

[54] COMPOUND AIR REGISTER OF ONE PIECE CONSTRUCTION

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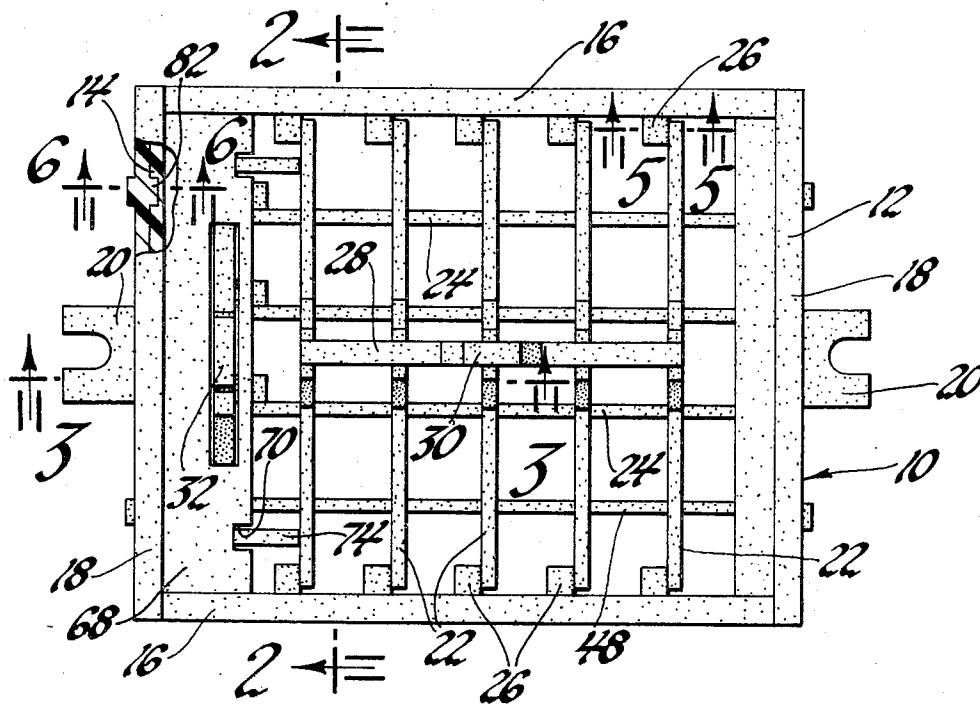
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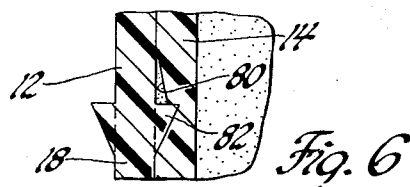
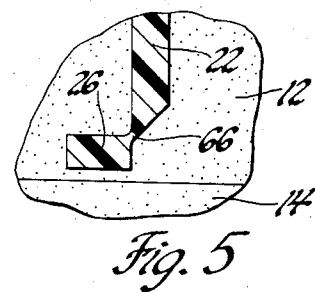
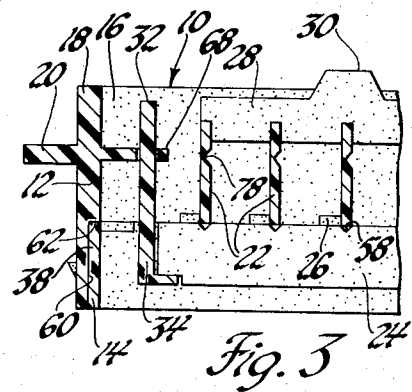
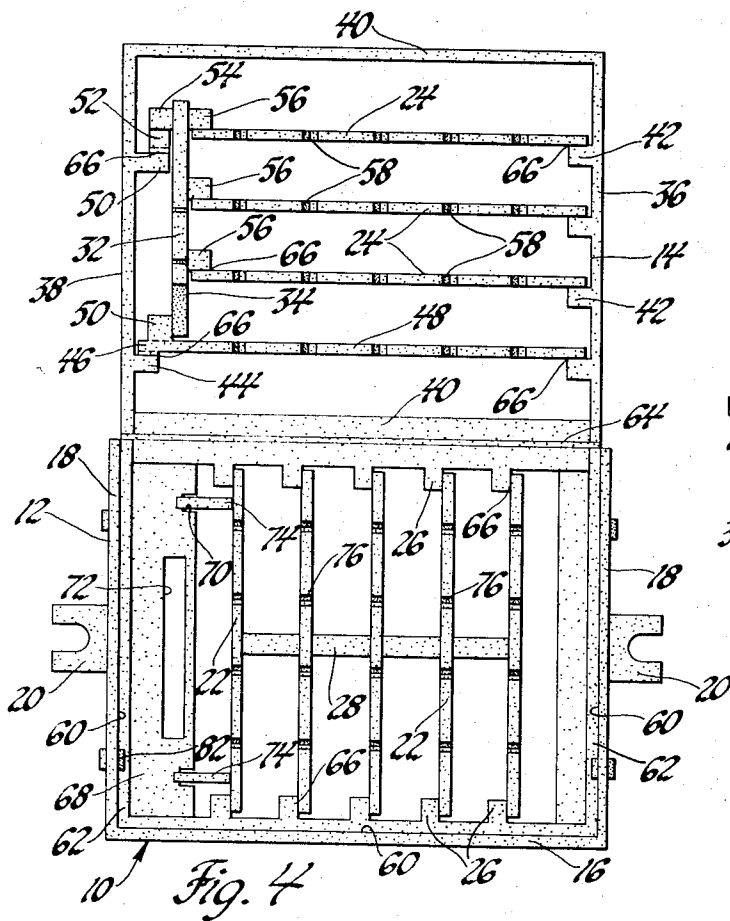
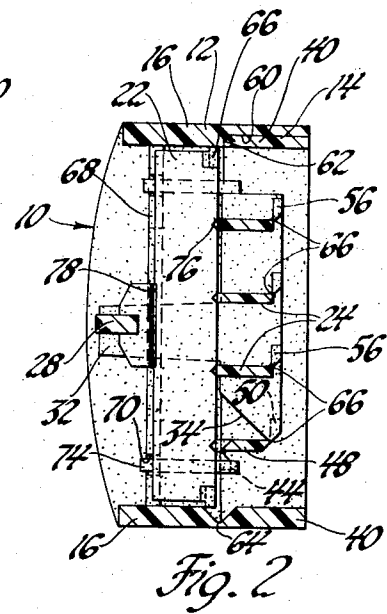
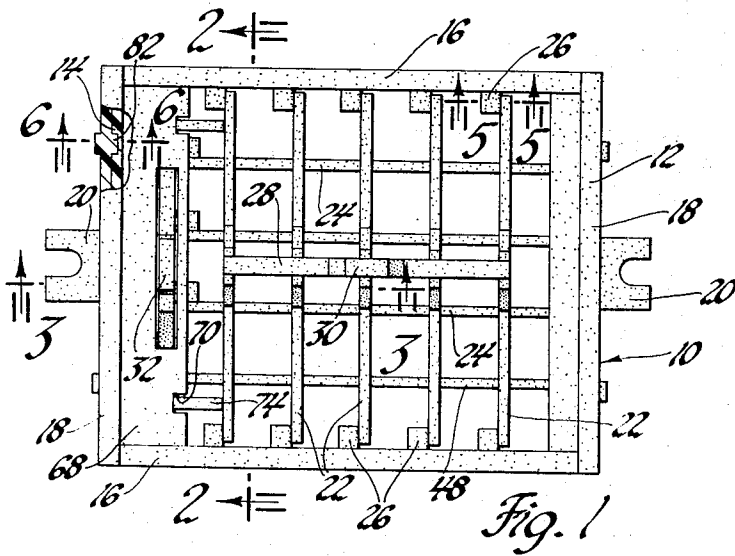
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ABSTRACT

A compound air register of one-piece molded plastic construction, in preferred form of molded polypropylene, including integrally connected frame members one being pivotally folded within the other, the respective frame members each including a plurality of vanes forming a vane set integrally molded therewith and capable of pivotal movement relative thereto. The vanes in the one frame vane set rotate about an axis normal to the axis of rotation of the vanes in the other frame vane set. When folded together the vanes in the one frame vane set are positioned normal to the vanes in the other frame vane set controlling the flow of air in both vertical and horizontal planes. Actuating means are also molded integral with the respective pluralities of vanes so that they may be rotated in unison as desired.

3 Claims, 5 Drawing Figures





COMPOUND AIR REGISTER OF ONE PIECE CONSTRUCTION

The present invention relates to a compound air register capable of controlling flow of air in both vertical and horizontal planes. More specifically, the present invention pertains to such a compound air register of one piece molded plastic construction wherein two frames, each containing a plurality of integrally molded pivotal vanes, are molded with an integral hinge connection providing for folding one of the frames within the other forming a compound unit.

Assembly of air registers providing control of air flow in both vertical and horizontal planes usually involves the association of several separate elements requiring a plurality of assembly steps to provide the finished product. For example, assembly of a plurality of pivotally mounted vanes in a single frame for operation in unison has required manufacturing and assembly costly procedures. The subject invention overcomes these difficulties by providing an integral molded plastic assembly, preferably composed of polypropylene, including two frames hinged together for folding one frame within the other. Each frame includes a plurality of integrally hinged vanes forming a vane set capable of pivoting relative to the frame, the vanes in one frame being disposed normal to the those in the other frame for controlling air flow through the register in vertical and horizontal planes. An actuating member is also integrally molded to each vane in the respective pluralities of vanes for manual movement of the vanes in unison for selective direction of the air flow. The respective vane sets, through their actuating means, are capable of separate actuation to direct the flow of air in one plane independent of the direction of flow in the other plane. When the frames are folded together, the vane sets are juxtaposed forming a relatively compact compound air register.

The compound air register of the subject invention is preferably composed of polypropylene because of its ability to flex in thin cross-sections as a hinge and is relatively stiff in thicker cross-sections for providing a framework. Of course, it will be understood that other suitable plastic materials having the ability to flex in thin sections while being relatively stiff in thicker sections could be used to form the subject air register.

A primary object of the present invention is the provision of a one-piece molded plastic compound air register formed as an integral unit while being capable of directing air in two planes.

Another object of the present invention is the provision of a compound air register including two frame members hinged together by a web portion for folding one frame member within the other, each frame member containing a plurality of pivotal vanes in a vane set with manual actuating means for each vane set, the entire unit being of one-piece construction of molded polypropylene.

A further object of the present invention is the provision of a compound air register including two frame members hinged together by a web portion for folding one frame member within the other frame member, each frame member including oppositely aligned inwardly extending hinge blocks connecting with a web hinge portion that in turn connects with a vane so that a plurality of vanes are capable of pivotal movement within and relative to their respective frames when a respective actuating member connected to the vanes in

each frame is moved, the entire register being of integral molded polypropylene construction.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is an elevational view of a compound air register constructed in accordance with the present invention.

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1 showing the integrally molded frame members of the subject air register in a folded position.

FIG. 3 is a fragmentary cross-sectional view taken on line 3—3 of FIG. 1.

FIG. 4 is an elevational view of the frames of the subject air register in an unfolded position illustrating the integrally molded pivotal connections of the vanes to the frames and the hinge connection between the frames.

FIG. 5 is an enlarged fragmentary cross-sectional view taken on line 5—5 of FIG. 1 showing a pivotal connection between a vane and a frame member.

FIG. 6 is an enlarged fragmentary cross-sectional view illustrating means for securing the frames together when moved to a folded position.

Referring now to FIG. 1, a compound air register 10 constructed in accordance with the subject invention includes an outer frame 12 having an inner frame 14 folded therein. The outer frame 12 consists of side portions 16 and end portions 18, the latter having mounting brackets 20 extending therefrom. The frame 12 contains a plurality of vanes 22 while the inner frame 14 contains a plurality of vanes 24 that extend in a direction normal to that of the vanes 22. The side portions 16 of outer frame 12 include a plurality of integrally attached spaced oppositely aligned and inwardly extending projections or hinge blocks 26. Respective ends of the vanes 22 are connected to the hinge blocks 26 via integral reduced web portions acting as hinges as will be later described in detail. A gang bar 28 including a handle 30 is connected to an upper edge of each of the vanes 22 for manual pivoting of the vanes in unison. Likewise the vanes 24 are capable of movement in unison when a handle 32, integrally connected to a gang bar 34, is actuated.

With reference to FIG. 4, the inner frame 14 includes end portions 36 and 38 and side portions 40. End portion 36 includes integral inwardly extending hinge blocks 42 positioned to support one end of each of the aligned vanes 24, while the end portion 38 includes a first inwardly extending hinge block 44 pivotally supporting end 46 of a modified vane 48 which in turn connects with a hinge block 50 integral with gang bar 34. The end portion 38 also includes a second inwardly extending hinge block 50 which is connected with a short link 52 that in turn connects with a hinge block 54 secured to gang bar 34. The gang bar 34 has a plurality of inwardly extending hinge blocks 56 which connect with respective ends of vanes 24 through respective web portions as shown. The vanes 24 include a series of spaced V notches 58 for a purpose later described.

The outer frame 12 includes relieved portions 60 which terminate in shoulders 62, best illustrated in FIGS. 2 and 3, for receipt of the inner frame 14 when

it is folded about integral hinge 64. As previously mentioned, the vanes 22 pivotally mounted within outer frame 12 are integral with hinge blocks 26, the pivotal connection being provided by a reduced web portion 66 which is likewise provided between the hinge blocks 42 and the vanes 24 in inner frame 14. The hinge web portions 66 are also provided between the inwardly extending hinge blocks 44 and 50 integrally connected with end portion 38 of the inner frame. Also the hinge blocks 56 which are integral with gang bar 34 are connected to the vanes 24 through a web portion 66 for relative pivotal movement therebetween. The outer frame 12 includes a plate 68 having notches 70 in one edge thereof and contains a rectangular aperture 72 which receives handle 32 providing for actuation of vanes 24 when the inner frame 14 is folded within the outer frame 12 and the handle 32 extends through the aperture 72. The notches 70 each receive a friction wheel 74 secured to an end vane 22 of the vane set so that the wheels engage surfaces of the plate and frictionally retain the vanes 22 in any adjusted position. The vanes 22 in the outer frame 12 also contain a series of V notches 76 similar to the notches 58 in the vanes 24.

With reference to FIGS. 2 and 3, the frames 12 and 14 are shown moved to their folded positions after being initially molded open as in FIG. 4. In the folded position, inner frame 14 engages stop shoulder 62 in the frame 12. The upper surfaces of vanes 24 and their notches 58 engage the aligned notches 76 in the vanes 22. Likewise the bottom edges of vanes 22 engage the aligned notches 58 in the vanes 24 providing respective pivot points as shown. The vanes 22 include reduced web portions 78 providing a hinge connection between the vanes and gang bar 28 so that there is relative movement between the vanes and the gang bar when the vanes are rotated by movement of handle 30.

A typical web portion 66 forming a hinge is shown in FIG. 5 wherein a vane 22 is illustrated being connected to hinge block 26 in an exploded view. A previously indicated, polypropylene is a preferred material for construction of the one-piece molded air register because of its characteristics of being flexible when configured in thin cross-sections while yet providing a relatively stiff member when provided in thicker cross-sections. Of course, it is appreciated that any plastic material could be used to form this one-piece unit as long as the aforementioned ability to be flexible when formed in relatively thin sections results while the material remains relatively stiff when produced in thicker sections.

The inner frame 14 is retained within outer frame 12 by virtue of a notched area 80 receiving a barbed lug 82 formed integral with end portion 18 of the outer frame 12. While a particular means of securing the inner frame within the outer frame has been shown, it is apparent that any known means could be used to retain the frames in a folded position providing the assembled unit.

It is significant that this invention does provide an air register capable of directing flow of air in both vertical and horizontal planes while being composed of a single molded unit. The one-piece construction, of course, is possible due to the characteristics of the particular material used. Polypropylene is particularly suitable for the construction of the subject air register in that it is a relatively tough material when formed in relatively

thick configurations while yet having the characteristic of being very flexible when formed in thin sections. These thin sections, such as the web portions 66, 78 and the relative larger web portion 64 forming the hinge between the frames 12 and 14, provide for the necessary relative movement between the components to assemble the unit and subsequently position the vanes in unison by movement of handle 30 or handle 32 as desired to selectively direct the flow of air in separate planes through the register 10.

While a preferred embodiment of the subject invention has been described for purposes of illustration only, such description is not intended to limit the scope of the invention except as required by the following appended claims.

I claim:

1. A compound air register of one piece molded plastic material construction of the type controlling the flow of air in both vertical and horizontal planes comprising: a first frame member including side and end portions; a plurality of oppositely aligned means on the side portions of said first frame member; a plurality of vanes integrally molded between said side members forming a vane set; a plurality of flexible plastic web portions connecting respective vanes to said aligned means forming a hinge connection therebetween; means attached to each of said vanes for manually rotating the plurality of vanes in unison on said hinge connections relative to said first frame about a first axis; a second frame member including side and end portions; a plurality of oppositely aligned means on the end portions of said second frame member; a plurality of vanes integrally molded between said end members also forming a vane set; a plurality of flexible plastic web portions connecting respective vanes to said aligned means forming a hinge connection therebetween; means attached to each of said vanes for manually rotating the plurality of vanes in unison on said hinge connections relative to said frame about a second axis normal to said first axis; and a molded thin web portion forming a hinge integrally pivotally connecting said first frame with said second frame whereby one of said frames can be folded within the other positioning the respective pluralities of vanes adjacent each other for controlling air flow in separate planes.

2. A compound air register of one-piece molded plastic material construction of the type controlling the flow of air in both vertical and horizontal planes comprising: a first frame member including side and end portions; a plurality of oppositely aligned inwardly extending hinge blocks on the side portions of said first frame member; a plurality of vanes integrally molded between said side members forming a first vane set; a plurality of flexible plastic web portions connecting respective vanes of the vane set to respective said aligned hinge blocks forming a hinge connection therebetween; a gang bar having a handle and being attached to each of said vanes for manually rotating the plurality of vanes in unison on said hinge connections relative to said first frame about a first axis, said vanes each having a plurality of spaced V notches in their upper surfaces, a second frame member including side and end portions; a plurality of aligned inwardly extending hinge blocks on one of said end portions; a pair of inwardly extending hinge blocks integrally connected with the other end portion of said second frame member; a gang bar extending parallel to the other of said end portions

and having spaced hinge blocks extending outwardly thereof; web portions connecting the outwardly extending hinge blocks of said gang bar with said pair of hinge blocks connected to said other end portion; a plurality of spaced inwardly extending hinge blocks secured to said gang bar; a plurality of vanes integrally molded between said gang bar and said plurality of hinge blocks on one said end portion forming a second vane set, web portions connecting the vanes with the gang bar hinge blocks and the plurality of hinge blocks on the one of said end portions; each vane in said second set having aligned V notches formed in their lower surfaces in alignment with the V notches in the upper surfaces of the vanes of said first set; and a web portion integrally connecting said first and second frames whereby the one may be folded within the other and the V notches in the respective vanes coincide with each other providing a pivotal point for the respective vanes, said gang bars in each vane set being capable of manual actuation to pivot the vanes and direct the air in the respective vertical and horizontal planes as desired.

3. A compound air register of one-piece molded plastic material construction of the type controlling the flow of air in both vertical and horizontal planes comprising; a first frame member including side and end portions; a plurality of oppositely aligned inwardly extending hinge blocks on the side portions of said first frame member; a plurality of vanes integrally molded between said side members forming a vane set; a plurality of flexible plastic web portions connecting respective vanes to respective said aligned hinge blocks forming a hinge connection therebetween; a gang bar having a handle and being attached to each of said vanes for

manually rotating the plurality of vanes in unison on said hinge connections relative to said first frame about a first axis, said vanes each having a plurality of spaced V notches in their upper surfaces in alignment with the like notches in the remaining vanes; a second frame member including side and end portions; a plurality of aligned inwardly extending projections on one of said end portions; a pair of inwardly extending hinge blocks integrally connected with the other end portion of said second frame member; a gang bar extending parallel to the other of said end portions and having spaced hinge blocks extending outwardly thereof; web portions connecting the outwardly extending hinge blocks secured to said gang bar; web portions connecting the vanes with the gang bar hinge blocks and the plurality of hinge blocks on the one of said end portions; each vane of the plurality in said second frame having V notches formed in their lower surfaces; a plate member secured adjacent one end of said first frame member; said plate member having spaced notches in one edge there; friction wheels attached to a vane in said plurality of vanes in said first frame; said friction wheels being aligned with and received in said notches providing frictional resistance to the pivotal movement of the vanes in said first frame retaining them in an adjusted position; and a web portion integrally connecting said first and second frames whereby the one may be folded within the other and the V notches in the respective vanes coincide with each other providing a pivotal point for the respective vanes, said gang bars in each vane set being capable of manual actuation to pivot the vanes and direct the air in the respective vertical and horizontal planes as desired.

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