Feb. 1, 1966 W. W. KENNEDY 3,232,206

FACE PLATE FOR AN AIR DISTRIBUTION OUTLET

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Fig. 1.

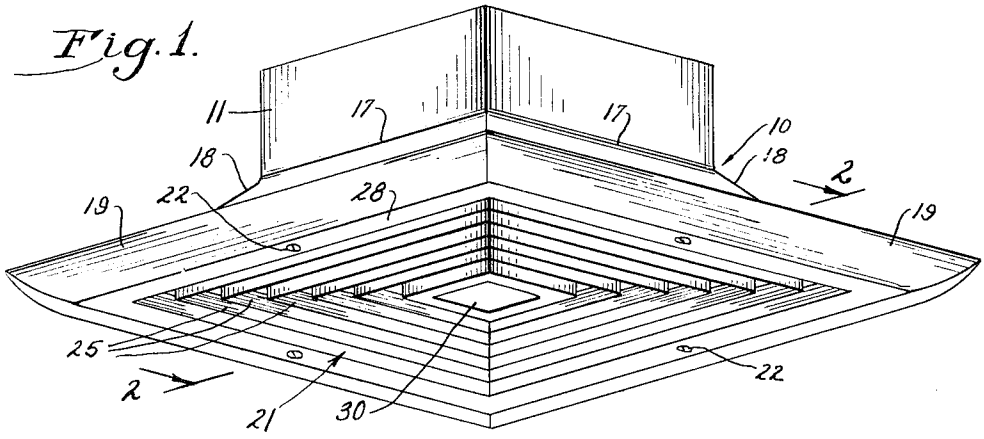


Fig. 2.

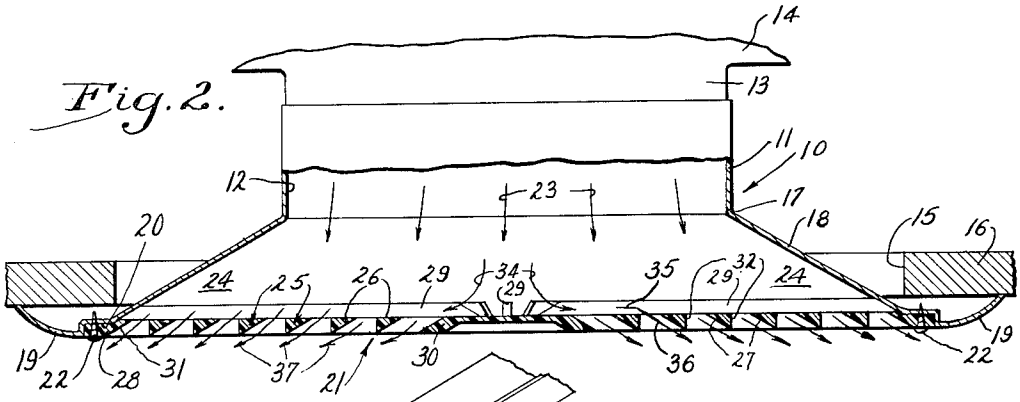
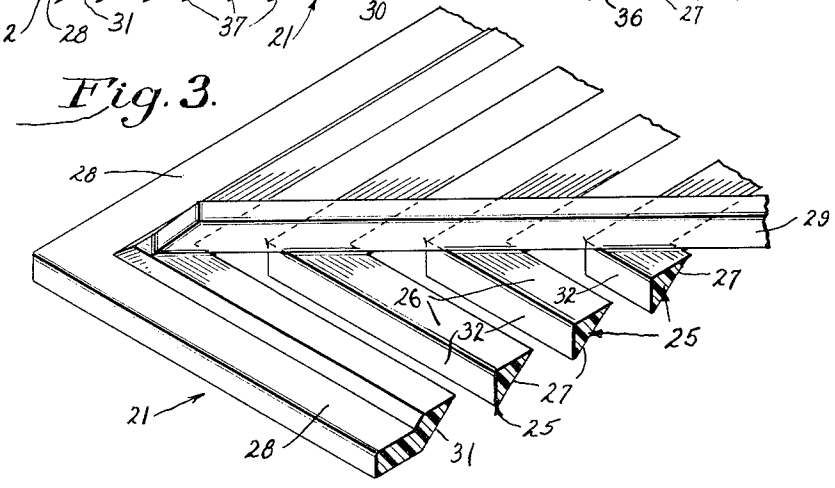


Fig. 3.



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Fig. 4.

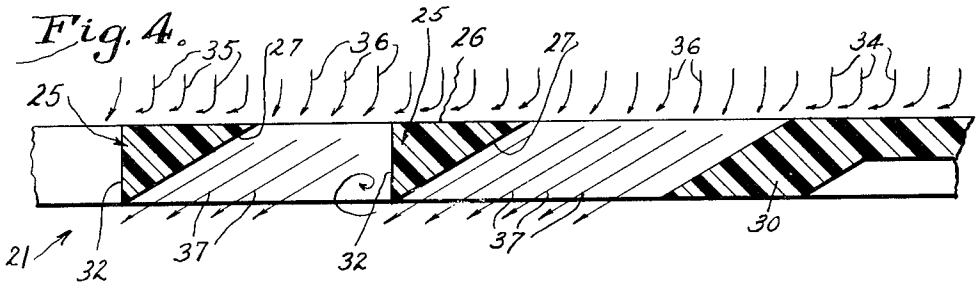


Fig. 5.

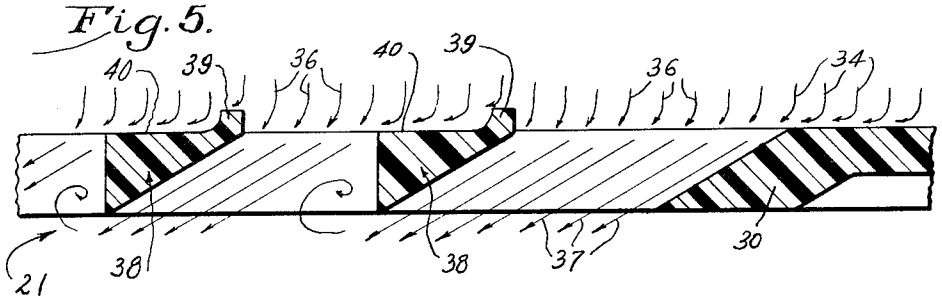
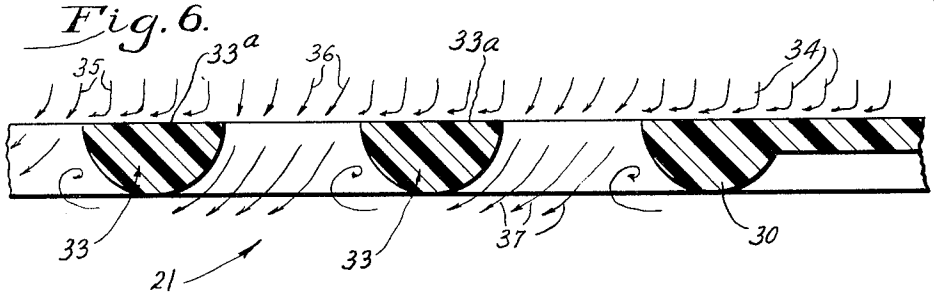


Fig. 6.



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FACE PLATE FOR AN AIR DISTRIBUTION OUTLET

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Filed July 12, 1963, Ser. No. 294,520
7 Claims. (Cl. 98—40)

This invention relates to outlets for use in air conditioning systems to control the manner of distribution of air into a room and, more particularly, to air distribution units of the type disclosed in Patent No. Re. 25,216 in which a flat discharge plate is disposed over the outlet opening in a room ceiling and formed with passages for directing conditioned air into the room. In the patented unit, the outlet is covered by a perforated metal plate with a deflector disposed in the air stream above the plate to divert the central portion of the stream radially outwardly across the upper side of the plate. This deflected air and the air similarly deflected by the imperforate areas of the plate merge with the remainder of the air stream flowing directly into the air passages and bend the latter outwardly. To permit the air to pass through the plate along nearly horizontal paths, the face plate of the patented unit is made very thin and preferably no thicker than .035 of an inch.

The primary object of the present invention is to obtain the same type of air distribution pattern produced by the patented unit with a novel face plate of more attractive louver-type design capable of being molded of plastic at low cost in a sturdy one-piece construction.

A more detailed object is to employ a plurality of laterally spaced bars or vanes to define the passages through the face plate and form the bars in a novel manner to produce the desired angle or air discharge while maintaining liberal spacing of the bars and sufficient bar thickness for structural rigidity of the face plate in service use.

Another object is to eliminate the need for a central deflector.

The invention also resides in the manner of supporting the bars on a frame capable of being molded in one piece with the bars.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a perspective view of an air distribution unit including a face plate embodying the novel features of the present invention.

FIG. 2 is a fragmentary cross-sectional view taken along the line 2—2 of FIG. 1 and showing the unit mounted in a room ceiling.

FIG. 3 is an enlarged fragmentary perspective view of one corner portion of the face plate.

FIG. 4 is an enlarged cross-sectional view similar to a portion of FIG. 2.

FIG. 5 is an enlarged cross-sectional view similar to FIG. 4 and showing an alternate form of the invention.

FIG. 6 is a view similar to FIG. 4 showing another alternate form of the invention.

As shown in the drawings for purposes of illustration, the invention is embodied in an air distribution unit **10** of the type disclosed in the aforesaid patent including a tubular casing formed by a collar **11** at one end defining an inlet **12** and flaring at the opposite end to form an outlet of substantialy greater cross-sectional area than the area of the inlet. The collar telescopes over and is connected to a branch **13** of an air supply duct **14** with the outlet end disposed in an opening **15** in the room wall **16** (FIG. 2) which usually is the ceiling of the room. The outlet end of the unit may be of the same size and rectangular shape as the tiles commonly used in acoustical ceilings.

In the form shown in the drawings, the collar **11** is square in cross-section and the lower edges of its flat sides merge at **17** with flaring walls **18** to form a pyramidal frustum projecting through the ceiling opening **15** and preferably terminating in upwardly curving flanges **19** overlapping the adjacent parts of the ceiling and defining the rectangular outlet opening of the unit. The inner periphreal portion of each flange is depressed to form a seat **20** (FIG. 2) for receiving the periphery of the flat face plate **21** which is flush with the lower faces of the flanges and secured to the latter by screws **22**. Thus, the face plate is substantially perpendicular to the axis of the casing and to the air stream flowing through the casing toward the outlet end thereof as indicated by the arrows **23**.

As fully described in the aforesaid patent, the lateral deflection of the air impinging against the imperforate areas of the face plate **21** and the low pressure region which develops at **24** within the casing as a result of the flaring of the walls **18** cooperate to bend the remainder of the air stream outwardly in passing through the air passages in the plate. The combined area of these passages is at least as great as the area of the inlet **12** to prevent back pressure from building up over the plate and causing air to issue through the plate along paths perpendicular to the latter. The outwardly spreading air pattern produced by the extremely thin plate of the patented unit is particularly desirable in cooling systems and produces a strong aspirating action below the unit to cause mixing of room air with the cool air and tempering of the latter before it reaches the occupants of the room.

In accordance with the present invention, the thin plate of the patented unit is replaced by a highly attractive louver-type face plate **21** capable of being molded at low cost to plastic in one piece sturdy enough to stand up in service use. To these ends, the face plate includes a plurality of relatively thick plastic bars **25** disposed in a common plane with the adjacent edges of adjacent bars spaced apart in the plane to define elongated air passages for the flow of air between the bars along paths perpendicular to the plane. Each bar is formed with an upper surface **26** facing toward the inlet **12** to intercept a portion of the air stream and deflect the same laterally outwardly toward one of the passages, and with a side surface **27** facing toward the adjacent inner bar and diverging downwardly and outwardly relative to the perpendicular paths through the face plate. Thus, the air deflected outwardly by one bar merges with the air flowing directly into the adjacent passage and bends the air outwardly along the diverging side of the next outer bar. Accordingly, all the air issues in an outwardly spreading pattern along paths inclined at acute angles with the plane of the face plate despite the increased thickness of the bars desirable for structural rigidity of the face plate.

While it will be seen that the bars **25** may be arranged in various forms such as concentric circles, herein they are arranged in the form of a series of rectangles of progressively decreasing size supported on a frame formed by four plastic strips **28** shaped to fit snugly in the seat **20** with four plastic brace strips **29** extending diagonally inwardly from the corners of the frame across the tops of the bars and integrally joined to the corners of the rectangles and to the central deflector **30**. Additional brace strips (not shown) may be provided if desired. The inwardly facing sides **31** of the frame strips are inclined in the same manner as the inner sides of the bars to cooperate with the outer rectangle in defining the outer set of air passages.

The tops of the bars 25 are flat and preferably perpendicular to the air stream flowing through the inlet 12, and the spacing of the tops of the bars should be such that the total solid area of the plate is at least as great as the free area, that is, the cross-sectional area of the passages between the bars as measured at the top of the plate. This may be accomplished by making the spaces of approximately the same width as or slightly narrower than the bar tops, and insures that the amount of air deflected laterally is sufficient to bend the remaining air outwardly at sharp angles.

In the form shown in FIGS. 1 through 4, the bars 25 are triangular in cross-section with the upper sides 26 horizontal, the outer sides 32 vertical, and the inner sides 27 inclined downwardly and outwardly at angles on the order of thirty degrees with the tops. Illustrated in FIG. 6 is another form of the bars in which the divergence of the inner sides of the bars 33 is obtained by making the bars semi-circular in cross-section with the flat side 33a facing upwardly and perpendicular to the air stream.

With both of these forms, the central portion of the air stream impinges against the top of the deflector 30 and is deflected radially outwardly in all directions, as indicated by the arrows 34 in FIGS. 2, 4 and 6 to flow across the tops of the bars and over the passages between the bars thereby causing the air impinging on each bar to flow outwardly as indicated at 35. This deflected air merges with the air 36 flowing directly toward the passages and bends the same outwardly along the diverging sides of the bars, as indicated by the arrows 37 to issue along the desired inclined paths. To make it possible to eliminate the deflector 30 or substantially reduce the size thereof, the bars 38 shown in FIG. 5 are generally triangular in cross-section as in FIGS. 2 and 3 and also include ribs 39 upstanding from the inner edges of the bars high enough to insure that air impinging on the top 40 of each bar is deflected away from the rib rather than toward it.

The liberal spacing of the bars of these new designs not only makes the face plate 21 highly attractive in appearance but also facilitates the molding of the face plate in one piece. With each bar spaced a substantial distance from the adjacent bars and with the side walls of each air passage between the bars diverging downwardly, it will be evident that the plates can be stripped quickly and easily from the molding dies. Of course, the bars and the brace strips 29 may be made thick enough to impart substantial structural rigidity to the face plate to insure that it will stand up during handling, installation and service use. While the brace strips preferably are molded on top of the face plate for purposes of overall appearance, it will be evident that the strips also could be molded below the bars or in the plane of the bars.

From the foregoing, it will be seen that the molded plastic face plate 21 is more attractive in appearance and less expensive to make than the thin perforated metal face plate of the patented unit. In addition to savings in the cost of material, a substantial saving results from the elimination of the labor formerly required for pressing, machining and framing the plate. At the same time, the plastic plate is of lightweight and sturdy construction and produces the same type of outwardly spreading air distribution pattern obtained with the patented unit.

I claim as my invention:

1. A face plate for masking a rectangular air distribution outlet in a room ceiling and directing a stream of air from the outlet into the room, said face plate comprising a rectangular plastic frame having a central rectangular opening therein, plastic brace strips extending diagonally inwardly from the corners of said frame and integrally joined thereto, a rectangular plastic deflector plate centered in and smaller than said opening and integrally joined at its corners to said strips with the upper side of said plate perpendicular to said stream thereby to intercept the central portion of the stream and deflect the same radially outwardly in all directions, and a plurality of plastic bars joined together to form a series of rectangles of progressively decreasing size disposed in a common plane in said opening and integrally joined at the corners to said strips with the bars of adjacent rectangles spaced laterally apart in said plane to form elongated passages for the flow of air between the bars along paths perpendicular to said plane, each of said bars having an upper surface of approximately the same width as said passages and generally perpendicular to said stream to intercept and deflect a portion of said stream outwardly and also having a side surface facing inwardly toward said deflector and diverging outwardly and downwardly relative to said perpendicular path whereby the air flowing directly between said bars is diverted outwardly by said deflected air and all the air issues into the room along paths inclined downwardly and laterally at acute angles with said plane.

2. A face plate for discharging a stream of air from an air distribution outlet in a room ceiling and comprising a frame, a plurality of elongated bars of substantial thickness disposed in a common plane generally perpendicular to said stream with adjacent edges of adjacent bars laterally spaced apart in said plane and forming passages for the flow of air between the bars along paths perpendicular to said plane, said bars having upper surfaces of substantial width and generally perpendicular to said stream for intercepting portions of said stream, and means on top of said face plate for inducing the air impinging on said upper surfaces to flow laterally outwardly in a predetermined direction across each bar, each bar having one side facing inwardly toward the oncoming deflected air and diverging downwardly and outwardly relative to said perpendicular paths whereby the air flowing directly between said bars is diverted outwardly by said deflected air and all the air stream issues through said passages along paths generally following said diverging sides and at acute angles with said plane.

3. A face plate as defined in claim 2 in which said means comprises a deflector generally centered on said face plate with an upper side facing toward said stream to deflect the central portion of the stream radially outwardly in all directions.

4. A face plate as defined in claim 2 in which said means includes ribs upstanding from and extending along the inner edges of the upper surfaces of said bars whereby air impinging on said upper surfaces is deflected toward the outer edges of said surfaces.

5. A face plate as defined in claim 2 further including brace strips extending across the top of said face plate from the peripheral portion of said frame and secured to said deflector and said bars to support the same on said frame, said peripheral portion, said brace strips, said bars and said deflector being composed of plastic and molded integrally with each other.

6. A face plate as defined in claim 2 in which said bars are of triangular cross-section with the outer side surfaces generally vertically disposed, the upper surfaces horizontal, and the inner side surface inclined downwardly and away from the adjacent inner bar at an angle with the upper surface on the order of thirty degrees.

7. A face plate as defined in claim 2 in which said bars are of generally semi-circular cross-section with the flat sides thereof facing upwardly.

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