United States Patent

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[54] BEZEL LOUVER SUPPORT STRUCTURE

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[52] **U.S. Cl.** .....**98/40 VM,** 98/2.06, 98/110, 98/121

[51] **Int. Cl.** **F25f 7/00**

[58] **Field of Search** .....98/110, 111, 112, 113, 114, 98/121, 2, 2.05, 2.06, 2.07, 2.08, 2.09, 2.15, 2.16, 2.17, 40 R, 40 A, 40 B, 40 D, 40 V, 40 VM

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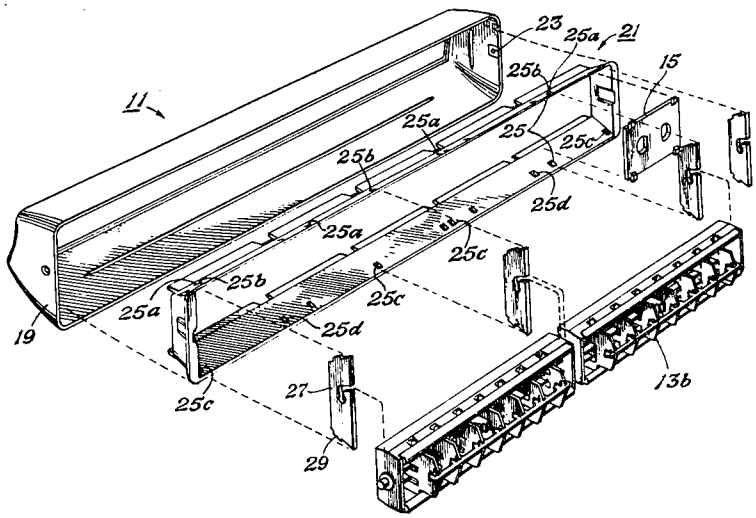
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[57] **ABSTRACT**

A bezel for use in a fluid distribution system characterized by an outer frame for connecting with a plenum and an inner guide frame adapted to conformingly fit within the outer frame to define a relatively streamlined flow boundary therewithin, the inner guide frame having a plurality of stations for mounting a plurality of louvers and a control panel within the outer frame. Also disclosed are preferred embodiments in which a plurality of sets of stations are included within the inner guide frame such that a variety of sizes of louvers may be employed; wherein the set of stations comprise at least a pair of stations adapted to receive a control panel and a pair of stations adapted to receive a support web that may be snapped into place, the support web in turn having a slot adapted for receiving the louvers which may be snapped into place; as well as preferred materials of construction.

5 Claims, 9 Drawing Figures



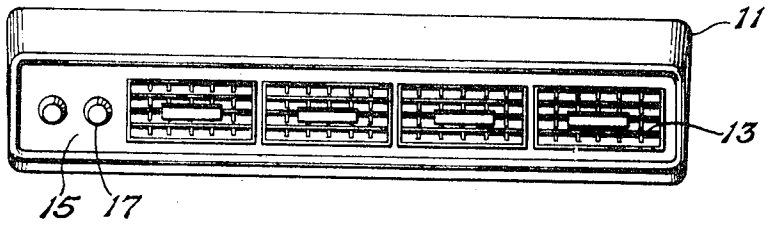


Fig. 1

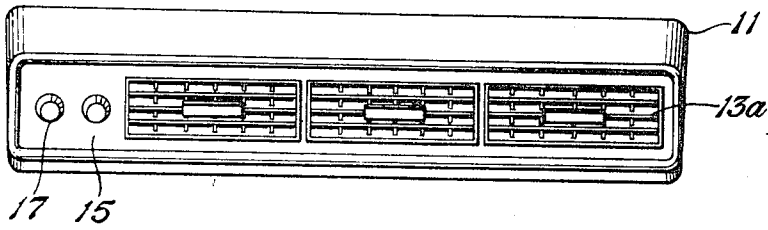


Fig. 2

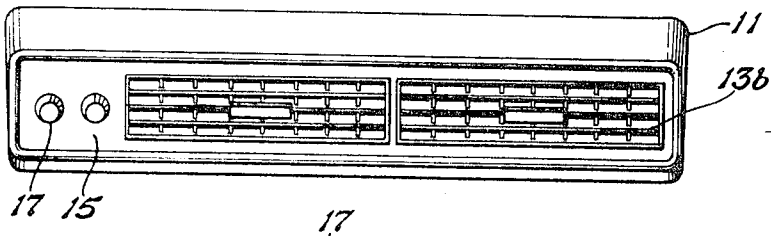


Fig. 3

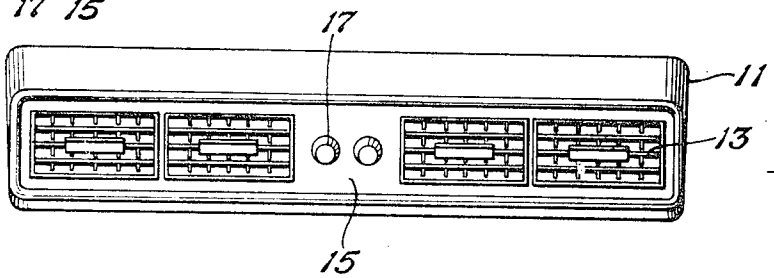


Fig. 4

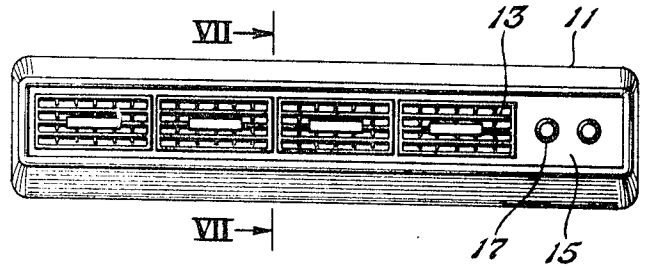


Fig. 5

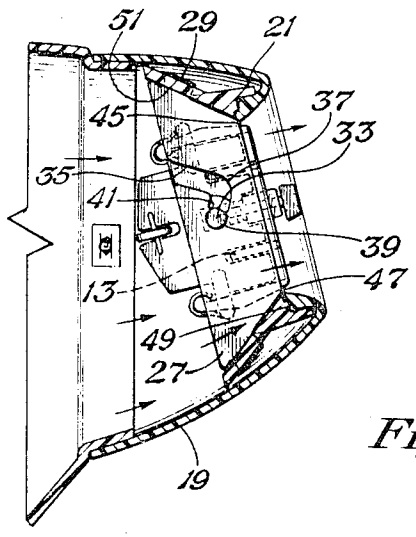


Fig. 7

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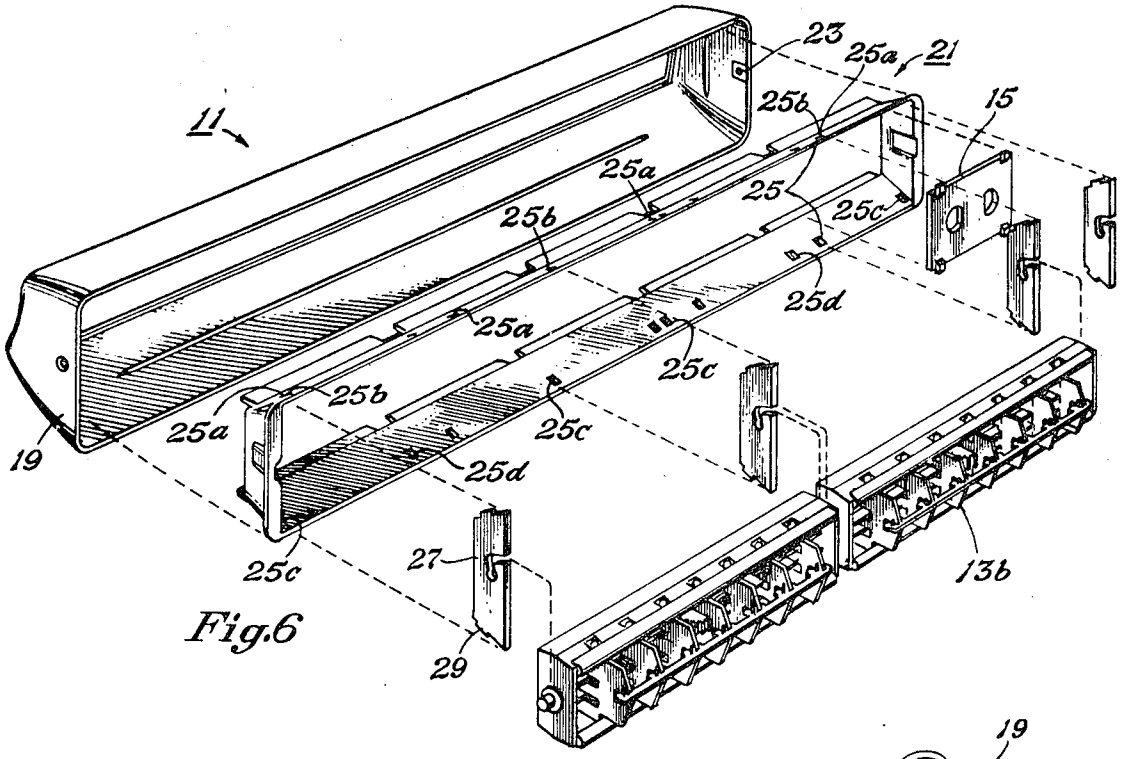
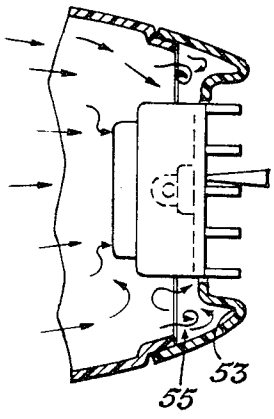


Fig.6



PRIOR ART

Fig.8

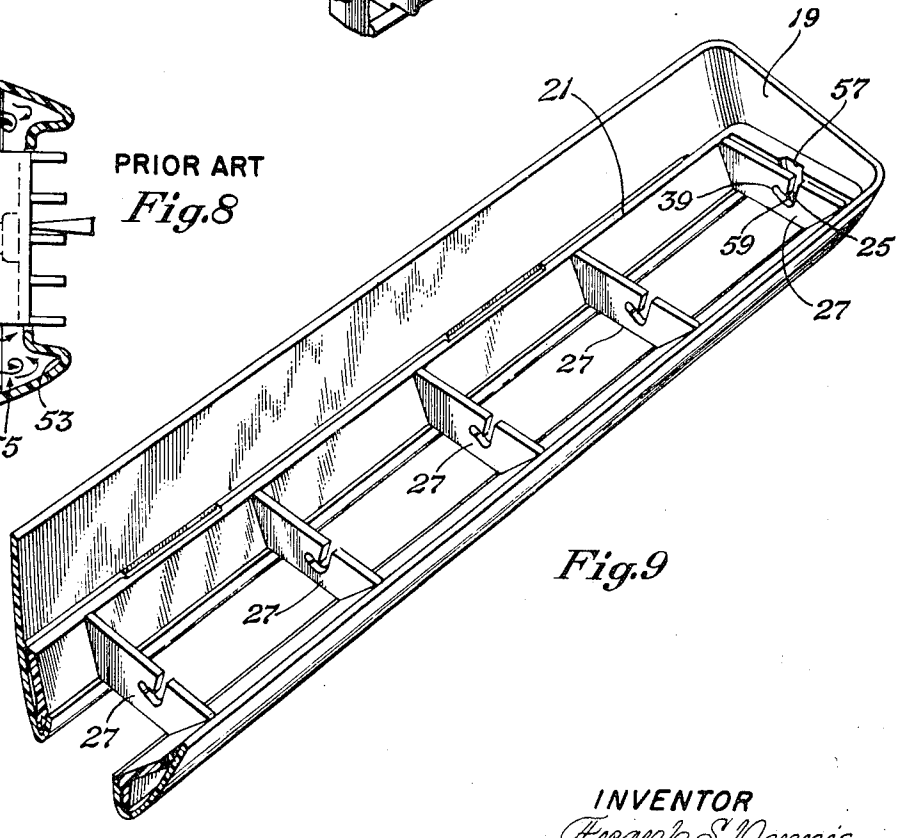


Fig.9

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BEZEL LOUVER SUPPORT STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to bezel structures such as are employed in fluid distribution systems like automotive air-conditioning systems.

2. Description of the Prior Art

A wide variety of discharge louvers and control panels are currently in use in automotive air-conditioning systems. Each type has heretofore required a custom bezel structure. For example, different bezels were required for the dual louver outlets, for the triple louver outlets, and for the quadruple louver outlets. It has, ordinarily, not been necessary to employ more than four louvers in any given outlet to effect the desired distribution of air toward the sides as well as toward the central passengers.

In addition, one set of different bezels were required if a control panel was mounted on the left of the bezel structure, a different set of bezels were required if a control panel was mounted on the right-hand side of the bezel, and still a different set of bezels were required if the control panel was mounted in the center. Thus, a large and objectionable inventory of bezels was required to allow the necessary flexibility in effecting the various designs of discharge louvers and control panels required for the different automobiles.

Additionally, the prior art type bezel structures had structural recesses that induced eddy currents and turbulence that adversely affected the flow pattern of the discharged fluid such as cold air.

Furthermore, the prior art type bezel structures required a multiplicity of fasteners for supporting each of the louvers and the control panel; requiring additional inventory, as well as additional time and expense in assembling the louvers and the control panel within the bezel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front elevational view of one embodiment of this invention.

FIG. **2** is a front elevational view of another embodiment of this invention.

FIG. **3** is a front elevational view of another embodiment of this invention.

FIG. **4** is a front elevational view of the embodiment of FIG. **1** having its control panel mounted in the center.

FIG. **5** is a front elevational view of the embodiment of FIG. **1** having its control panel mounted on the right-hand side.

FIG. **6** is an exploded isometric view of the embodiment of FIG. **3**.

FIG. **7** is a side cross-sectional view taken along the lines VII—VII of FIG. **5**.

FIG. **8** is a side cross-sectional view of a typical prior art structure.

FIG. **9** is a partial isometric view, partly in section showing the assembled bezel frames and support webs in accordance with the embodiment of FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

It is an object of this invention to provide a universal bezel structure that allows wide flexibility in effecting any final design and obviates the disadvantages of the prior art structures requiring a different and respective bezel for each design.

It also is an object of this invention to provide a bezel structure that eliminates eddy currents and turbulence that adversely affected the flow patterns of the discharged fluid from the prior art type bezel structures and, instead, provides an internal flow profile that is streamlined and effects a better flow of the fluid being distributed with less power requirements.

It is an object of this invention to provide a bezel structure accomplishing the foregoing objects and employing readily assemblable structures that may be snapped into place without requiring additional fastening means.

Referring to FIGS. **1–5**, various embodiments of final designs of bezel **11**, discharge louvers **13**, and control panel **15** are illustrated. Fig. **1** illustrates four discharge louvers **13** and a control panel **15** mounted at the left within the louver structure **11**. FIG. **2** illustrates three discharge louvers **13***a* with the control panel **15** mounted at the left. FIG. **3** illustrates two discharge louvers **13***b* with the control panel **15** mounted at the left. FIG. **4** illustrates an embodiment in which the louvers **13** are evenly spaced on both sides of a centrally mounted control panel **15** within bezel **11**. A single louver like louvers **13***b* may be employed on each side instead of the dual louvers **13** in the embodiment of FIG. **4** if desired. FIG. **5** illustrates the embodiment of FIG. **1** in which the control panel **15** is mounted on the right-hand side of the louvers **13** and bezel **11**. The embodiment of FIG. **5** may be effected simply by rotating the embodiment of FIG. **1** through 180° to move the control panel from the left-hand side to the right-hand side. Each of the embodiment of FIGS. **1–3** may be converted to have the control panel **15** mounted on the right-hand side by similarly rotating through 180°. Suitable controls, typified by control knobs **17**, are installed in a conventional way for all embodiments.

The improved bezel structure of this invention makes possible all of the foregoing discharge louver designs, both explicit and implicit. It is illustrated in exploded form in FIG. **6**. Therein, bezel **11** comprises an outer frame **19** and an inner guide frame **21**. The outer frame **19** is adapted for connection with a plenum in the fluid distribution system, as by apertures **23** for receiving a suitable fastener means such as a sheet metal screw.

The inner guide frame **21** is adapted to fit within the outer frame **19**. The inner guide frame **21** has a plurality of stations, or mounting positions, for mounting a plurality of louvers within the outer frame. The stations are illustrated by matched receptacle means such as respective pairs of matched apertures **25**. The plurality of stations comprise a plurality of sets of stations, each set of stations, in turn, comprising at least a pair of stations so spaced as to mount a louver within the outer guide frame. The plurality of stations also comprise a pair of stations for mounting a control panel within the outer frame. The oppositely disposed sides of the inner guide frame **21** are identical so that the inner guide frame may be rotated 180° to place the left-hand side, or end, on the right-hand side, or vice versa.

Referring to the inner guide frame **21**, there are **10** stations that are so arranged that **8** combinations of design are possible with only three different louver sizes, enabling having either **2**, **3**, or **4** louvers per bezel. At each station a support web **27** is provided. Support web **27** has a means for mounting it to both the top and bottom inner guide frame. As illustrated, the means for mounting comprises snap-in appendage means such as protrusions **29** for engaging the respective pair of matched apertures **25**. Preferably, each protrusion **29** conformingly engages its correlative aperture **25** on at least two sides. The snap-in protrusions **29** may be snapped manually and readily into the pair of matched apertures **25** to affix the support web **27** to inner guide frame **21** at each station desired.

As can be seen, if support webs **27** are respectively snapped into the matched pair of apertures **25***b* and the bezel assembled, a structure like the one illustrated in FIG. **3** is effected in which the control panel **15** is on the left-hand side and a pair of louvers **13***b* are disposed on the right-hand side. As indicated, if the control panel is desired on the right-hand side, the entire assembly is merely rotated 180° to place it on the right-hand side before mounting the inner guide frame **21** within the outer frame **19**.

Similarly, if three louvers are desired, as illustrated in FIG. **2**, the respective support webs are snapped into place in the matched pairs of apertures **25***a*. The inner guide frame may then be positioned to place the control panel on either the right or the left.

On the other hand, if the control panel is to be emplaced in the center, the support webs will be snapped into apertures

25c. In addition, if dual louvers are to be employed on both sides of the control panel, support webs 27 are snapped into apertures 25d, also.

It is preferred that a simple structure be provided for supporting the respective louvers in their respective support webs. Accordingly, each support web 27 has a snap-in receiving means adjacent its center for receiving a compatible snap-in structure supporting the louvers to be mounted therein. Specifically, each of the louvers 13 has a stub shaft 33, FIG. 7, protruding from their ends that are to be adjacent the support webs 27. The snap-in receiving means comprises a slot means 35 having its entry at the rear of the support web 27, traversing forwardly to a turning location, or knee portion, 37 and then backwardly to a terminal portion 39 adjacent the center of the support web 27. The terminal portion 39 is adapted to conformably and pivotally retain the stub shaft 33 in place. A protrusion 41 is provided intermediate the terminal portion 39 and the knee portion 37 for retaining the stub shaft 33 in place. The distance separation between protrusion 41 and the opposite wall or similar matching protrusion 41 is large enough; or the protrusions are small enough; that the stub shaft 33 can be snapped therepast and into the terminal portion 39. On the other hand, the distance separation between the protrusions 41 is small enough; or the protrusions 41 are large enough; to prevent inadvertant release of the stub shaft 33 from the terminal portion 39. It is noteworthy that the louvers may be rotated with whatever pressure is necessary from the front and, yet, the stub shaft will be retained within the terminal portion, since pressure from the front will not displace the stub shaft rearwardly out of the slot means because of the knee portion 37. It is particularly noteworthy that no tools or other accessories are required in effecting assembly of this bezel structure or the louvers mounted therewithin.

As can be seen in FIG. 7, the outer frame 19 has a curved front that terminates in an inner edge 45. The inner guide frame 21 is adapted to fit within the outer frame 19 and to conforminly abut the inner edge 45 with a shoulder 47. To facilitate retaining abutment, the edge 45 and shoulder 47 may have conforming, stairstep construction 49. In any event, the inner surface 51 of the inner guide frame 21 defines a relatively streamlined flow boundary between the internal wall of the outer frame and the inner edge for eliminating turbulence. As can be seen in the prior art illustration of FIG. 8, the prior art bezels had a curved internal front portion 53 that induced eddy currents 55 that created turbulence and wasted energy, in addition to adversely affecting the flow pattern of the discharged air.

FIG. 9 illustrates the assembled outer frame and inner guide frame, with the end cut away to show more graphically the relatively streamlined flow boundary thereby effected. Specifically, the inner guide frame 21 is emplaced within the outer frame 19. The inner guide frame 21 has the respective support webs 27 snapped into place therein so as to receive four louvers. Ordinarily, the stub shafts of the respective louvers are snapped into the respective slot means 35 before the inner guide frame assembly is inserted. In this way the extra length of the terminal stub shafts may slide forwardly via a niche 57 in each end of the inner guide frame. Niche 57 extends forward to define a front portion 59 that can receive any excess length of stub shaft 33. This prevents the necessity of having to have two different length stub shafts, a shorter one for the terminal louvers and a longer one to interconnect between adjacent louvers on the remainder of the support webs 27.

The elements described hereinbefore are preferably formed of a material that will resist corrosion in the fluid being circulated. For example, it is preferred that the elements be formed of a plastic material so as to prevent corrosion due to the moisture of condensation from the cold air being circulated in an automotive air-conditioning system. The plastics may either be thermosetting or thermoplastic plastics as long as they have the requisite rigidity and resistance to deformation under conditions of use. Well known thermosetting plastics like the phenol-formaldehyde copolymers may be employed. The thermosetting copolymers like the acrylonitrile-butadiene-styrene copolymers also are satisfactory and may be employed. The thermoplastic plastics such as nylon may be employed for the stub shafts and the like.

This invention provides a bezel structure that satisfies the foregoing objects and obviates the disadvantages of the prior art structures in that it:

1. allows wide flexibility in effecting any final design;

2. provides a streamlined internal flow profile that eliminates eddy currents and minimizes turbulence; thereby improving flow patterns and fluid distribution;

3. employs readily assemblable snap-in structure that may be readily and manually snapped into place without requiring warehousing of additional parts and tools and costly and time consuming assembly of the parts; and

4. forms a snap-in structure that may be manipulated from the front without being inadvertently disassembled, because of its unique construction.

Once the advantageous features of employing multiple sets of stations within a given bezel structure are known, one skilled in the art may come up with other structures employing the principles of this invention without employing the exact structure delineated hereinbefore. The exact structure delineated hereinbefore is to be considered in an illustrative sense and not in a limiting sense. Numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention.

What is claimed is:

1. A bezel for use in a fluid distribution system comprising:

a. an outer frame adapted for connecting with a plenum in said fluid distribution system; and

b. an inner guide frame adapted to fit within said outer frame and having a plurality of stations for mounting a plurality of louvers within said outer frame; said plurality of stations comprising a plurality of sets of stations, each said set in turn comprising at least a pair of stations so spaced as to mount a louver within said outer frame; said plurality of stations also comprising a pair of stations for mounting a control panel within said outer frame; each said station comprising a support web means, said web means and said inner guide frame having compatible snap-in means whereby said web means may be removably snapped into said inner guide frame at any of said plurality of stations for mounting the louvers within the outer frame.

2. The bezel of claim 1 wherein said snap-in means comprise an appendage means at each end of each said support web means and a receptacle means on the top and bottom of said inner guide frame for receiving said appendage means.

3. The bezel of claim 2 wherein each said receptacle means is an aperture adapted for conformingly receiving said appendage means on at least two sides.

4. The bezel of claim 1 wherein each said web has a snap-in receiving means adjacent its center for receiving a compatible snap-in structure supporting the louvers to be mounted therein.

5. The bezel of claim 4 wherein louvers are to be snapped into position and said louvers have stub shafts protruding from their ends that are to be adjacent said webs; said snap-in receiving means comprises a slot means having its entry at the rear of said support web, traversing forwardly to a knee portion and then backwardly to a terminal portion adjacent said center; said terminal portion being adapted to conformably and pivotally retain said stub shafts; and a protrusion intermediate said terminal portion and said knee portion said protrusion being small enough that said stub shafts can be snapped therepast and into said terminal portion and large enough to prevent inadvertent release of said stub shaft from said terminal portion; whereby said web means can be snapped into position within said inner guide frame and said

stub shafts and said louvers may be snapped into position in said web means for assembly without other accessories or tools.

* * * * *