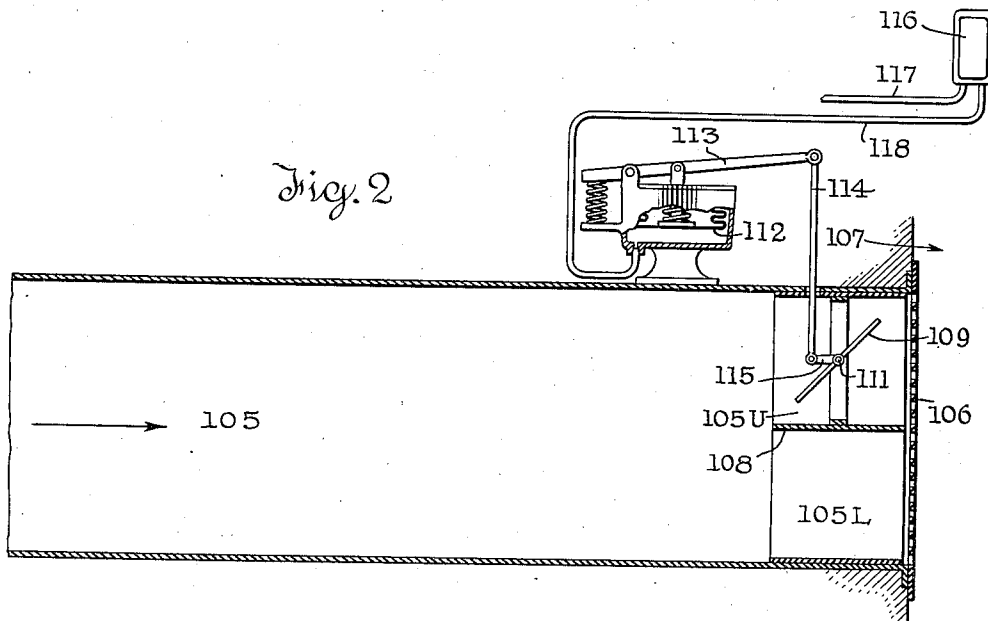


Fig. 2



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AIR CONDITIONING

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3 Claims. (Cl. 98—37)

This invention relates to room cooling and conditioning, and particularly to a flow regulating damper construction having important operating characteristics.

5 In conditioning an enclosed space by delivering cooled air thereto, it has been found desirable to deliver the air at least ten feet above the floor, and at such velocity that the entering air stream will penetrate deeply into the air of the room, so as to mix effectively with the room air before settling. In such systems it is usual to maintain a substantially constant static pressure in the delivery duct, irrespective of the opening and closing of delivery dampers, and the present invention is preferably used with systems of this type.

With such an installation, flow restricting dampers which reduce the velocity of delivery are objectionable, because the cold air issuing at low velocity settles prematurely, causing drafts and discomfort. Dampers which restrict flow while maintaining the velocity of discharge are known, but they are expensive to construct and comparatively difficult to operate, because throttling must occur at the very point of discharge into the rooms.

The present invention takes advantage of the fact that in conditioning systems some air is discharged at all times, and involves dividing the discharging air into two streams, a lower unregulated stream corresponding to the minimum or sustained discharge which flows at all times at full velocity; and an immediately juxtaposed upper stream which is damper regulated and at times discharges at reduced velocity. When the upper stream is throttled, and hence tends to settle, it encounters the lower faster-moving stream and is carried along.

With such an arrangement it is possible for all practical purposes to prevent settling of the upper stream. The construction of the damper according to the invention is simple and inexpensive, and the operation of such a damper is more easily and certainly effected.

Preferred embodiments will now be described by reference to the accompanying drawing, in which:—

Fig. 1 is a vertical section through a discharge duct showing the regulating damper in an intermediate position. The damper motor and controlling thermostat are also indicated.

Fig. 2 is a similar view showing a modified construction.

Referring first to Fig. 1, the discharge duct 5,

which preferably is maintained under constant static pressure, delivers cooled air through grille 6 to room space 7. The discharge is horizontal and through the side wall of the room above the zone of occupancy. The direction of air flow is indicated by arrows.

A partition 8 of substantial length extends from the grille inward and divides the discharge end of duct 5 into two distinct passages, a lower uncontrolled passage 5L, and an upper passage 5U controlled by a butterfly damper 9 fast on shaft 11.

The passage 5L is so proportioned that it will deliver at the normal flow velocity the minimum required cooled air. Hence the vertical position of the partition 8 is a function of the operative character of the particular plant and is subject to variation. The highest practicable position is considered best, to assure the largest practicable stream issuing at full velocity.

A pneumatic damper motor 12 of the familiar bellows motor type actuates damper 9 through lever 13, link 14 and arm 15 which last is fast on shaft 11. The damper motor is caused to move progressively by suitable controlling means, for example an intermediate type thermostat 16 whose air supply line is indicated at 17 and whose branch line 18 is connected to damper motor 12. The thermostat 16 varies the pressure in the damper motor and thus causes damper 9 to move gradually in response to temperature changes.

The specific controlling mechanism is not a feature of the invention and is subject to wide variation.

With the parts arranged as shown in Fig. 1 the operative characteristics are as follows:

If damper 9 is wide open air issues from 5U and 5L at full velocity. As damper 9 moves in a closing direction, the velocity through 5U is reduced. The turbulence caused by damper 9 is largely dissipated in the long duct 5U and the air issuing somewhat slowly from 5U is carried along by the fast moving stream issuing from 5L. Hence in all positions of damper 9 settling of cold issuing air is minimized.

The modified structure shown in Fig. 2 is the same except that the damper is immediately behind the grille. The same reference numerals as in Fig. 1, but increased by 100 are used in Fig. 2 to represent corresponding parts. Since duct 105U is short the disturbing effect of damper 109 is more pronounced. In order that this may not direct issuing air downward it should be arranged so that when the damper swings from open to—

ward closed position, the edge of the damper toward the grille swings upward. Hence such deflection as the damper produces is upward.

5 While I have illustrated and prefer the simple butterfly damper, the invention can be modified to use other types. Generally stated the detailed description given above is intended to be illustrative and not limiting.

What is claimed is:

10 1. The combination of a duct arranged to deliver cooled air horizontally into a room or the like above the zone of occupancy; a partition dividing said duct into a lower constantly open portion and an upper portion; and a damper

adjustable to vary the flow through said upper portion.

2. The combination defined in claim 1 in which said partition is of such length and the damper is so located in advance of the point of discharge, that turbulence induced by the damper in said upper portion of the duct is substantially eliminated before discharge occurs.

3. The combination defined in claim 1 in which said damper is of the pivoted type, is located 10 adjacent the point of discharge, and is so arranged that in its partly open positions it has a tendency to direct discharging air upward.

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