Jan. 31, 1967 R. R. KELLER 3,300,928

STRUCTURAL BUILDING PANELS

Filed Nov. 22, 1963

Fig. 1.

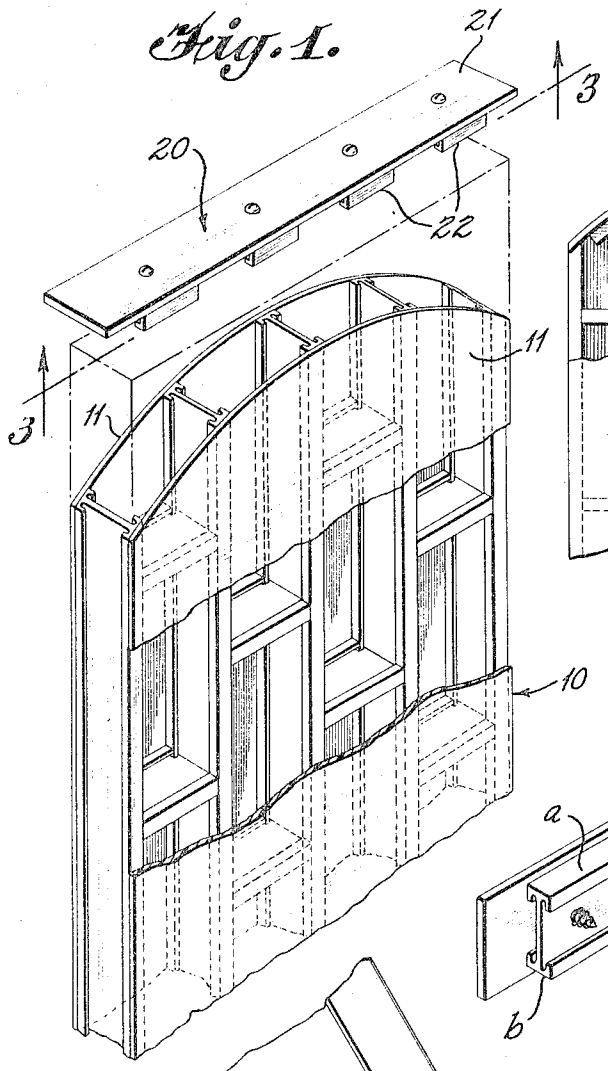
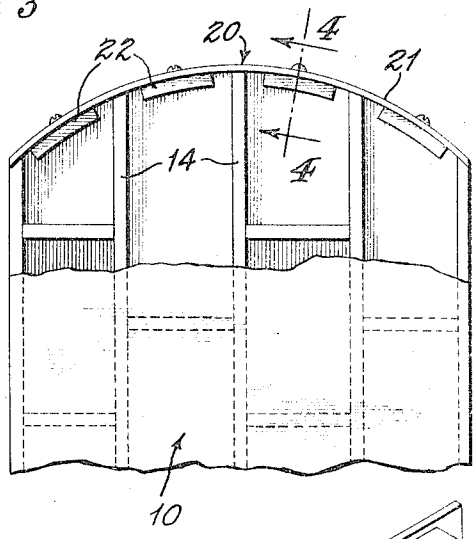



Fig. 2.



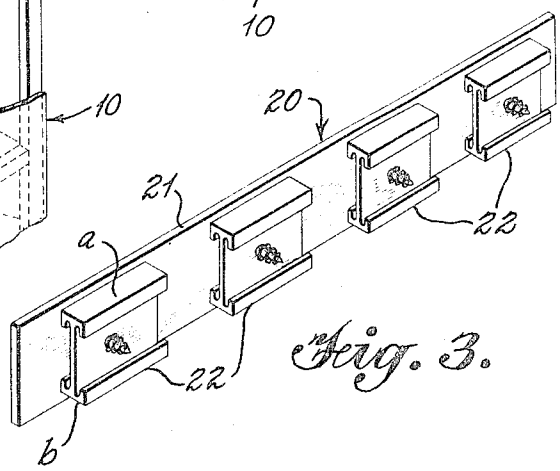




Fig. 3.

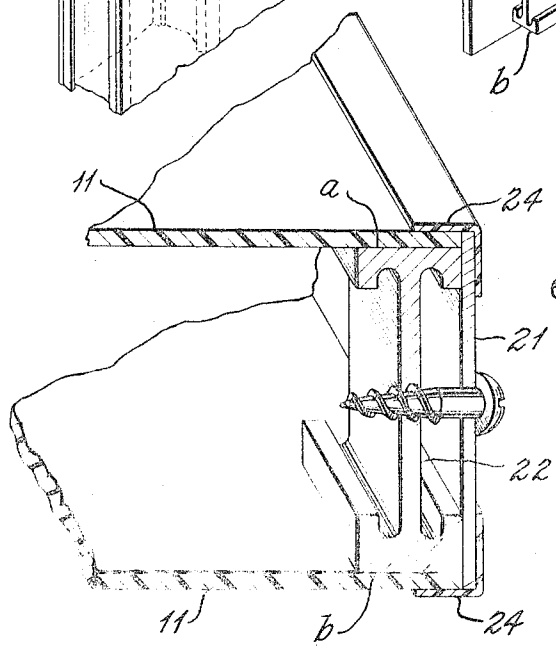



Fig. 4.

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# STRUCTURAL BUILDING PANELS

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This invention generally relates to structural building panels, and more particularly to improvements in the construction and erection of such panels which are referred to in the trade as sandwich or stressed skin panels. These panels are usually comprised of translucent or opaque sheet material laminated to both sides of a suitable core. These cores may be in the nature of lightweight forms, honeycomb, or open-grid configurations made of suitable structural material.

In the field of building panels, it has in the past been the general practice to employ a construction which provides a unitary interconnected core fastened in a suitable manner to a peripheral frame and having continuous facing sheet material fastened to either or both sides thereof. Such facing sheets are relatively thin in nature and are employed for decorative as well as structural effects. Panels of this type are normally assembled and prefabricated at the factory and transported as completely finished units to the construction site for installation.

These panels, typically represented by my U.S. Patent No. 2,931,468, are peripherally secured in position by a compressive type mechanical clamping system rigidly attached to the building opening, or alternatively, may, under some circumstances, be glazed or otherwise conventionally sealed into position.

One of the major drawbacks of existing sandwich type and stressed skin wall panel construction and use is that each panel incorporated into a structure must be prefabricated to its finished dimensions at the factory; that is to say, once the panel and its clamping accessories are delivered to the erection site, no further dimensional changes in such a panel are possible, without completely reworking such panel at the factory, and even then, a factory re-work is oftentimes impractical.

Those connected with the development of translucent building wall panels have long recognized the need for an improved panel construction that would permit cutting and shaping of such panels at the erection site in a simple yet effective manner. For example, in the construction of buildings requiring certain architectural characteristics as found in churches or schools, it frequently becomes desirable to provide panel shapes in arched, trapezoidal, or other geometric shapes necessary to conform to the constructional requirements of such a building or to otherwise satisfy aesthetic appearances. Accordingly, if such panel shaping is to be accomplished at the job site, it must be done economically, yet in a manner which would provide for a neat and effective weather seal when secured into position and still preserve the structural integrity of the panel with as much versatility as that found in related building materials.

However, because of the hollow construction of this type of wall panel, and the compressive pressures exerted along its edges when used with compressive type mechanical clamping means required in the installation thereof, these panels require some form of internal edge support, which not only provides a neat and aesthetically appealing appearance, but also assures a positive weathertight seal to prevent the ingress of moisture to the panel interior. In the past, such support has come about from a peripheral framework which remained a permanent and unitary part of the prefabricated panel with its cellular core. It is to be understood that the term "cellular core" as employed in this disclosure includes those cores employing lightweight forms, honeycombs, open-grid configurations, or other related constructions.



The present invention, however, eliminates the need for a permanent peripheral frame and provides a means of preserving the desirable features of the prior art while overcoming the objections thereof, whereby a panel may be suitably shaped or sized by cutting at the construction site just as other building materials are, with the assurance that suitable peripheral panel support for securing within the accessory clamp system and positive weather sealing will be retained at all times. This result is generally achieved by providing for the edge of the cut panel a flexible edge strip or cap carrying a plurality of spaced apart segments which are adapted to fit in a face to face relationship with the opposed inner faces of the translucent sheet material interiorly of the panel.

Because of the flexible nature of this edge stripping a panel can be easily cut at the job site in a manner to effect any desired geometry of configuration either curved or linear. By utilizing the herein disclosed invention it also becomes possible to cut out variously shaped sections within the panel to provide space for the installation of windows, louvers, or to permit the passage of conduit therethrough without substantially affecting the structural integrity of the panel.

As a further significant contribution to the prior art, the herein invention provides a building panel which can be regarded as a basic raw material (much like plywood, for example), that can be handled and worked in a conventional manner at the job site. The inability of the prior art to provide panels to which on-site modifications can be made has been a severe limitation of the sandwich type panel concept insofar as selling and public acceptance of these were concerned. This invention serves to overcome these past limitations by providing a novel panel construction.

It is therefore among the objects of this invention to provide a panel which can be supplied in standard sizes for modification or alternation at the job site to a desired configuration while still preserving the structural integrity thereof.

It is a further object of this invention to provide a sandwich type wall panel after being cut into a desired shape, has provided therefor flexible edge stripping which functions to seal and support the exposed cut edge of the panel, thereby providing a panel wall unit which may be fabricated as a raw material and completed to its custom size and shape at the erection site in a simple yet effective manner.

It is another object of this invention to provide a wall panel of a construction which, after having its edges cut to conform to a desired shape at the job site, can be secured within its intended opening by conventional glazing and sealing, or alternatively, can be secured to its accessory mechanical clamp joint system with firm peripheral support.

It is yet a further object to provide an open grid core or related form of building panel which embodies the versatility of installation previously found only in the more conventional building sheet materials.

With these and other objects in view as will hereinafter more fully appear, and which will be more particularly pointed out in the appended claims, reference is now made to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 illustrates a exploded view of a typical wall panel having an open core grid assembly and its associated edge cap portion;

FIGURE 2 illustrates an assembled view of FIGURE 1;

FIGURE 3 illustrates a view of the edge cap taken as line 3—3 of FIGURE 1; and

FIGURE 4 illustrates a typical cross-sectional view of

the components of FIGURE 2 in their assembled positions taken on line 4—4.

As an example of the practice of this invention, reference is now had to the drawings and more particularly to FIGURE 1, wherein is shown in exploded view a typical building wall panel **10**, one edge of which has been cut in a curvilinear shape, and its corresponding edge strip **20** adapted for structural engagement with and sealing of the exposed edge of the panel. For purposes of illustration panel **10** is shown as being comprised of an open core grid assembly of interlocking horizontal and vertical I-beam shaped members having translucent or other suitable sheet material **11**, of .045 to .090 inch in thickness laminated to both sides thereof. These panels are usually fabricated so that a longitudinal structural element of the grid core assembly also forms the longitudinal edges of the panel. The techniques of construction of such a panel are typically exemplified and described in my aforementioned U.S. Patent No. 2,931,468. Though the depicted embodiment illustrates an open grid core type of panel construction, it is to be understood that the principles and techniques herein disclosed apply equally as well to other panel constructions with cellular cores of the type hereinbefore referred to.

In the past, sandwich type panels were prefabricated at the factory to fit specifically designed openings in the building under erection, whereby each panel had its predetermined shape location. In the event that for some reason, the prefabricated panel and its corresponding building opening did not conform with each other, there was the problem of either fabricating another panel with its accompanying expense, or alternatively, providing a makeshift installation, which detracted from the structural integrity of the installation as well as the aesthetic appeal.

If a panel is to have, for example, the arched configuration such as that shown in FIGURE 1, prior art methods of fabrication would require that this panel form be entirely completed as a pre-assembled, finished unit at the factory. However, by virtue of the instant disclosure, any standard rectangular panel, as shown by the dotted lines of FIGURE 1, may be delivered to the erection site, suitably cut to an arched shape and fitted with the flexible edge support **20** as shown, for accurate installation into its intended opening in the building.

Referring now to FIGURE 3, there is shown in greater detail the structural features of edge strip **20**, taken on line 3—3 of FIGURE 1. Edge strip **20** is comprised of a plurality of spaced apart inserts or segments **22** fastened to flexible strip **21** by screws or other conventional fastening devices. Strip **21** may be formed of sheet metal, plastic or other suitable material. In the illustrated embodiment, inserts **22** are, as a practical matter, made from segments of the I-beam shaped structural elements which comprise the grid core assembly. The use of this particular material for these segments is not essential and any material which meets the dimensional and structural requirements of compressive strength may be employed. By employing segments made from the structural grid core elements, however, the segment surfaces (*a*) and (*b*) are spaced apart accurately to fit between the opposed inner faces of the translucent sheet material **11**. This is more clearly depicted by reference to FIGURE 4 which illustrates an assembled sectional view of panel **10** and edge strip **20** taken on line 4—4 of FIGURE 2. It will be noted that edge stripping **21** extends laterally beyond segments **22** on each side thereof, an amount approximately equal to the thickness of facing sheet material **11** in order that stripping **21** and the edges of facings **11** may be in abutting relationship when assembled together.

Prior to assembling flexible strip **20** into the exposed panel edges, opposed surfaces (*a*) and (*b*) of segments **22** may be coated with an adhesive compound of the type disclosed in my aforementioned U.S. Patent 2,931,468,



whereby the inner face surfaces of the overlay sheet material **11**, are adhered to each of the segments. Though this is not a positive requirement, such an adhesive face assists in keeping the segments and facing sheet material intact, which may be an important consideration, in the event the panel is glazed into position rather than being rigidly held in position by conventional compressive type clamping devices. The adhesive above referred to is not of a permanent type and may, by the use of solvents or heat, have its tack lessened in order to remove strip **20** if need be.

To provide a positive weather seal between edge strip **21** and the panel **10**, once they are assembled, this invention provides for the use of a weatherproof type pressure sensitive tape **24** of, for example, polyvinyl fluoride which is affixed over the jointure between edge stripping means **20** and panel **10**, thereby preventing the ingress of moisture to the interior of the panel, and serving to secure the edge strip **21** to the panel in the event no adhesive is employed on opposed surfaces (*a*) and (*b*) of segments **22**. Though the preferred embodiments utilizes Tedlar type tape, it is, of course, understood that any other suitable tape material may also be employed, provided it exhibits the required characteristics of adhesiveness to the translucent sheet material and the surface of the edge stripping; does not deteriorate with age or exposure; and retains these desired characteristics over a wide temperature range.

In light of the foregoing disclosure, it will now be apparent that segments **22** should be so spaced apart on strip **21** that when edge strip **20** is assembled with panel **10**, segments **22** will be spaced approximately mid-way between adjacent grid core elements **14** so as to offer the maximum edge support to the translucent sheet material. The length of each segment will vary depending on the span of unsupported facing sheet material between adjacent grid elements so that, for example, although the entire span of facing sheet material between adjacent vertical grid core elements need not be occupied by a segment **22**, there should be enough to lead adequate support against deflection when acted upon by compressive type clamping means. The amount of support required depends in part on the stiffness of the overlay sheet material which, in turn, is related to its thickness.

Though the disclosed embodiment depicts one form of grid core pattern; it should be realized that many different grid patterns can be employed. Once any one of these patterns becomes standardized, then it becomes a relatively easy matter to manufacture and stockpile the edge stripping material which will correspond with a particular panel for field use.

Thus it may now be seen that as a result of the foregoing disclosure, this invention accomplishes the hereinbefore set forth objects in a completely novel and effective manner.

It will be understood that various changes in the details, materials, steps and arrangements of parts, which have been herein described and illustrated in order to explain the nature of this invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patents is:

**1.** In a sandwich panel comprised of a cellular type core with thin facing sheets of continuous material bonded to either side thereof, where such panel has at least one peripheral edge which exposes the panel interiorly thereof between unsupported edge portions of said continuous facing sheet material the combination thereof with; an edge cap member comprising a flexible sheet material having a plurality of spaced apart segments fastened thereto, said flexible sheet material having a width corresponding to the width of its associated panel, said segments having a width equivalent to the distance be-

tween the opposed inner faces of said facing sheet material, said edge cap is placed in sealing engagement with the aforesaid peripheral edge exposing the panel interiorly, the flexible sheet is in abutting relation to the edge portions of said facing sheets, and the segments are in face to face contacting relation with the opposed inner surfaces of the overlay sheet material.

2. The combination of a sandwich type building wall panel having at least one edge portion exposing the interior of the panel and independently removable edge cap means covering said edge portion and held in abutting, weather-sealing relationship to said panel with a polyvinyl fluoride tape.

3. A sandwich wall panel comprising a core, continuous sheet material overlaying each side of said core, said panel exhibiting at least one edge portion exposing the interior of said panel and which is intermittently unsupported by said core, an independently removable edge cap in sealing engagement with said one edge portion, said edge cap comprising a flexible sheet material having a width coextensive with the width of said wall panel and abutting against the edges of said facing sheet material, and a plurality of rigid segments fastened to said flexible sheet material in spaced apart relation with one another and in contacting relationship with the opposed inner faces of said intermittently unsupported facing sheet material, whereby to offer structural support for compressive stresses acting along the panel edge, and polyvinyl fluoride tape securing said edge cap to said panel in sealing, weather-tight relation.

4. A sandwich wall panel comprised of a cellular type



core with continuous sheets of thin overlay material laminated to both sides thereof, said panel having at least one curvlinear exposed peripheral edge open to the interior of said panel and structurally unsupported portions of said overlay sheet material adjacent said exposed edge exhibiting a higher degree of deflection than said supported portions thereof, an independently removable edge cap in sealing engagement with said exposed peripheral edge, said edge cap comprising a flexible sheet material having a width coextensive with the width of said wall panel and abutting against the edges of said facing sheet material, and a plurality of rigid segments fastened to said flexible sheet material in spaced apart relation with one another and adhesively secured to the opposed inner fces of the unsupported edge portions of facing sheet material.


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