

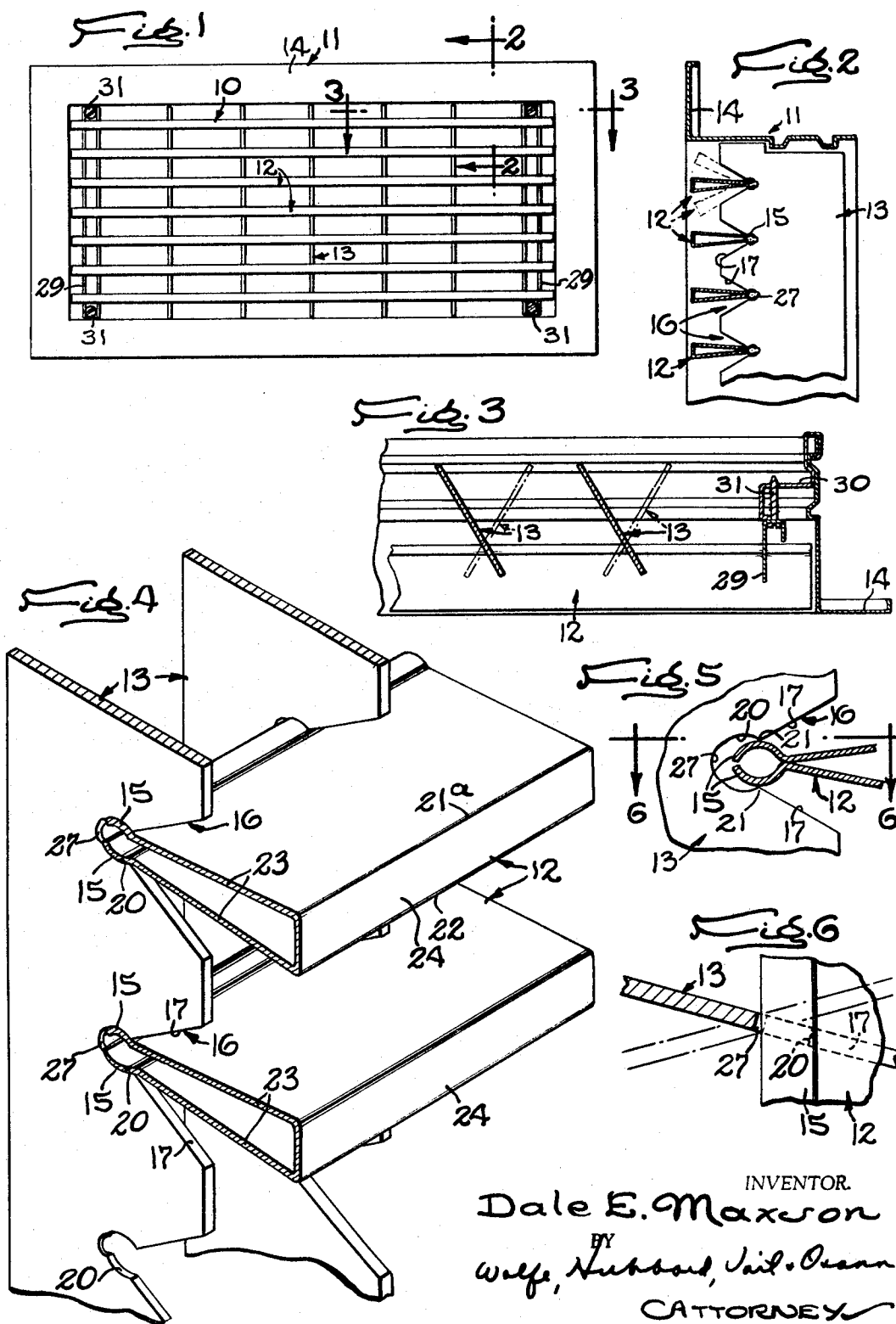
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D. E. MAXSON

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DOUBLE-ADJUSTABLE GRILLE

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INVENTOR
Dale E. Maxson
BY
Welf, Hubbard, Jail. O'nean
ATTORNEY

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DOUBLE-ADJUSTABLE GRILLE

Dale E. Maxson, Rockford, Ill., assignor to Barber-Colman Company, Rockford, Ill., a corporation of Illinois

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ABSTRACT OF THE DISCLOSURE

For use in air conditioning systems, a double-adjustable grille includes a core formed as a unitary structure by a set of adjustable vertical vanes and a set of independently adjustable horizontal vanes. Each of the latter is formed along one edge with a resiliently yieldable rib which snaps into complementary shaped openings in the vertical vanes and bears frictionally against the edges of the openings to hold the vanes in assembled relationship while permitting free and independent adjustment of the vanes of each set. The core may be supported within an opening in a surrounding frame simply by snapping the ribs into notches formed in a pair of upright posts spanning the frame opening.

This invention relates to a double-adjustable grille of the type used in air conditioning and heating systems and, more particularly, to a grille comprising a core formed by two sets of relatively perpendicular vanes both of which are adjustable selectively to control the direction and pattern of the flow of air discharged into a room or other space.

The general object of the present invention is to provide a double-adjustable grille of the above character which is simpler in construction, more economical to manufacture, and more easily assembled than prior devices of the same general type.

A further object is to construct the core as a unitary structure in which the sets of vanes are snapped together in assembled relationship, are supported solely by each other, and yet are pivotable relative to one another to vary the direction of the air flow.

Another object is to support the grille core in a mounting frame without the need of pivotal connections between the movable vanes and the frame thereby to reduce the number of parts and complexity of the grille.

A more detailed object is to achieve the foregoing by snapping resiliently flexible ribs formed along the trailing edges of the vanes of one set into spaced notches formed along the leading edges of the vanes of the other set, and by allowing the ribs to expand within the notches to bear against the latter with sufficient force to hold the vanes in assembled relationship while leaving the sets free for relative adjustment.

The invention also resides in the novel construction and coaction of the two sets of vanes permitting the same to be snapped together in adjustable relationship.

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 front elevational view of a grille embodying the novel features of the present invention.

FIG. 2 is an enlarged fragmentary cross-section taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is an enlarged fragmentary cross-section taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is an enlarged fragmentary perspective view of the vanes.

FIG. 5 is a fragmentary side elevational view of the vanes shown in FIG. 4 as they are being assembled.

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FIG. 6 is a fragmentary cross-section taken substantially along the line 6—6 of FIG. 5 and showing the vanes in assembled positions.

As shown in the drawings for purposes of illustration, the invention is embodied in a double-adjustable grille comprising a core 10 fitted within a frame 11 and formed by two sets of crossed horizontal and vertically disposed vanes 12 and 13 pivotally supported to swing about horizontal and vertical axes respectively. Such grilles are especially useful for controlling the flow of air discharged from heating or cooling ducts of air conditioning systems in that the vanes may be adjusted to a number of selected positions to vary the direction of the air flow. Herein, the frame comprises a sheet metal tube of rectangular shape adapted to telescope within a duct and having a right angular peripheral flange 14 (FIGS. 1 and 2) adapted to be secured against the face of the wall through which the duct is formed.

In accordance with the present invention, the core 10 is constructed as a unitary structure in which the crossed sets of vanes 12 and 13 are snapped together in assembled relationship, are supported solely by each other and, at the same time, may be pivoted relative to one another to vary the direction of the air flow. To these ends, the trailing edges of one set of vanes, herein the horizontal vanes 12, are formed with resiliently flexible and opposed ribs 15 which, after simply being flexed toward each other and snapped into notches 16 formed in the leading edges of the vertical vanes 13, are allowed to expand within the notches to bear against the walls of the latter with sufficient force to hold the two sets of vanes fastened together. The size and shape of the ribs and notches are such that the vanes of each set are free for pivotal adjustment to various selected positions relative to the vanes of the other set in spite of the holding force developed by virtue of the resiliency of the ribs. With this arrangement, the grille not only requires fewer parts but also may be manufactured more economically and assembled more easily than prior grilles of a similar nature.

In the present instance, each vertical vane 13 of the core 10 is formed from a flat strip of thin sheet metal and the notches 16 are punched from and equally spaced along the leading edges of the vanes. The notches are generally V-shaped and their outwardly flaring defining edges 17 (FIGS. 4 and 5) form equilateral triangles each with its apex located on the horizontal center line of an arcuate hole 20 defining the inner or closed end of the notch. As shown most clearly in FIG. 5, oppositely and vertically extending projections 21 are formed at the junctions of the straight edges 17 of the slots and the curved edges of the holes.

To form the horizontal vanes 12, a relatively wide strip of resiliently flexible sheet metal first is folded or bent laterally at 21a (FIG. 4) and then reversely at 22 to define a pair of upper and lower vertically spaced side panels 23 integrally connected by an outwardly facing end panel 24. The ribs 15 are simply arcuate lips formed at the free edge portions of the side panels and oppositely curved along a radius herein the same as that of the holes 20. Before assembly of the core 10, the side panels are relaxed and are spaced relatively far apart so that the distance between the opposed ribs of each horizontal vane 12 is greater than the distance between the projections 21 formed on each vertical vane 13.

In order to fasten the horizontal vanes 12 to the vertical vanes 13, the latter are supported in horizontally spaced relationship in a suitable fixture with the notches 16 of each vane being aligned with the corresponding notches of the adjacent vane. The side panels 23 of each vertical vane then are squeezed or flexed toward each other so that the ribs 15 may snap past the projections 21 and into the holes 20 as shown most clearly in FIG. 5. After the ribs

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have passed by the projections, the tendency of the side panels to return to their relaxed positions by virtue of the resiliency of the material urges the ribs into bearing engagement with the edges of the holes to develop sufficient force for holding the sets of vanes assembled as a unitary core without need of additional fastening means.

Because of the mating arcuate surfaces of the ribs 15 and the holes 20, the horizontal vanes 12 may be swung individually upwardly and downwardly relative the vertical vanes 13 to deflect the air streams upwardly and downwardly respectively. The outwardly flaring edges 17 of the notches 16 allow such swinging of the horizontal vanes to the limit positions shown in phantom in FIG. 2. Similarly, all or part of the air streams may be diverted to the left or right by swinging the vertical vanes in opposite directions about vertical axes extending through the centers of the holes 20. To insure that the vertical vanes may pivot relative to the horizontal vanes, it is desirable to provide a slight amount of clearance between the ribs 15 and the holes 20, such as by forming a small recess 27 (FIGS. 4 and 5) at the inner end of each hole. It is apparent that such clearance could be formed in various other ways, as for example, by chamfering the edges of the holes.

Advantage is taken of the above-described unitary construction of the core 10 to fasten the latter within the frame 11 in a simple and rapid manner. For this purpose, the extreme end portions of the horizontal vanes 12 are snapped into forwardly opening notches formed in channel-shaped supporting posts 29 (FIGS. 1 and 3) disposed near opposite sides of the frame. At their upper and lower ends, the posts are fastened to spring mounting clips 30 (FIG. 3) by sheet metal screws 31 and the mounting clips, in turn, are snapped over the rear edges of the frame. Thus, after fastening the clips to the frame, the core may be installed in the frame simply by threading the screws through the end posts and the clips. Such simple installation is possible because the vanes 12 and 13 pivotally support each other and need not be connected to the frame by trunnions or the like.

From the foregoing, it will be apparent that the new and improved grille of the present invention may be manufactured and assembled in an extremely simple manner thus resulting in a very inexpensive product. Since both sets of vanes are individually adjustable, the grille is as effective in service use as the more costly grilles used for related purposes.

I claim as my invention:

1. A double-adjustable grille comprising a first set of vanes each having a plurality of outwardly flaring V-shaped notches formed in and spaced along one edge thereof and terminating at the apex in a hole having arcuate edges, said vanes being spaced from each other with the notches of each vane aligned with the corresponding notches of the adjacent vane, a second set of spaced vanes each disposed in and extending through one set of the aligned notches of said first vanes, each of said second vanes being made of a sheet of resiliently flexible material folded laterally and then reversely to form a pair of opposed side panels each having an arcuately curved rib at the free edge thereof, said side panels being flexed toward each other with said ribs projecting into the holes in said first vanes and being urged into frictional bearing engagement with the edges of said holes by virtue of the

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resiliency of said material to hold the first and second sets of vanes in assembled relationship, said holes being shaped to leave said first vanes free for pivotal adjustment relative to said second vanes about a first set of axes extending lengthwise of the first vanes, and said ribs being turnable in said holes about a second set of axes extending lengthwise of said second vanes to leave the latter free for pivotal adjustment relative to and independently of said first vanes and within the confines of said notches.

2. A grille as defined in claim 1 in which said side panels are interconnected by an integral and outwardly facing end panel formed by the lateral and reverse folding of said sheet of material.

3. A grille as defined in claim 1 in which oppositely extending projections are formed in said first vanes at the junctions of the outwardly flaring edges of said notches and the arcuate edges of said holes.

4. A double-adjustable grille having a frame and a core telescoped into said frame, said core comprising a first set of vanes each having a plurality of outwardly flaring notches spaced along one edge thereof and merging into holes having arcuate edges spaced inwardly from the edge of said vane, said vanes being spaced from each other with the notches of each vane aligned with the corresponding notches of the adjacent vane, a second set of spaced vanes each disposed in and extending through one set of the aligned notches of said first vanes, each of said second vanes having a pair of arcuately curved and resiliently flexible ribs projecting into the holes in said first vanes and urged in opposite directions against the edges of said holes to hold said first and second sets of vanes in assembled relationship, said ribs and said holes being shaped to leave the vanes of each set free for pivotal adjustment relative to the vanes of the other set, supporting means pivotally mounting said second set of vanes, means constituting the sole connection between said core and said frame fastening said supporting means to said frame, said supporting means comprising a pair of posts disposed adjacent opposite ends of the vanes of said second set, said posts having notches spaced along one edge thereof in accordance with the spacing of the notches in the vanes of said first set, and said notches in said posts receiving said ribs on the vanes of said second set to pivotally mount the latter.

5. A double-adjustable grille as defined in claim 4 in which the vanes of said second set are made of a sheet of resiliently flexible material folded laterally and then reversely to form a pair of opposed side panels, and said ribs are formed integrally with the free edges of said side panels.

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ROBERT A. O'LEARY, *Primary Examiner.*

M. A. ANTONAKAS, *Assistant Examiner.*