

[54] VENT OPENING GRILL

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[58] Field of Search **98/110, 114, 121 A, 40 V**

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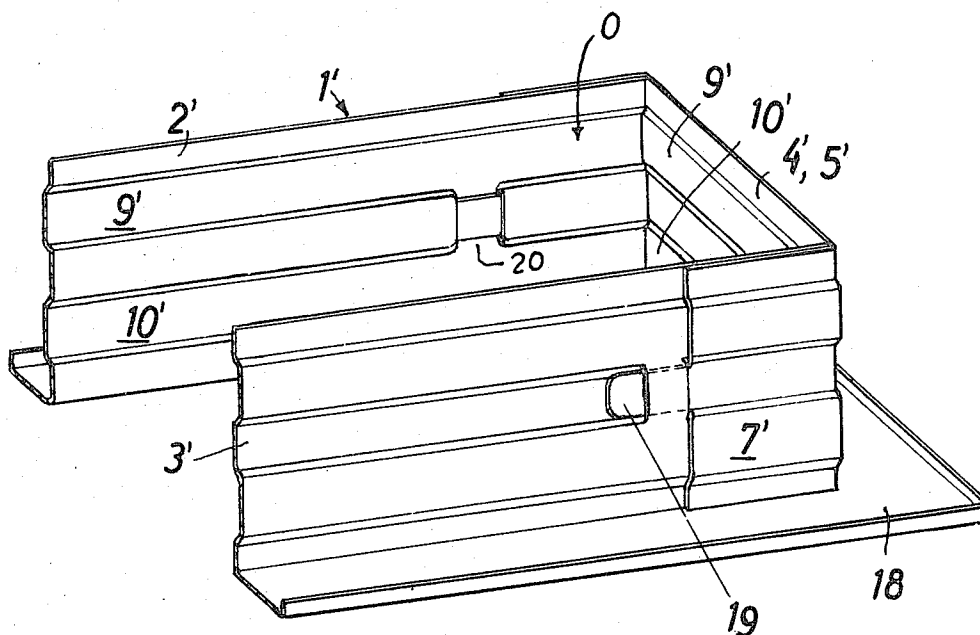
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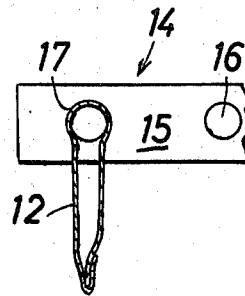
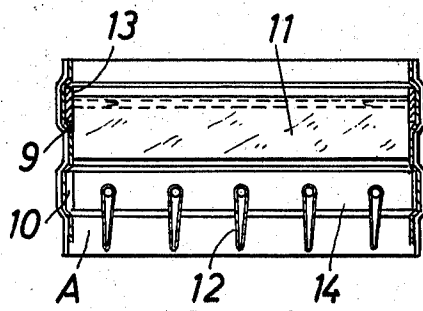
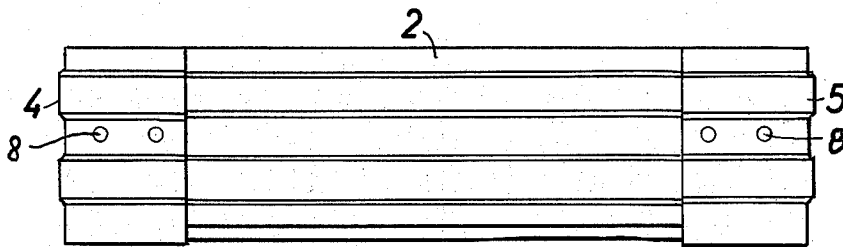
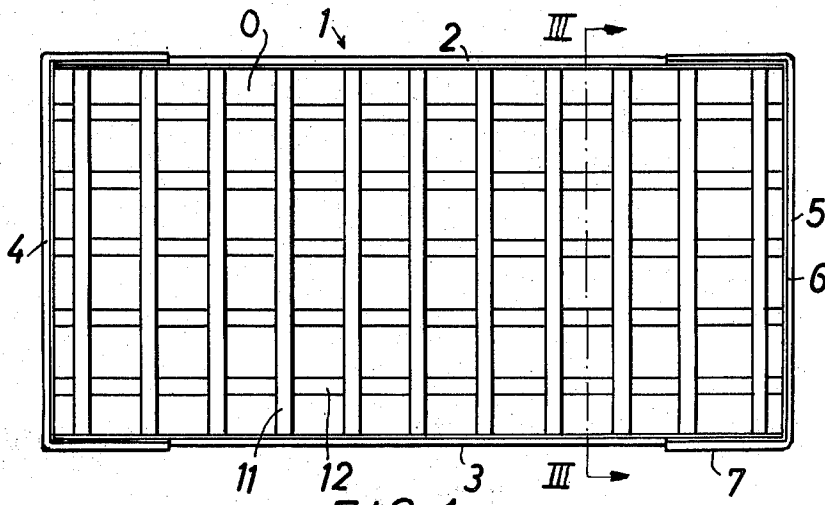
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[57] **ABSTRACT**

A vent opening grill having a rectangular frame composed of two pairs of parallel frame members surrounding a rectangular vent opening and consisting of metallic or plastic sheet material. The inner sides of the frame members are provided with elongated parallel grooves which snugly receive rails having rows of parallel pins for louvers which extend across the vent opening and are turnable about the respective pairs of pins. The louvers between one pair of frame members are normal and offset relative to the louvers between the other pair of frame members. The frame members of one pair are U-shaped and have pairs of legs which overlap and are connected with adjacent end portions of the other pair of frame members. One pair of frame members may be integral with a flat plate which surrounds one end of the vent opening.

10 Claims, 5 Drawing Figures





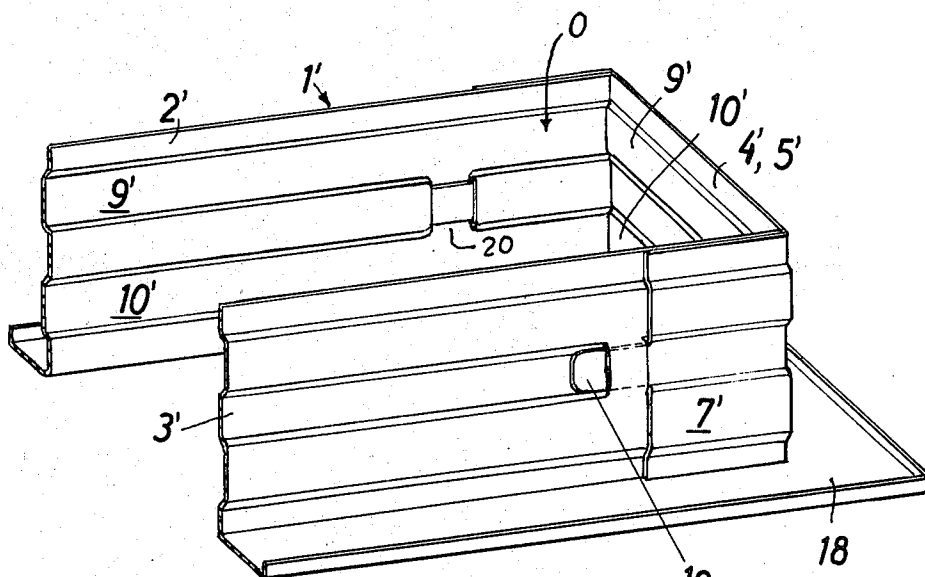


FIG. 5.

VENT OPENING GRILL

BACKGROUND OF THE INVENTION

The present invention relates to vent opening grills in general, and more particularly to improvements in vent opening grills having one or more rows of louvers which are adjustable relative to the frame of the grill.

SUMMARY OF THE INVENTION

An object of the invention is to provide a novel and improved vent opening grill which is assembled of a small number of simple parts.

Another object of the invention is to provide a vent opening grill wherein the louvers are adjustable relative to the frame, and wherein the mounting or supporting means for the louvers are simpler than in conventional grills.

A further object of the invention is to provide a novel method of assembling the improved vent opening grill.

The improved vent opening grill comprises a frame defining a substantially rectangular vent opening and including a pair of frame members which flank the opening and are disposed in spaced parallel planes. The frame members have inner sides which face each other and each of which is provided with at least one elongated groove with the groove of one frame member parallel with the groove of the other frame member. The grill further comprises a pair of elongated rails each of which is received in one of the grooves, and a plurality of elongated parallel louvers extending between and transversely of the rails across the vent opening. The grill further comprises coupling means which connect the end portions of the louvers to the respective rails so that each louver is adjustable angularly about an axis extending between its end portions.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved vent opening grill itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a plan view of a vent opening grill which is constructed and assembled in accordance with a first embodiment of the invention;

FIG. 2 is a side elevational view of the grill shown in FIG. 1;

FIG. 3 is a transverse sectional view as seen in the direction of arrows from the line III—III of FIG. 1;

FIG. 4 is an enlarged view of the detail A shown in FIG. 3; and

FIG. 5 is a fragmentary perspective view of the frame forming part of a modified vent opening grill.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 1 to 3, there is shown a vent opening grill which comprises a substantially rectangular frame 1. The frame 1 includes two longitudinally extending parallel frame members 2 and 3, and two transversely extending substantially U-shaped frame members 4 and 5. The frame members 2 and 3 are substan-

tially flat plates of metallic or synthetic plastic sheet material. Each of the end frame members 4 and 5 comprises an elongated base 6 which extends transversely of the frame members 2, 3 and two parallel legs 7 which are normal to the respective base 6 and overlap the adjacent end portions of the frame members 2 and 3. As shown in FIG. 2, the legs 7 are riveted (as at 8) to the adjacent end portions of the frame members 2 and 3. However, it is equally within the scope of the invention to resort to welding or to employ a suitable adhesive. It is further clear that the length of each base 6 may exceed or equal the length of the frame members 2 and 3.

Each of the frame members 2, 3, 4, 5 consists of sheet material and can be obtained by stamping, punching or rolling. As shown in FIGS. 2 and 3, each of these members has an internal surface or inner side formed with a pair of longitudinally extending parallel grooves 9 and 10. When the frame 1 is assembled, the grooves 9 and 10 of the frame members 2 and 4 respectively face the grooves of the frame members 3 and 5. Since the material of the frame members 2-5 is preferably of constant thickness, the formation of grooves 9 and 10 in the inner sides of these frame members results in the formation of complementary raised portions in the external surfaces of such members. This is clearly shown in FIGS. 2 and 3. When the frame 1 is fully assembled, the grooves 9 of all four frame members 2-5 are located in a first plane, and the grooves 10 of all frame members are located in a second plane which is parallel to and spaced from the plane of the grooves 9 as considered in the direction of air flow through the opening O which is bounded by the frame members 2, 3 and webs 6 of the frame members 4 and 5.

The grooves 9 of the frame members 2 and 3 receive two elongated rails 13 which are configured in such a way that each thereof is a rather snug fit in the respective groove 9. The inner sides of the rails 13 are provided with rows of parallel projections here shown as pins 16 (see also FIG. 4) which serve as a means for coupling the rails 13 with a plurality of parallel louvers 11 which extend across the opening O and between the frame members 2 and 3. A second pair of rails 14 are received in the grooves 10 of the bases 6 of the frame members 4, 5 so that they extend at right angles to the rails 13 in the grooves 9. Each of the rails 14 is also provided with a row of coupling pins 16 which are received in the adjacent end portions of louvers 12. Each of the louvers 11 and 12 has two end portions provided with substantially circular recesses or bores 17 (see FIG. 4) for reception of the adjacent pin 16 in such a way that the louver 11 or 12 is turnable about the common axis of the respective pair of pins 16. In the positions shown in FIGS. 1 and 3, the planes of the louvers 11 are parallel to the planes of the bases 6, and the planes of the louvers 12 are parallel to the planes of the frame members 2 and 3. Each of the rails 9 and 10 is shown in the form of a strip 15 consisting of metallic or synthetic plastic material. The length of each strip 15 preferably equals the length of the corresponding groove 9 or 10. The pins 16 in the strips 15 forming part of the rails 9 and 10 are preferably but not necessarily equidistant from each other.

As shown in FIG. 4, each of the louvers 11 and 12 (only one of the louver 12 shown) can be obtained by suitably folding a blank of sheet material so as to impart thereto a substantially airfoil-shaped profile. The afore-

mentioned recesses 17 in the end portions of each of the louvers 11 and 12 may constitute bores of finite length or continuous bores which extend all the way between the two end faces of the respective louvers. The sockets or recesses 17 preferably receive the respective pins 16 with at least some friction so that the louvers 11 and 12 will normally remain in their selected angular positions. Means may be provided to simultaneously adjust the entire set of louvers 11 or 12. Alternatively, each of the louvers 11 or 12 can be adjusted by hand.

The vent opening grill of FIGS. 1 to 4 can be assembled as follows:

In the first step, a suitable number of louvers 11 will be mounted on the pins 16 of the rails 13. A second set of louvers 12 will be mounted on the pins 16 of the rails 14. The frame members 2 and 3 are maintained at a necessary distance away from each other so that they are located in parallel planes as shown in FIG. 1. One of the frame members 4, 5 is attached to the respective end portions of the frame members 2 and 3 so that the frame 1 is assembled with the exception of the member 5 or 4. In the next step, the rails 13 (with the set of louvers 11 therebetween) are slid into the grooves 9 of the frame members 2, 3 in a direction toward the transverse frame member 4 or 5. The rails 14 (with a set of louvers 12 therebetween) are inserted into the grooves 10 until the leading rail 14 enters the groove 10 of the transversely extending frame member 4 or 5. In the final step, the frame member 5 or 4 is attached to the adjacent ends of the frame members 2, 3 to thus complete the assembly of the frame 1 and of the entire vent opening grill. The frame member 5 or 4 is attached in such a way that its groove 10 receives the other rail 14. As mentioned before, the frame members 2 to 5 can be obtained by punching, stamping or rolling. However, it is equally within the scope of the invention to produce such frame members by resorting to extrusion of metallic or synthetic plastic material. It is further clear that the improved vent opening grill may be provided with a single set of louvers or with more than two sets of louvers. For example, the grooves 10 in the frame members 4, 5 can be omitted if the grill is to comprise only a single set of louvers, namely, the louvers 11 between the rails 13. If the louvers are to extend in parallelism with the frame members 2, 3, the louvers 11 and the corresponding rails 13 will be omitted so that the construction of the frame members 2 and 3 can be simplified by omitting the grooves 9.

In accordance with a presently preferred mode of making the rails 13 and 14, the pins 16 are preferably made integral with the corresponding strips 15. For example, each of the rails 13 and 14 can be made by molding a plastic material into the shape of a long, rectangular profile and shaped integrally with the respective row of pins 16. If desired, the rails 13 and 14 can be provided with holes for reception of coupling pins which are integral with or removably inserted into the sockets 17 of the corresponding louvers 11 and 12. The embodiment which is shown in the drawing and according to which the pins 16 are integral with the respective strips 15 is preferred at this time because it simplifies the production substantially.

The frame 1' of the vent opening grill shown in FIG. 5 is similar to the frame 1 of FIGS. 1 to 3. All such parts of the structure shown in FIG. 5 which are clearly analogous to or identical with the corresponding parts of the first grill are denoted by similar reference charac-

ters each followed by a prime. The parallel frame members 2' and 3' are punched from a single blank of metallic sheet material and are dimensioned in such a way that they provide a flat frame front portion 18 which is integral with the members 2' and 3'. The portion 18 constitutes a flat frame member at one end of the vent opening O. As shown, the frame members 2' and 3' are bent at right angles to the general plane of the flat frame member 18. The grooves 9' and 10' in the frame members 2' and 3' are made by stamping prior to bending but after the necessary cutting of the blank which is converted into the frame members 18, 2' and 3'. The configuration of the transverse frame members 4', 5' is substantially identical with that of the frame members 4 and 5. The main difference is that the legs 7' of the frame members 4', 5' are provided with elongated tongues 19 which extend through substantially eyelid-shaped apertures 20 provided therefor in the adjacent end portions of the frame members 2' and 3'. Consequently, the rivets 8 shown in FIG. 2 can be omitted.

The frame 1' of FIG. 5 is assembled substantially in the same way as the frame 1 of FIGS. 1 to 3. However, the assembly is simplified because the frame members 2' and 3' are automatically maintained in parallel planes by the flat frame member 18, so that the transverse frame members 4' and 5' need not be connected to the frame members 2', 3' prior to insertion of one or both sets of louvers and the corresponding rails (not shown in FIG. 5). Furthermore, and since the frame members 4' and 5' need not be attached to the frame members 2', 3' prior to insertion of the louvers, both ends of the opening O between the frame members 2' and 3' can remain open for convenient insertion of the rails and louvers. In fact, the frame members 4' and 5' can be omitted altogether, particularly if the material of the frame members 2', 3' and 18 is rigid enough to insure that the frame members 2' and 3' will not change their positions relative to each other. The omission of the frame members 4', 5' will not in any way effect the stability of the frame 1' if the material of the frame members 2', 3' is sufficiently rigid and particularly if the frame 1' is to receive a single set of louvers, namely, a set of louvers which extend transversely of the frame members 2' and 3'. The frame 1' may consist of metallic or synthetic plastic material.

Vent opening grills according to the invention are used, a.o., as air supply or extraction grills. They can also be used as dampers, e.g., to reduce draft in case of fire. For supplying cold or warm air in a room conditioning system (or just through a vent hole in an outside wall) it would be suitable to arrange the front louvers (facing the room) horizontally and to adjust the louvers to conduct the air flow upwardly away from the floor in case of cold air (or downwardly towards the floor in case of warm air) and to arrange the rear louvers vertically and divergently to spread the air flow in horizontal directions.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and the range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. A grill, comprising a frame defining a substantially rectangular vent opening and including two first and second frame portions of sheet material flanking said opening, said first frame portions being disposed in spaced parallel planes and having inner sides facing each other and each provided with at least one elongated first groove having two open ends, and outer sides facing away from each other and each comprising a least one elongated bulge complementary to said first groove, said grooves and said bulges being parallel to each other, and each of the second frame portions comprising a base and two legs adjacent said base and extending perpendicularly thereto in mutual parallelism, at least said legs being provided with second grooves, said legs overlapping portions of said outer sides and portions of said bulges of said first frame members being received in said second grooves; a pair of elongated rails each received in one of said first grooves; a plurality of elongated parallel louvers extending between and transversely of said rails across said opening and each having two end portions; and coupling means connecting the end portions of said louvers to the respective rails so that each of said louvers is adjustable angularly about an axis extending between the respective end portions.

2. A grill as defined in claim 1, wherein said frame portions are elongated and said first grooves extend through substantially the full length of the respective frame portions.

3. A grill as defined in claim 1, wherein said portions of said outer sides are provided with eyelid-shaped apertures and said legs comprise tongues extending into the respective apertures.

4. A grill as defined in claim 1, wherein said second frame portions have inner sides facing each other and provided with a plurality of parallel grooves, each first frame portion also having a plurality of parallel grooves and each groove of said second frame portion being coplanar with one groove of said first frame portion.

5. A grill as defined in claim 1, wherein said second

frame portions include additional inner sides facing each other and provided with additional grooves extending substantially the entire length of at least said base, said additional grooves having longitudinal axes defining a first plane and the longitudinal axes of said first grooves defining a second plane parallel to and spaced from said first plane; and further comprising an additional pair of elongated rails each received in one of said additional grooves; an additional plurality of elongated parallel louvers extending between and transversely of said additional rails across said opening and each having two end portions; and additional coupling means connecting the end portions of said additional louvers to the respective additional rails so that each of said additional louvers is adjustable angularly about an axis extending between the respective end portions of said additional louvers.

6. A grill as defined in claim 5, wherein said second and said additional grooves extend over both said legs and said base of said second frame portion, said inner sides of said first frame portions being provided with additional first grooves whose axes are located in said first plane and said outer sides of said first frame portions comprising additional bulges complementary to said additional first grooves and being received in said additional grooves.

7. A grill as defined in claim 1, wherein said frame further includes a substantially flat end frame portion surrounding said opening and rigid with said first frame portions, said planes being at least substantially normal to the plane of said flat frame portion.

8. A grill as defined in claim 7, wherein said first and end frame portions consist of a single piece of sheet material and said first frame portions extend from one side of said end frame portion.

9. A grill as defined in claim 1, wherein said coupling means are pins which are rigid with said rails and extend into sockets provided in the adjacent end portions of the respective louvers.

10. A grill as defined in claim 9, wherein said rails and said pins consist of synthetic plastic material.

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