

Sept. 30, 1952

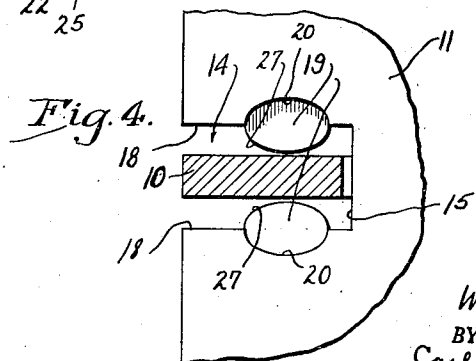
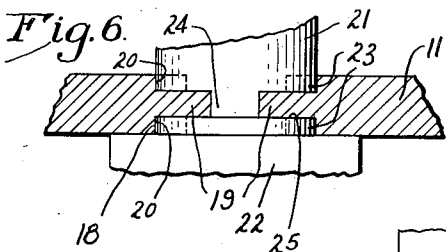
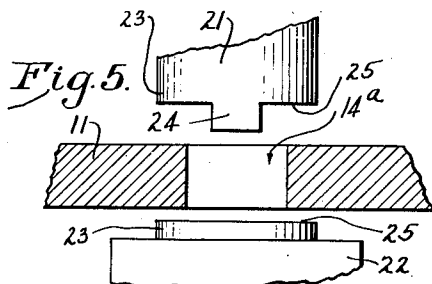
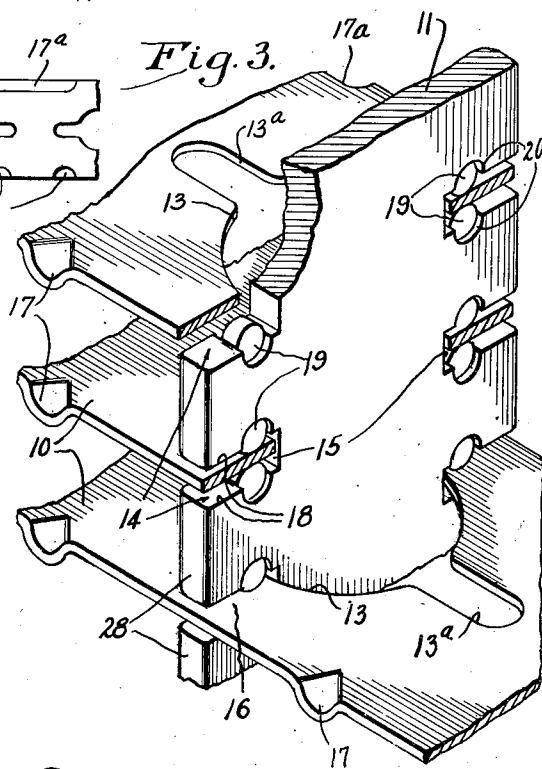
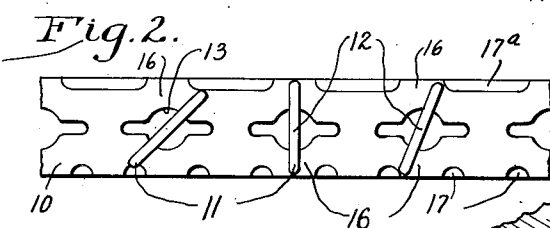
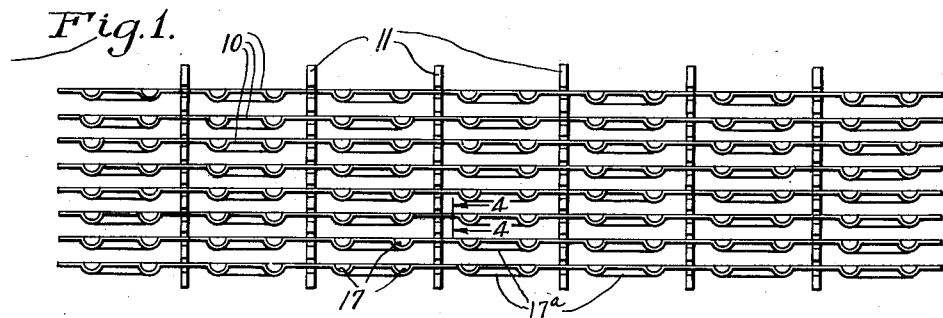
W. W. KENNEDY

2,612,096

ADJUSTABLE AIR DISTRIBUTION GRILLE

Filed Dec. 21, 1949

2 SHEETS—SHEET 1



INVENTOR.
Walter W. Kennedy
BY
Carlson, Pilger, Hessel & Wolf
ATTORNEYS

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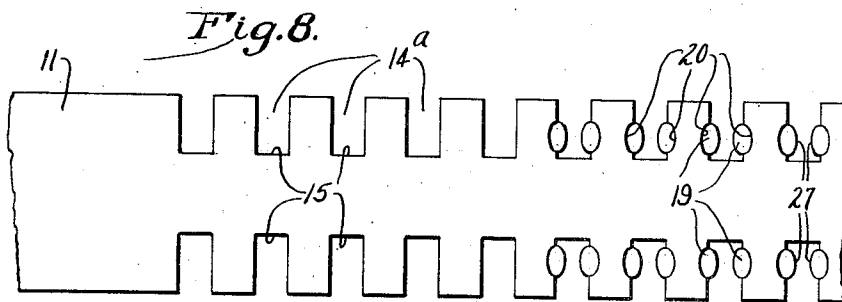
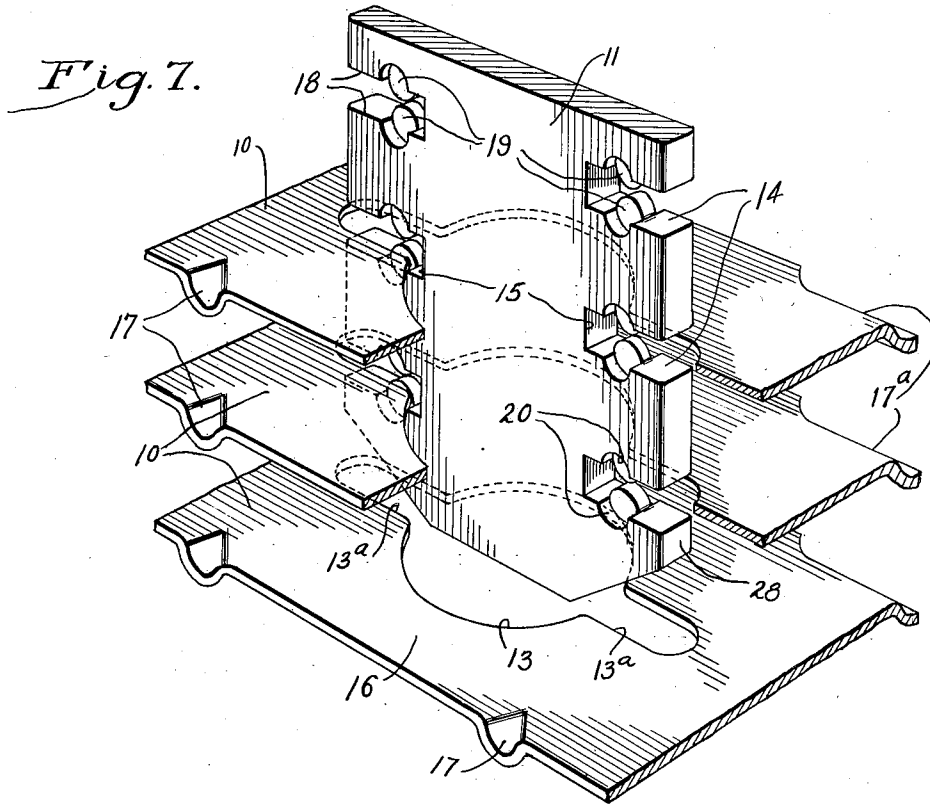
W. W. KENNEDY

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ADJUSTABLE AIR DISTRIBUTION GRILLE

Filed Dec. 21, 1949

2 SHEETS--SHEET 2



INVENTOR.

INVENTOR,
Walter W. Kennedy

BY

Carlson, Pitzner, Husband + Wife

ATTORNEYS

UNITED STATES PATENT OFFICE

2,612,096

ADJUSTABLE AIR DISTRIBUTION GRILLE

Walter W. Kennedy, Rockford, Ill., assignor to
Barber-Colman Company, Rockford, Ill., a corporation of Illinois

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7 Claims. (Cl. 98—40)

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This invention relates to air distribution grilles having one set of spaced vanes or fins crossing another set of vanes or crossbars in relatively perpendicular relationship with each crossbar adapted for individual adjustment about a longitudinal axis so that, by selective adjustment of the crossbars, the direction of all or part of the air stream discharged through the grille may be varied as desired.

The general object of the invention is to interfit the two sets of vanes together in a novel manner which permits the vanes to be made of relatively thin sheet metal so as to obtain an optimum free air area through the grille, which facilitates assembly at low cost, and which insures firm retention of the vane adjustments in spite of manufacturing variations and wear in service use.

A further object is to notch the crossbars and aperture the fins for interfitting in a novel manner such as to utilize the inherent unevenness and inaccuracies of the thin fins to insure firm frictional holding of the crossbars in all of their positions of adjustment.

Another object is to confine the rubbing engagement between the notch walls and the fins to areas of the latter which are not exposed to view.

The invention also resides in the novel construction of the crossbar notches which avoids excessive breakage of the punching tools while enabling the required close dimensional limits to be attained.

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 the core of an air distribution grille embodying the novel features of the present invention.

Fig. 2 is a fragmentary plan view.

Fig. 3 is an enlarged fragmentary perspective view of a part of the grille core.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 1.

Figs. 5 and 6 are fragmentary views illustrating steps in the punching of the crossbars.

Fig. 7 is a fragmentary view similar to Fig. 3 illustrating the initial step in the assembly of the grille.

Fig. 8 is a fragmentary face view of one of the crossbars in the course of its formation.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment. It

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is to be understood, however, that I do not intend to limit the invention by such disclosure, but aim to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The grille core shown on the drawings for purposes of illustration comprises generally a multiplicity of closely spaced vanes or fins 10 crossing a plurality of vanes or crossbars 11 in perpendicular relationship, the bars and fins interfitting with each other in a novel manner such that each set of vanes is supported and maintained in spaced parallel relation entirely by the vanes of the other set, while at the same time permitting each crossbar to be adjusted about its longitudinal axis 12. For these two purposes, each fin is cut away between its side margins to form holes 13 for receiving the crossbars by endwise insertion of the latter through the holes (see Fig. 7) and the margins of the crossbars are formed with notches 14 to permit turning of the inserted crossbars into interfitting relation with respect to the fins.

To avoid unnecessary reduction in the free air area through the grille, the fins are made of thin strip material, preferably soft steel, about .018—.020 of an inch thick and of sufficient width and close lateral spacing to gain control over the air forced through the grille frame. The holes 13 are formed at opposite ends with narrow slots 13^a by which the holes are elongated along the center line of the fins to a length slightly greater than the over-all width of the crossbars. Intermediate their ends, the holes are generally circular in form and of a diameter slightly greater than the spacing of the roots 15 of the notches 14 on opposite sides of the crossbar. A land 16 is thus formed between each marginal edge of the fin and the adjacent edge of the fin hole 13.

Preferably, the side margins of each fin are deformed at longitudinally spaced points to form deflecting and diffusing elements 17 along one margin and similar but substantially longer elements 17^a along the other margin, the elements 17 and 17^a being staggered relative to the holes 13 in the fins.

The crossbars 11 are made substantially stiffer and thicker than the fins 10 in order that they may be held in tight frictional engagement with the fins to retain their adjusted positions and yet may be turned to different positions without danger of becoming twisted or bent. Preferably, the bars comprise flat strips of metal about $\frac{1}{8}$ of an inch thick and only slightly narrower

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than the fins 10, whereby to enable the bars to be used most effectually in deflecting each increment of the air stream discharged through the space between a pair of adjacent fins and a pair of adjacent crossbars.

The invention contemplates a novel shaping of the crossbar notches 14 to permit formation thereof in a punching operation, to facilitate assembly of the fins and crossbars, to enable the fins to be of very thin sheet metal, to compensate for dimensional inaccuracies resulting from formation of the fins as sheet metal stampings, and to utilize the resiliency of the fin material in producing firm, binding engagement for maintaining the adjusted positions of the crossbars. To these ends, the side walls 13 of the crossbar notches 14 are spaced apart a distance, for example, $\frac{5}{16}$ of an inch, several times the thickness of the fins 10, the notches being about $\frac{3}{8}$ of an inch deep in the present instance. Then, to adapt the notch walls for engagement with the fins, the metal of the crossbar adjacent the notches is deformed so as to produce lugs or projections 19 extending inwardly and partially across the notch for frictional bearing engagement with the surfaces of the fin lands 16. Herein each notch has two lugs 19 projecting inwardly toward each other at points adjacent the notch roots 15 which are substantially square. While the lugs may be of various shapes, they are in the present instance generally semicircular and formed by first punching squared notches 14^a along the edge of the crossbar and then compressing semicircular areas 20 of the crossbar to reduce the thickness of the crossbar over these areas and cause the metal thus displaced to flow inwardly and into the notches in the plane of the crossbar. This may be accomplished by the co-action of dies 21 and 22 (Figs. 5 and 6) having opposed flat surfaces 23 rounded at their ends 23, one of the surfaces having a flat sided projection 24 of a width equal to the spacing of the lug ends desired in the finished crossbar.

In the movement of the dies together to the position shown in Fig. 6, the metal displaced from the areas 20 flows inwardly along and between the confining surfaces 25 which in the final position of the dies (Fig. 6) are spaced according to the desired thickness of the lugs 19, this being less than the thickness of the crossbars. Because the depressed areas 20 are semicircular and therefore wider at their centers, more metal is displaced along the center lines and therefore the natural flow of the metal imparts a generally rounded contour to the inner end surfaces of the projections 19. Thus, the outer edge portions 27 of the lug edges diverge outwardly toward the open ends of the notch and merge with the walls 13 thereof without leaving any abrupt shoulders. The extreme ends of the projections are preferably spaced apart a few thousandths of an inch more than the thickness of the fins, the spacing being about .025 of an inch in the present instance.

To assemble the fins and crossbars, the fins are supported in parallel relation and spaced according to the spacing of the crossbar notches 14. Next, the bars are alined with the axes of the fin holes while the bars are disposed in planes paralleling the side edges of the fins. Now, as the bars are moved endwise into and through the holes, the opposite edge portions will pass through the slots 13^a of the fins as shown in Fig. 7. With the fins lying in the planes of the respective bar notches, the bars may be turned about their axes

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whereupon the notches swing out of the fin slots 13^a and the projections 19 of each pair straddle the associated fin and pass around the land 16 for engagement with the surfaces of the latter along an arcuate line spaced outwardly from the edges of the holes 13.

The entry of the fin in between the lugs 19 is facilitated by the inward convergence of the lug surfaces 27 which thus act as guides on the defining edges of the slots 13^a and direct the fin lands 16 into the narrow parts of the notches. Proper interengagement of the fins and crossbars is thus achieved even though many of the lands 16 will not be centered in the notches as they enter the latter. Because of this, the minor deformities of the fins naturally resulting from the stamping operations performed on the fins do not interfere with the assembly of the parts. Actually, these deformities are utilized to advantage in producing sufficient frictional engagement between the surfaces of the fins and the lugs 19 to insure retention of the crossbars effectually in their different positions of adjustment. Thus, in the slight bending of one of the fin lands 16 as may be necessary in forcing its entry between the lugs 19, the force under which the land and lug surfaces are pressed together is increased. The resulting friction thus created at a multiplicity of points along each crossbar is sufficient to hold the bar firmly in any selected position of angular adjustment. The combined friction on each bar is usually sufficient to require adjustment of the bars by means of a suitable tool capable of exerting substantial leverage.

In the grille constructed in the manner above described, it will be apparent that the fins remain equally spaced at all times and thus impart a uniform and attractive funnel appearance to the grille face. Since the edges 23 of the crossbars between the adjacent notches 14^a remain visible in all positions of angular adjustment of the crossbars, the variation of the spacing of the visible edges 23 in different positions of adjustment of the crossbars is hardly noticeable. In addition, the grille is extremely versatile in enabling the discharged air to be deflected in any pattern in the plane of the fins simply by adjusting the crossbars to different angular positions as illustrated in Fig. 2. Moreover, the construction lends itself to mass production of the parts by stamping operations together with quick and simple assembly.

I claim as my invention:

1. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, semicircular depressions formed in opposite sides of said crossbars adjacent the margins of each of said notches, and lugs projecting into said notches and toward each other from the depressed portions of the crossbar with the opposed inner ends of the lugs spaced apart a distance slightly greater than the thickness of the fins for engagement with the surfaces of said fin portions.

2. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker

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than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, semicircular depressions formed in opposite sides of said crossbars adjacent the margins of each of said notches to displace material edgewise of said margins, and lugs formed out of said displaced material and projecting into said notches and toward each other and into engagement with the surfaces of at least part of said fins.

3. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars of ductile metal substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, and lugs struck out of said crossbars and projecting toward each other from opposite walls of the notches with the opposed inner ends of the lugs spaced apart a distance slightly greater than the thickness of the fins whereby each fin, owing to its inherent deformities bears frictionally against the ends of a plurality of said lugs.

4. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, and projections thinner than said crossbars and integral therewith extending into said notches from the defining walls thereof and adapted for bearing engagement at their inner ends with surfaces of said fins at points disposed outwardly from the edges of the holes.

5. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls

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straddling the portions of the fins surrounding said holes, and lugs projecting inwardly from the walls of said notches for engagement at their inner ends with surfaces of said fins and along arcs larger than said fin holes.

6. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, and a pair of lugs in each of said notches projecting inwardly toward each other from opposite walls of the notch at points spaced inwardly from the outer ends of the notches, the outwardly facing side edges of the lugs of each pair converging inwardly from the outer end of the notch whereby to guide the entrance of one of said fins edgewise into the notch and past the lugs.

7. A grille comprising a series of thin flat fins disposed in spaced parallel relation and having holes therethrough spaced longitudinally of the fins, a plurality of crossbars substantially thicker than said fins each extending through one set of the alined holes of the fins and having marginal notches substantially wider than the thickness of said fins and defined by parallel side walls straddling the portions of the fins surrounding said holes, and lugs integral with said crossbars and projecting into said notches from opposite walls thereof with the opposed inner ends of the lugs adapted for engagement with the surfaces of said fins, the end surfaces of each lug being convexly curved.

WALTER W. KENNEDY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,185,712	Rowley	Jan. 2, 1940
2,272,227	Thomas	Feb. 10, 1942

FOREIGN PATENTS

Number	Country	Date
564,707	Germany	Nov. 22, 1932
810,856	France	Jan. 6, 1937