

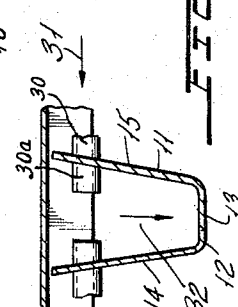
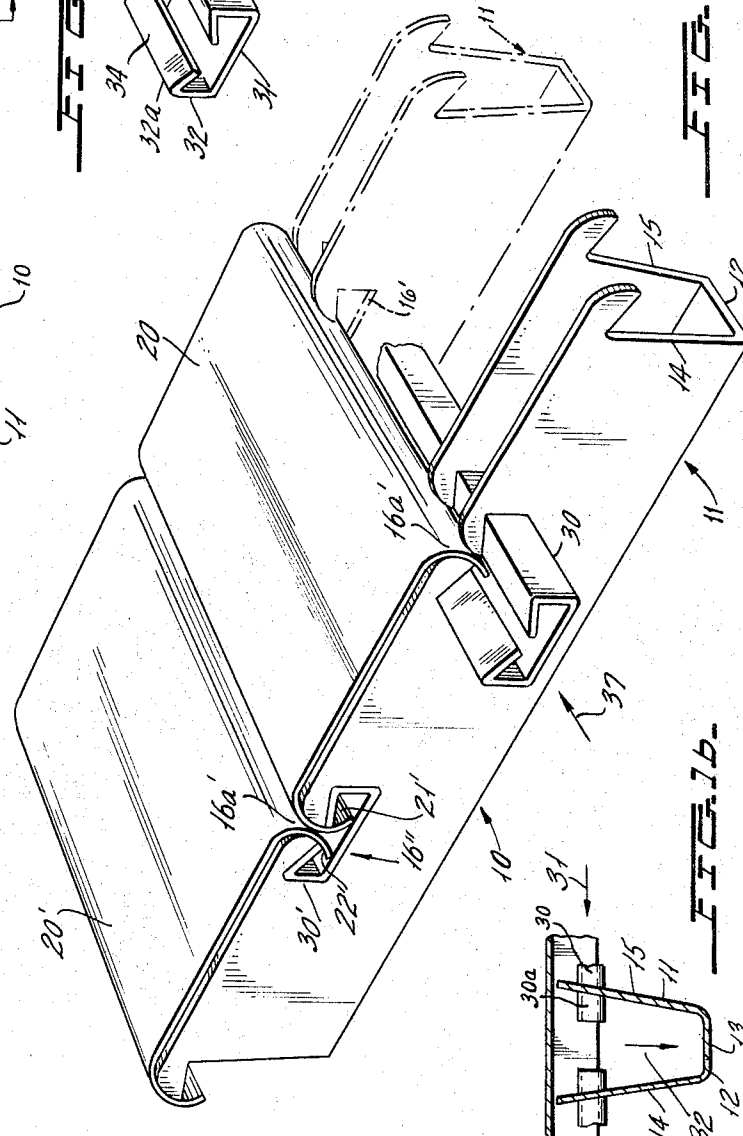
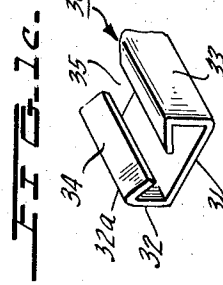
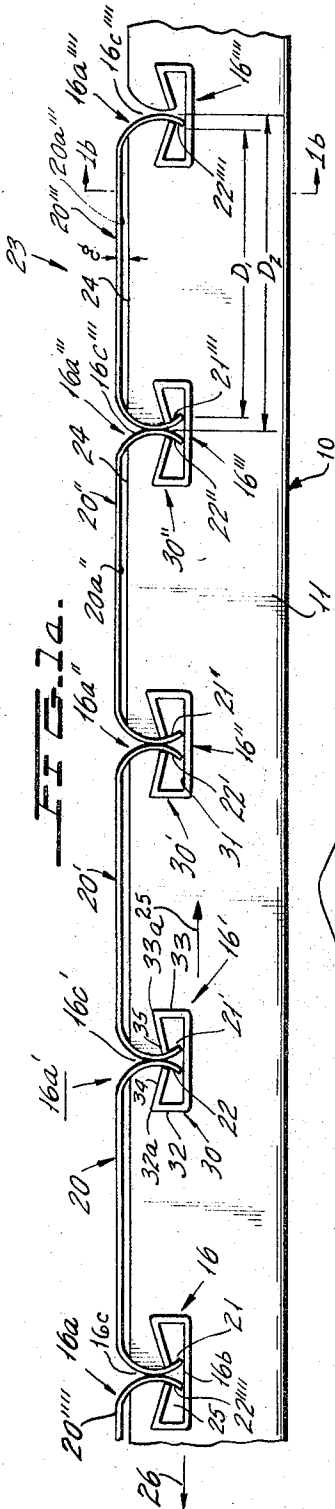
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FLUSH PANEL STRINGER ASSEMBLY

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FLUSH PANEL STRINGER ASSEMBLY

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This invention relates to lightweight metallic assemblies for roofs, awnings, building facings and the like, and more particularly to a flush panel stringer assembly for such uses which is so designed as to provide the substantially lightweight assembly which affords a superior watertight construction and suitable means for carrying off any water collected therein and an easy snap-on way to assemble such a structure.

Present day building structures find widespread use for lightweight metallic building facings, roofs and awnings, since such assemblies are relatively inexpensive, provide significantly high strength and endurance, are aesthetically appealing, and further, provide superior weather resistant and weathertight characteristics. Such structures are easy to assemble and once assembled right on the job site, provide rugged, dependable structures. It is desirable, however, to provide the best weatherproof seal possible and also to provide adequate means for the carrying off of any water which may be collected due to rain, or accumulation of moisture in order to make the region protected by such building assemblies completely watertight.

The instant invention, in addition to providing all of the above features, is so designed as to provide a low profile stringer assembly in which panels thereof are flush mounted in such a way as to provide an excellent seal between adjacent panels to prevent the passage of water therethrough, as well as to provide further means for the carrying off of any water which may percolate in the region between adjacent panels.

The instant invention is comprised of a plurality of elongated panels which are substantially flat and provided with flanges bent substantially transverse to the surfaces of said panels along the length of their edges. The panels are positioned and supported by means of supporting ribs designated as stringers, which are substantially U-shaped members wherein the base or central portions of the U-shaped members are provided with suitable apertures or any other suitable means for the purpose of mounting the stringers to the building supporting structure. The extending arms of the stringers are provided with slots or notches having a configuration adapted to receive the curved flanges of the panel members in order to properly position and support such panels. The notches are so designed as to receive all of said panels such that they are positioned with their flanged edges facing downward. This provides a facing for the stringer assembly which is substantially flat and smooth so as to provide an overall aesthetic appearance. The panel members are force-fitted into the notches which are positioned at spaced intervals along said stringer members such that the inwardly curved flanges of each panel member provide a force-fit due to the opposing tensions of the flanges exerted by the stringer assembly. The slots provided in the stringer assembly are sufficiently wide to permit the flanges of adjacent panel members to be readily snapped into position while at the same time providing an extremely close positioning between the facing flanges of adjacent panels to give the appearance actual physical contact and also to reduce infiltration of rain therebetween to a minimum.

In cases where additional protection may be desired, joiner strip means are provided and are adapted for in-

sertion into the notches of said stringers. The joiner strips are designed to carry off any water which may percolate through the facing edges of adjacently mounted panels. The joiner strips are of sufficient length so as to carry off any water which may be collected therein to a point at which it may be readily and easily disposed. If it is desired to provide a greater carrying capacity for the carrying off to any water which may collect therein, the joiner strips may be so designed that they terminate the region between two arms of a stringer member so that water may be carried by the stringer member to a position where it may be readily disposed of. The joiner strips are very easily slid into position in the stringer member notches and thereby greatly facilitate the assembly of such flush panel stringer structures.

It is therefore one object of the instant invention to provide a flush panel stringer assembly which is so designed as to provide a substantially low profile arrangement for the mounting of panel members.

Still another object of the instant invention is to provide a stringer assembly for use in building awnings, roofs, facings and the like, having novel stringer means for the mounting of panel members, in order to provide an excellent watertight structure.

Still another object of the instant invention is to provide a flush panel stringer assembly for use in building awnings, roofs, facings and the like, wherein the stringer means is provided with notches of novel configuration designed to receive panel members in such a manner as to provide excellent pressure fits between adjacently mounted panels in order to prevent the passage of water between such engaging surfaces.

Still another object of the instant invention is to provide a panel stringer assembly for use in building awnings, roofs, facings and the like, which is so designed as to provide a unique snap-on assembly for mounting panels in a side-by-side arrangement whereby adjacently mounted panels have very tightly engaging surfaces therebetween.

Still another object of the instant invention is to provide a panel stringer assembly for use in building facings, awnings, roofs and the like, which is so designed as to provide complete waterproofing, as well as providing means for carrying off any water collected therein to a suitable point at which the water may be disposed.

Still another object of the instant invention is to provide a panel stringer assembly for building facings, roofs, awnings and the like, comprising novel stringer means having notches which are so designed as to provide clearance between the stringer means upper edges and the inner faces of panel members providing freedom for expansion and contraction and a minimum of denting at the stringer line.

These and other objects of the instant invention will become apparent when reading the accompanying description and drawings in which:

FIGURES 1a and 1b are side and end views respectively, of a flush panel stringer assembly designed in accordance with the principles of the instant invention; FIGURE 1b being taken on line 1b-1b of FIGURE 1a;

FIGURE 1c is a perspective view showing a portion of the joiner strip of FIGURES 1a and 1b; and

FIGURE 2 is a perspective view showing a portion of a flush panel stringer assembly of the type shown in FIGURES 1a and 1b.

Referring now to the drawings FIGURES 1a and 1b show a stringer assembly 10 comprised of a substantially U-shaped stringer member 11 having a base or central portion 12 which may be provided with suitable apertures such as, for example, the aperture 13 for the purpose of

securing stringer 11 to a building superstructure (not shown) in any suitable manner.

The stringer 11 is provided with outwardly extending arms 14 and 15 which project in substantially the same direction away from central portion 12. Referring specifically to FIGURE 1a, each of the arms 14 and 15 (only one of which can be seen in FIGURE 1a) are provided with a plurality of slots or notches 16 positioned at spaced intervals along the length of stringer 11. Each of said notches 16 are provided with a main or central portion 16b which is substantially rectangular in shape and with a mouth portion 16a having a narrow neck 16c which communicates with the main portion 16b. The sides of the mouth portions 16a have an arcuate shape which curve in toward one another to form the narrow neck portion 16c.

The slots 16 are designed to receive elongated panels 20, each of which is provided with flanges 21 and 22 running the entire length of the left and right-hand edges of said panels, which flanges curve substantially inwardly as can best be seen in FIGURE 1a. The distances between adjacent mouth portions, such as, for example, the mouth portions 16a and 16a' are such that the panels 20 when positioned in the manner shown in FIGURE 1a have a portion of the inward surfaces of their flanges making engagement with the arcuate sides of the mouth portions 16a and 16a'. As can be seen in FIGURE 1a, the distance D_1 between the marginal edges of the flanges, such as, for example, the flanges 21''' and 22''' is substantially less than the distance D_2 between the adjacent mouths 16a''' and 16a'''' such that in the placement of panel 20''' and its flanges in the notches 16''' and 16'''' the panel 20''' is pressed downwardly in the direction shown by arrow 23 upon the stringer member 11 until the marginal edges of flanges 21''' and 22''' contact the central portion of the notches 16''' and 16'''' respectively, and until the neck portions 16c''' and 16c'''' are passed, respectively by the marginal edges of flanges 21''' and 22''' at which time the panel 20''' "snaps" into the position as shown in FIGURE 1a. The panels 20 and the notches 16 are so designed that when the marginal edges of the flanges 21 and 22 rest upon the bottom edges of the notches 16 a gap g exists between the top edge 24 of stringer member 11 and the inner surface 20a of the panel member 20 (see panel 20''' at the right in FIGURE 1a). This spacing permits the panel member 20 to experience expansion and/or contraction which may occur due to temperature changes experienced due to changing weather conditions such that any denting or severe creasing of the panels 20 will not occur between the region adjacent panel member flanges such as the flanges 22' and 21'', for example. As can be seen in FIGURE 1a, all notches 16, 16' and 16'' and so forth, are substantially identical to one another and all panels 20, 20', 20'' and so forth are substantially identical to one another, such that all of these panels mount in substantially the identical manner within their associated notches. However, when adjacent panels, such as, for example, the adjacent panels 20' and 20'' are snapped into the positions as shown in FIGURE 1a, the spacing between notches is so designed as to cause an extremely tight pressure fit to exist at the engaging surfaces of the flanges 21 and 22 with the mouth portions whereby such pressure fits occur at the mouths 16c, 16c' and 16c'' and so forth, of the respective notches 16, 16', 16'' and so forth. The arrangement further provides extremely close spacing between the outer surfaces of adjacent flanges, such as, for example, the outer surfaces of flanges 22' and 21'', such that this close spacing provides an effective seal along the entire length of the adjacent panels to prevent any water from penetrating through these engaging surfaces. From a force viewpoint, considering the panel 20, it can be seen that the flanges 22 exerts a force on the panel member 20' in the right-hand direction shown by arrow 25, while its opposite flange 21 exerts a force upon the panel 20'''' in the direction shown by

arrow 26. These opposing tensions exist at the engaging surfaces of adjacent panel flanges along the entire length of the stringer member 11 and they have been shown at one position only for purposes of clarity. Thus, when all panels 20 are suitably positioned within the notches 16 of the stringer member 11, each and every panel flange pair 21-22 cooperates to exert substantially equal and opposite forces upon its panel central portion so that upon completion of the panel stringer assembly all panels cooperate to provide an effective watertight assembly having a smooth, even, outward appearance while at the same time being an extremely easy structure to construct from the assembly viewpoint.

While the assembly of FIGURE 1a provides an effective watertight seal between adjacent panels, if it is desired to collect and carry off any water which may percolate through the opposing edges of neighboring flanges, the stringer assembly is further provided with joiner strip members, such as, for example, the joiner strip member 30 shown in FIGURE 1c which is comprised of an elongated substantially C-shaped member having a base or central portion 31 and first and second arms 32 and 33 extending therefrom, the outer ends of said arms 34 and 35 respectively being bent inwardly and downwardly in the manner shown in FIGURE 1c. The end view of the joiner strip 30, shown in FIGURE 1c, can be seen in FIGURE 1a which employs joiner strips 30, 30' and 30'', for example, and it can be seen that the end profile or cross-sectional view of joiner strips 30 is substantially identical to the configuration of the main portions 16b of the notches 16, allowing the joiner strips 30 to be very readily slid into position within the base or main portions 16b of the notches 16. When so positioned, the joiner strips act to collect any water which may percolate through the engaging flanges and will carry the water off to a position at which the water may be disposed without ever entering into the region being protected by the stringer assembly 10.

As can best be seen in FIGURE 1a the marginal edges of the inwardly bent flanges 34 and 35 make physical contact with the inner surfaces of the flanges 22 and 21' when panels 20 and 20' are positioned as shown so as to prevent the joiner strip from experiencing any longitudinal movement after once being positioned.

The marginal edges of the panel flanges such as for example flanges 21' and 22'' engage the base 31 of joiner strip 30' so as to maintain the gap g previously described and also serve to prevent the joiner strip from experiencing longitudinal movement.

The high points 32a and 33a of flanges 32 and 33 respectively are elevated above the marginal edges of flanges 34 and 35 to permit inclination of the stringer assembly such that its left hand end maybe elevated above its right-hand end (or vice versa) while enabling the water-seal to be maintained since water will collect between the base 31 and the flange 35 (or 34) and be carried off. Thus the stringer may be inclined at a substantial angle and still collect and run off water which may penetrate the space between panels.

Considering FIGURE 1b, a joiner strip 30 is shown therein and is so positioned relative to the stringer member 11 that the end 30a of joiner strip 30 is positioned substantially intermediate the arms 14 and 15 of stringer member 11. Let it be assumed that water is collected in the joiner strip 30 of FIGURE 1b and that the water is moving in the direction shown by arrow 31. As the water passes beyond the end 30a of joiner strip 30 it falls by gravity downward in the direction shown by arrow 32 to the base of the stringer member 11. Thus the stringer member 11 may itself act as a means for carrying water away from the area or region being protected by the stringer assembly to a position where it may readily be disposed of. Such an arrangement thereby provides additional capacity for carrying off water which may collect due to percolation of water and moisture between the

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engaging edges of neighboring panel flanges. The arrangement of FIGURE 1b is generally unnecessary as the space between panels, if any space at all, is extremely small and the joiner strips will have more than adequate capacity to carry off water. Also, in most applications, the stringer assembly 10 may be utilized without the joiner strip and still provide excellent watertight characteristics.

The stringer assembly of FIGURE 2 shows a typical application of such a stringer structure which employs two stringer members 11 and 11' for receipt of the panel members 20. Thus, in addition to each individual stringer member 11 and 11' positioning the panels 20, two such stringer members employed in the manner shown in FIGURE 2, act to support the panel members 20 substantially at the ends thereof in a manner as might be required for roof or awning purposes. It should be understood, however, that a greater number of stringer members 11 may be employed and the number employed and distances between adjacent stringer members is dependent only upon the length of the panel members 20. Also, the stringer assembly of FIGURE 2 may be employed in the vertical position as well so as to be used as a building facing. As can be seen in FIGURE 2, a joiner member 30 is shown extending to the left of stringer member 11. In order to position joiner strip 30, this may readily be done simply by sliding the joiner strip 30 in the direction shown by arrow 37 until it threads through both the notch 16 in the arms of stringer 11, as well as the notch 16' in the arms of stringer 11'. The panel members 20 and 20' are then snapped into position in the same manner as previously described. Another typical stringer assembly is described in copending application Ser. No. 277,050, filed Apr. 30, 1963, by Francis Vecchiarelli, entitled "Rainguard Stringer Assembly," now Patent No. 3,228,159, issued Jan. 11, 1966, to the assignee of the instant invention. In the above mentioned copending application, the panel assembly described therein does not provide the extremely low profile provided in the assembly of the instant invention since the panels of the copending application are mounted such that alternate panels have their flanges facing in alternate opposing directions, thus providing a groove-like profile which is substantially different from the extremely low profile arrangement of the instant invention. It can therefore be seen that the instant invention provides an extremely low profile panel stringer assembly which is so designed as to be assembled with extreme ease, has an excellent watertight seal between adjacent panel edges and provides an extremely smooth, even, eye appealing surface which is further designed to allow for normal expansion and contraction without exposing the panel members of the assembly to denting or creasing.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

What is claimed is:

1. A weather proof assembly for buildings and the like comprising a plurality of elongated flexible panel members each having a C-shaped cross-section; the central portion of each of which is substantially flat and is provided with first and second substantially curved flanges running along substantially the entire length of opposite edges of said panel member; at least one stringer member comprising a substantially flat elongated member having a plurality of slots positioned at spaced intervals along the length of said stringer member; the sections of said stringer member between said slots each forming a projection extending in the direction of the length of said stringer member; each of said projections having in overlying relation one of said panel members with said flanges curving around the ends of said projection; each of said slots having a profile receiving and engaging a flange of adja-

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cent panel members wherein said slots are comprised of a wide mouth and a lower portion communicating with said wide mouth by means of a narrow neck portion, the sides of said mouth portion being arcuately curved toward each other to form said narrow neck portion and to provide camming surfaces for the flanges of said panel members during assembly; each of said slots being spaced relative to one another to cause flanges of each panel member mounted in said slots to make firm physical contact with the ends of said projections; the confronting walls defining said stringer member slots being spaced relative to one another not substantially more than required for the entry of adjacent panel flanges thereinto, thereby providing an effective water seal therebetween.

2. A weather proof assembly for buildings and the like comprising a plurality of elongated flexible panel members each having a C-shaped cross-section; the central portion of each of which is substantially flat and is provided with first and second substantially curved flanges running along substantially the entire length of opposite edges of said panel member; at least one stringer member comprising a substantially flat elongated member having a plurality of slots positioned at spaced intervals along the length of said stringer member; the sections of said stringer member between said slots each forming a projection extending in the direction of the length of said stringer member; each of said projections having in overlying relation one of said panel members with said flanges curving around the ends of said projection; each of said slots having a profile receiving and engaging a flange of adjacent panel members wherein said slots are comprised of a wide mouth and a lower portion communicating with said wide mouth by means of a narrow neck portion, the sides of said mouth portion being arcuately curved toward each other to form said narrow neck portion and to provide camming surfaces for the flanges of said panel members during assembly; each of said slots being spaced relative to one another to cause flanges of each panel member mounted in said slots to make firm physical contact with the ends of said projections; the confronting walls defining said stringer member slots being spaced relative to one another not substantially more than required for the entry of adjacent panel flanges therein, thereby providing an effective water seal therebetween; the distance between the neck portions of adjacent slots being greater than the distance between the marginal edges of said panel member first and second flanges enabling said panel members to be easily snapped into position upon said stringer member.

3. A weather proof assembly for buildings and the like comprising a plurality of elongated flexible panel members each having a C-shaped cross-section; the central portion of each of which is substantially flat and is provided with first and second substantially curved flanges running along substantially the entire length of opposite edges of said panel member; at least one stringer member being a substantially flat elongated member having a U-shaped cross-section comprised of a central portion and first and second arms extending therefrom in a first direction, each of said arms being substantially flat and having a plurality of slots positioned at spaced intervals along the length of said stringer member; the sections of said stringer member between said slots each forming a projection extending in the direction of the length of said stringer member; each of said projections having in overlying relation one of said panel members with said flanges curving around the ends of said projection; each of said slots having a profile receiving and engaging a flange of adjacent panel members wherein said slots are comprised of a wide mouth and a lower portion communicating with said wide mouth by means of a narrow neck portion, the sides of said mouth portion being arcuately curved toward each other to form said narrow neck portion and to provide camming surfaces for the flanges of said panel members during assembly; each of said slots

being spaced relative to one another to cause flanges of each panel member mounted in said slots to make firm physical contact with the ends of said projections, said stringer member slots being spaced relative to one another not substantially more than required for the entry of adjacent panel flanges thereinto, thereby providing an effective water seal therebetween.

4. A weather proof assembly for buildings and the like comprising a plurality of elongated flexible panel members each having a C-shaped cross-section; the central portion of each of which is substantially flat and is provided with first and second substantially curved flanges running along substantially the entire length of opposite edges of said panel member; at least one stringer member being a substantially flat elongated member having a U-shaped cross-section comprised of a central portion and first and second arms extending therefrom in a first direction, each of said arms being substantially flat and having a plurality of slots positioned at spaced intervals along the length of said stringer member; the sections of said stringer member between said slots each forming a projection extending in the direction of the length of said stringer member; each of said projections having in overlying relation one of said panel members with said flanges curving around the ends of said projection; each of said slots having a profile receiving and engaging a flange of adjacent panel members wherein said slots are comprised of a wide mouth and a lower portion communicating with said wide mouth by means of a narrow

neck portion, the sides of said mouth portion being arcuately curved toward each other to form said narrow neck portion and to provide camming surfaces for the flanges of said panel members during assembly; each of said slots being spaced relative to one another to cause flanges of each panel member mounted in said slots to make firm physical contact with the ends of said projections; the confronting walls defining said stringer member slots being spaced relative to one another not substantially more than required for the entry of adjacent panel flanges thereinto, thereby providing an effective water seal therebetween; the distance between the neck portions of adjacent slots being greater than the distance between the marginal edges of said panel member first and second flanges enabling said panel members to be easily snapped into position upon said stringer member.

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