The present invention relates to an improved air distribution device of the type used in residential air conditioning systems.

In certain residential air conditioning systems the same under-floor duct work is used to conduct warm air in winter and cool air in summer. This air, when warm or cool, is discharged into a room from an air distribution device located at the floor level. The warm air is lighter than the air in a room being heated and the cool air is heavier than the air in a room being cooled. Therefore, an air distribution device which is set to discharge either cool or warm air efficiently will generally be inefficient when discharging the other. More specifically, when warm air is being discharged, for optimum operation the air distribution device should be set to discharge the warm air horizontally into the cooler air along the floor to mix therewith. However, if the air distribution device, which is set for discharging warm air, were used to discharge cool air horizontally, the latter would merely settle along the floor without rising and mixing with the warmer room air. This results in undesirable stratification of temperature within the room and consequently discomfort for the occupants. Also, when cooling, for optimum operation, cool air should be discharged vertically so that it will mix with the warm room air to provide efficient cooling. However, if the air distribution device is set for discharging air vertically, and it is supplied with warm air, the latter will be distributed vertically and it will merely rise to the ceiling without providing the desired mixing effect. This also causes stratification of temperature and the discomfort because of cold feet. It is therefore desirable that the air distribution device should be capable of discharging warm air horizontally and cool air vertically for most efficient operation during all seasons.

A further complication results from the use of full length draperies which, when closed, frequently interfere with the air discharge. If a grille which discharges air vertically is close to the wall, the air flows in back of the draperies, thus increasing the heat loss in the winter and the heat gain in the summer, and impairing circulation in the room. If the vertical discharge grills are placed in front of the drapes to avoid this problem, new problems are created involving the expensive procedure of cutting and furnishing carpeting and floor around the grills.

An additional problem in residential air conditioning develops when certain persons desire to open windows at night. This results in wasted heating capacity in the winter and cooling capacity in the summer if the grill is not shut off. For such persons it is desirable to provide a means of completely shutting off the air supply to the room in a simple manner.

In the past certain air distribution devices have been made to discharge cool air vertically and warm air horizontally in order to solve the problem of stratification. However, these devices were deficient in certain respects. First of all, certain of these devices operated automatically by means of a thermostat control and were therefore relatively costly as well as being subject to malfunction. In addition, previous devices were capable only of providing the above types of discharge but did not include mechanism for terminating flow of air completely. Neither did such devices solve the problems which arose because of the use of full length draperies or interference with carpeting. It is with a device which overcomes the foregoing shortcomings of prior air distribution devices that the present invention is concerned.

It is accordingly the object of the present invention to provide an improved air distribution device for a residential air conditioning system which includes an extremely simple manual baffle arrangement which can provide either vertical air discharge, horizontal air discharge, or shut off the flow of air completely. Other objects and attendant advantages of the present invention will readily be perceived hereafter.

The improved air distribution device of the present invention comprises a housing adapted to be located at the floor level of a room and includes air inlet aperture means, first discharge aperture means in said housing for discharging the cool air vertically, second discharge aperture means in said housing spaced from said first discharge aperture means for discharging the warm air horizontally, a simple baffle means, means for pivotally mounting said baffle means on said housing, and means for removing said baffle means to a first position to obstruct flow therethrough and to a second position to obstruct flow therethrough and to a third position to obstruct flow therethrough and to a fourth position to obstruct flow therethrough.

FIGURE 1 is a fragmentary perspective view of the improved air distribution device located at the junction of the floor and wall of a room;

FIGURE 2 is a cross sectional view taken substantially along line 2—2 of FIGURE 1, with certain portions omitted in the interest of clarity;

FIGURE 3 is a perspective view of the baffle used in the device of FIGURES 1 and 2; and

FIGURE 4 is a cross sectional view of an alternate type of baffle which may be used.

The improved air distribution device 10 of the present invention includes a housing 11 consisting of a combination back and bottom 12 having a vertical wall 13 and a horizontal wall 14. An air inlet portion 15 of substantially rectangular shape is formed by cutting bottom wall 14 and bending portions so cut downwardly to provide a sleeve 16 for receiving, in telescoping relationship, a portion of plenum 17 in communication with upper portion of a room. Air is discharged into the room through such sleeve 16.

Vertical wall 13 fits through suitable aperture in floor 19 and the remainder of bottom 14 rests on the floor. Vertical wall 13 fits against wall 19 of the room. Suita-
ble screws or the like may be used to fasten wall 13 to wall 19 or bottom wall 14 to floor 19.

Suitably fastened to the upper portion of rear wall 13 by means of a lap joint 20 is the upper portion 21 of housing front wall portion 22, the lower portion of which is attached to bottom wall 14 at lap joint 23. The upper horizontal portion of housing front 22 has a grill 24 formed therein by a suitable shearing and bending operation wherein a plurality of vanes or louvers 25 are formed from a single sheet of material which is bent along axis 37 to provide planar halves 38 and 39. Stub shafts 40 and 41 are secured to baffle 36 at the ends of axis 37 and extend beyond the ends of the baffle. Planar portions 38 and 39 extend at approximately an angle of 150° relative to each other. The projecting end of stub shaft 40 fits into a sleeve 42 which is mounted on end plate 28. The projecting end of stub shaft 41 extends through an aperture 43 (FIG. 2) in end plate 29. It is by means of the foregoing structure that baffle 36 is mounted for pivotal movement or rotation within housing 11. A control knob 44, which is essentially a lever, fits on the end of shaft 41 of the housing that is positioned between point 45 being in alignment with portion 39 of baffle 36.

When pointer 45 extends vertically toward T it will indicate that the top grill 24 is in communication with inlet duct 15 and flow through side grill 26 is obstructed because baffle 36 will be in the position shown in FIGURE 2. This position is used when the cool air is being discharged and the passage of such cool air through grill 24 will be upwardly in a vertical direction which will cause it to mix intimately with the air in a room to be cooled.

When the air conditioning system is shifted from its cooling function to a heating function, knob 44 is manipulated so that pointer 45 will be pointing toward B which shows that vane 39 will assume a horizontal attitude as shown in dotted lines in FIGURE 2 and vane 38 will assume a corresponding attitude. The position of baffle 36 is indicated by designation A—A. When this is the case, it can be seen that flow of heated air through upper discharge grill 24 is blocked and such heated air will be discharged horizontally through lower grill 26 so that it will mix intimately with the cooled room air which has gravitated to the floor.

Under certain circumstances it is desirable to shut off flow of air from distribution device 10 completely. This is desirable when the windows are opened, either in summer or winter to thereby avoid wasting either cooling or heating capacity, respectively. Therefore, knob 44 is manipulated to cause the pointer 45 to point at letter C which indicates that distribution device 10 is closed against passage of air, and vanes 38 and 39 will assume the position indicated by centerline negotiation B—B. As can be seen from FIGURE 2, baffle 36, when in position B—B block off grills 24 and 26 from inlet duct 15.

It will be appreciated that in certain circumstances there is a departure from the foregoing procedure, as when air distribution device 10 is located underneath the window having full length drapes of sufficient length that they enclose the upper discharge grill 24. When such drapes are closed, it would be highly undesirable to permit the discharge of air vertically from grill 24 because this air would pass up between the drapes and the window. Therefore, in this situation it is desirable to cause baffle 36 to assume position A—A so that the air would be discharged under the drapes horizontally into the room rather than vertically behind the drapes where its cooling or heating effect would be partly wasted.

In order to provide sealing between baffle 36 and the housing 11 sealing strips 46, 47, 48 and 49 are provided. Each of these strips extends the entire length of the housing between end plates 28 and 29. This, as can be seen from FIGURE 2, provides a seal between the edges of the baffle 36 and the inside surfaces of housing 11 to thereby minimize leakage.

To further minimize leakage, flexible wipers 50 and 51 are mounted at the ends of vanes 38 and 39, respectively, and are held on the edges of said vanes by crimping said edges into the U-shaped configurations 52 and 53, respectively. This will cause wipers 50 and 51 to be held and rotated with baffle 36. When the wipers 50 and 51 abut any of the two sealing strips 46, 47, 48 or 49 in the positions shown in FIGURE 2, it will cause effective sealing to be provided against leakage of air from the desired path.

The sealing strips 50 and 51 also perform a detent or stop function to hold baffle 36 in its intended position. More specifically, as can be seen from FIGURE 2, wiper strip 51 will abut the right side of sealing strip 47 and sealing strip 50 will abut the left side of sealing strip 49 when baffle 36 is in the position shown in FIGURE 2, that is when pointer 45 is pointing upwardly. The person adjusting the baffle will merely turn it until he feels the baffle lock as a result of upper wiper 51 leaving louvers 25 and entering the space 52' to the right of sealing strip 47. When knob 44 is manipulated so that pointer 45 points at B, the pointer 45 will lie in space 53' between the lower side of sealing strip 48 and the upper edges of louvers 27, and strip 50 will lie adjacent the bottom side of sealing strip 46. The person manipulating knob 44 will feel the detent action when this position is reached. When knob 44 is moved from B to A, the pointer 45 will move from the left side of upper end of baffle 36 and 51 is moved to the left of upper left edge of sealing strip 49 and wiper 50 will lie to the upper left edge of sealing strip 46. It will readily be appreciated that as wiper 50 moves along the curved inner surface of sealing strip 46, there will be a certain amount of resistance and when it leaves this surface when baffle 36 is in position B—B, a detent action will be felt by the person manipulating knob 44. It can thus be seen that sealing strips 50 and 51 in addition to performing the sealing function also provide a detent action for retaining baffle 36 in its intended position.

Sealing strips 46, 47, 48 and 49 are made of foam rubber, plastic or any other suitable material which is resilient and performs a sealing function. Wipers 50 and 51 are preferably made of rubber, or may be made out of any other resilient material.

In FIGURE 4 an alternate baffle construction is shown which does not have wipers 50 and 51 thereon. This baffle construction can be used where sealing strips 46, 47, 48 and 49 extend inwardly a greater distance than shown in FIG. 2, so that the ends of vanes 38' and 39' will wipe across them and come to rest along the sides thereof. It will be appreciated that the louvers 24 and 27 must be dimensioned to provide sufficient clearance, that is so the ends of vanes 38' and 39' do not contact...
these louvers. With the baffle construction of FIGURE 4, ridges may be provided extending longitudinally in the sealing strips to receive the edges of the baffle in the position in which it is to be locked.

While the improved air distribution device has been depicted at the floor level, it will be appreciated that the basic principles thereof may be incorporated in devices adapted to be located on a wall or at ceiling level. In the latter case the baffle would direct cool air horizontally and warm air downwardly. It will also be appreciated that while the inlet portion 15 is shown in the disclosed embodiment as extending from the bottom wall, a suitable inlet duct may also be positioned in vertical wall 13.

If desired, an alternate type of detent arrangement may be provided wherein a spring-pressed ball is mounted on housing end 29 facing toward knob 44, with suitable depressions provided in the rear of knob 44 to receive the ball at the desired locations T, B or C.

It can thus be seen that the above described air distribution device is manifestly capable of achieving the above enumerated objects, and while preferred embodiments have been shown, it is to be understood that the present invention is not limited thereto but may be otherwise embodied within the scope of the following claims.

I claim:

1. An air distribution device comprising an elongated housing having wall portion means and first and second opposite end portions, air inlet aperture means in said housing, first elongated discharge aperture means in said wall portion means of said housing for discharging air in a relatively horizontal direction, second elongated discharge aperture means in said wall portion means of said housing and spaced from said first elongated discharge aperture means for discharging air in a relatively vertical direction, elongated baffle means confined entirely within said wall portion means of said housing and having first and second ends and extending in substantially the same direction and as said housing, said first and second ends of said baffle means being located proximate said first and second end portions, respectively, of said housing, first and second shaft means in alignment with each other extending from said first and second ends, respectively, of said baffle means, first means journaling said first shaft means solely for rotation relative to said first end portion of said housing, second means journaling said second shaft means solely for rotation relative to said second end portion of said housing, and means coupled to said baffle means for rotating said baffle means to a first position to effect communication between said air inlet aperture means and said first discharge aperture means or to a second position to effect communication between said air inlet aperture means and said second discharge aperture means or to a third position to obstruct flow through said air inlet aperture means.

2. An air distribution device as set forth in claim 1 wherein said first shaft means extends through said first end portion and wherein said means for rotating said baffle means comprises knob means mounted on said first shaft means externally of said housing for rotating said baffle means, and stop means for holding said baffle means in said first, second, or third positions.

3. An air distribution device as set forth in claim 2 wherein said baffle means comprises a member having first and second planar halves intersecting along a line which is in substantial alignment with said first and second shaft means.

4. An air distribution device as set forth in claim 3 wherein said first and second planar halves each have an edge remote from said line of intersection, and sealing means mounted relative to said edges and said housing for tending to prevent leakage of air therebetween.

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