Jan. 20, 1959 W. S. WHITE, JR 2,869,182

ROOF OR WALL CONSTRUCTION

Filed March 15, 1955

Fig. 1

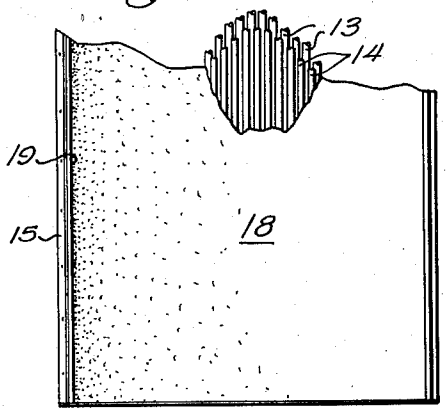


Fig. 4

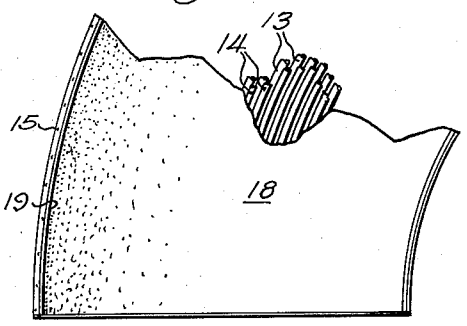


Fig. 2

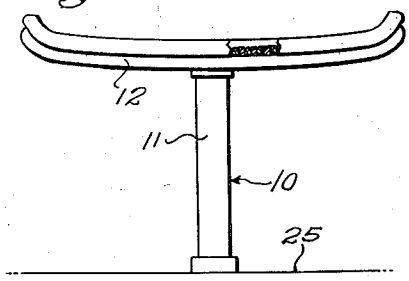


Fig. 5

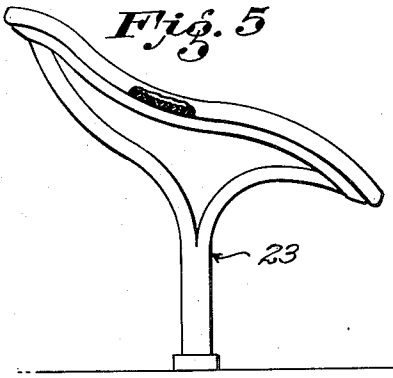


Fig. 6

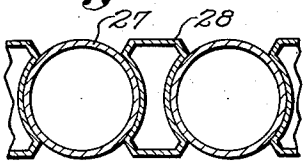


Fig. 3

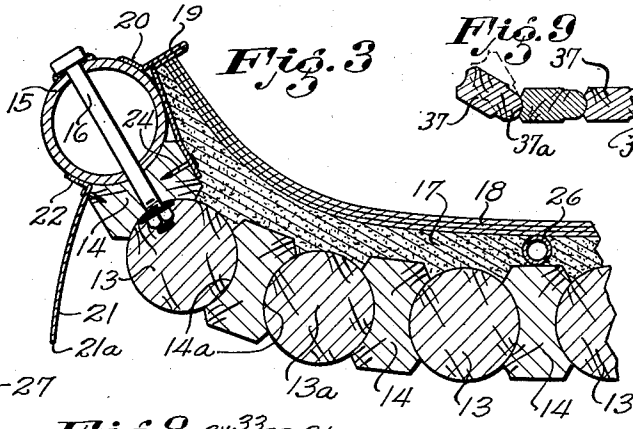


Fig. 9

Fig. 7

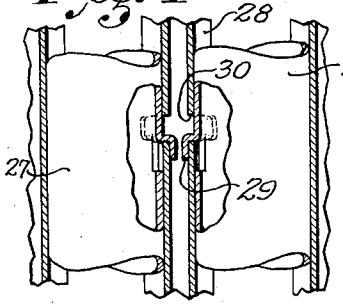
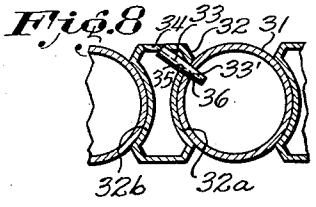


Fig. 8



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ROOF OR WALL CONSTRUCTION

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11 Claims. (Cl. 20—4)

This invention relates to a building construction, and particularly to a roof or wall structure.

In the past, providing curved wall or roof structures in accordance with modern architectural trends, required substantial time, effort and expense. Many separate structural sections had to be especially fitted together over a carefully prepared framework.

The primary object of this invention is to provide a wall or roof structure that may conform to complex curved configurations, eliminating the tedious fitting operations heretofore required, and materially reducing the number of structural parts required.

It is another object of this invention to provide a structure of this character that, while conformable, nevertheless provides a continuous surface.

To accomplish these objects, elongate, substantially coterminous elementary members are provided that are fitted together so that the angular relationship between adjacent members may be determined without disturbing the fitted relationship between them. This feature makes it possible to achieve desired curvature in a transverse direction, simple preformed supports or the like being provided to which the members are secured at intervals along their length, the configuration of the supports determining the configuration of the members. The elementary members are preferably sufficiently small in cross-section to provide a small bending moment of inertia. This feature makes it possible to achieve curvature in a longitudinal direction.

It is another object of this invention to provide a structure of this character that makes it possible to provide an inexpensive roof or wall structure.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a fragmentary plan view of a roof structure incorporating the present invention;

Fig. 2 is a diagrammatic view, showing one of the standards supporting the roof structure shown in Fig. 1;

Fig. 3 is an enlarged fragmentary transverse sectional view of the roof structure shown in Figs. 1 and 2;

Fig. 4 is a view similar to Fig. 1, showing a roof structure of arcuate plan;

Fig. 5 is a view similar to Fig. 2, showing one of the standards supporting the roof structure shown in Fig. 4;

Fig. 6 is a fragmentary transverse sectional view similar to Fig. 3, showing a modified form of the present invention;

Fig. 7 is a fragmentary sectional view, of a further modification;

Fig. 8 is a fragmentary sectional view similar to Fig. 6, showing a further modified form of the present invention; and

Fig. 9 is a fragmentary sectional view similar to Fig. 3, showing still another modified form of the present invention.

In Fig. 2, one of a series of spaced supports or standards 10 is shown which supports the roof structure. The standard 10 comprises a column 11 and a transverse beam or brace 12 secured in place upon the top of the column 11.

The brace 12 and similar braces of other columns form surfaces upon which elongate complementary wooden elements 13 and 14 may rest.

The elongate elements 13 and 14 are disposed in alternate series relationship with each other. The elements 13 are generally of cylindrical configuration and interfit the adjacent elongate elements 14 disposed on opposite sides thereof. For this purpose, the elongate elements 14 have symmetrically disposed concave cylindrical surfaces 14*a* on opposite sides, each engaging an arcuate portion of the cylindrical surface of the corresponding adjacent member 13.

Each of the bi-concave elements 14 can be angularly moved about the longitudinal axis 13*a* of the adjacent cylindrical member, the curvature of the elements 13 corresponding to that of the bi-concave elements. In this manner the series of elongate elements may be made to conform to the curved or arcuate configuration of the surface of the brace 12 without disturbing the fit of the interengaging parts of the elements. The elements 13 and 14, each being symmetrical about planes parallel to the corresponding elemental part of the roof or wall structure formed thereby, permit either a concave or convex configuration without requiring reversal of the elements.

In practice, the elements 13 and 14 are placed alternately and one at a time, upon the brace 12. In the present instance, an appropriate adhesive is placed between the engaging surfaces of the elements 13 and 14 to provide a secure weather tight connection. Each element is secured to the grace 12 after it is positioned in interfitting relationship.

The end element 15 is provided with supplemental means to hold it in place, inasmuch as it engages only one of the bi-concave elements 14. For this purpose, a bolt 16 is provided that passes through the end element and the adjoining bi-concave element 14. To facilitate the placement of the bolt 16, the end element 15 is made of hollow metal material.

To protect the structure from the weather, a roofing material may be applied upon the upper exposed or weather sides of the elements 13 and 14. In one example, a thin layer of cinders and cement 17 forms a bed for several layers of roofing paper 18. The edges of the roofing paper 18 abut an intermediate upwardly extending flange 19 of elongate metal flashing material 20. The flashing 20 overlies portions of the end element 15 and the next adjacent bi-concave member 14 and is appropriately secured thereto, as by nails 24.

A sheet metal deflector 21 is secured at the underside of the end member 15 and depends therefrom in order to deflect moisture from the lower surfaces of the series of elements 13 and 14. A flange 22, formed along one edge of the deflector 21, engages the end element 15 and ensures that moisture on the exposed area of the end member 15 will pass to the deflector 21 rather than along the undersides of the elements 13 and 14. Moisture will drip from the end edge 21*a* of the deflector

to the ground. The lower or sheltered side of the elements **13** and **14** are uncovered to provide a decorative effect.

In Fig. 3 there is shown, by way of example, a conduit **26**, such as for electrical lead wires, that is supported in place upon one of the elements **14** beneath the roofing material **18**.

In the form shown in Figs. 4 and 5, a modified form of standard **23** is provided. This standard is generally of skeletonizide triangular configuration, one side of the standard forming a support for the elements 13 and 14.

In the present form, the elements **13** and **14** are longitudinally curved about substantially vertical axes, the standards **23** being appropriately located for this purpose.

The elements **13** and **14** are sufficiently flexible in a transverse direction to permit them to assume such arcuate configuration. Flexure of the individual elements does not detract from the ability of the elements to interfit each other since the difference in curvature, if any between adjacent elements, is quite small, and the curvature itself is small.

In this form, as in the previous form, adjacent elements **13** and **14** may be relatively angularly positioned about a longitudinal axis in order that the alternate series of elements may conform to the surface of the standard **23**.

Consecutive standards **23** may provide different curvatures so that the transverse curvature of the roof continuously varies. In this instance, the elements **13** and **14** are caused to flex arcuately about generally horizontal axes.

Thus by the aid of the interfitting flexible elements **13** and **14**, it is possible in a simple manner to construct a wall or roof structure that has a compound curvature. Only the flexibility of the elements limits the extent of curvature possible. If the curvature is intended to be extreme, the elements **13** and **14** are made smaller in proportion in order to add flexibility as well as to provide more perfect conformance with the curved configuration of the standards.

A wall structure can similarly be provided by the aid of the elements **13** and **14**, appropriate supports serving the function of the satndards **10** or **23** being provided. By extending the brace **12**, for instance, to the surface of the floor **25**, it is possible to provide a continuous wall and roof structure. In the event that the elements **13** and **14** are used for a generally vertical wall structure, no roofing material, of course, need be provided. The interfitting relationship between the elements **13** and **14** is sufficient when painted, and especially when an adhesive is provided between the elements, to protect against the weather.

The interfitting elements may be made of material other than wood. Thus, for instance, in Fig. 6, a cylindrical element **27** and bi-concave element **28** are provided that are made of seamless tubing, such as of aluminum.

If desired, the metal elements **27** and **28** may be held together by the aid of fingers **29** (Fig. 7) struck outwardly from the cylindrical members **27**. These fingers **29** enter arcuate apertures **30** provided in the curved portions of the bi-concave elements **28** that are elongated in a peripheral direction. The finger **29** has an end extending parallel to the length of the elements. The apertures **30** are sufficiently wide to permit the finger to enter within the hollow element **28** upon alignment of the elements. Thereafter, upon relative longitudinal movement of the elements **27** and **28** with respect to each other, the end of the finger **29** is caused to engage beneath the edges about the aperture **30** appropriately to hold the adjacent elements **27** and **28** against relative separation. The arcuate extent of the apertures **30** permits relative adjustment of the angular position between adjacent elements.

In the form shown in Fig. 8, a hollow cylindrical elemen **31** and a hollow bi-concave element **32** are provided, as in the previous form.

To secure adjacent elements together, a series of taper pins **33** are provided. These pins are force-fitted into circular apertures of the elements **31** and **32**.

When the adjacent elements **31** and **32** are appropriately in place upon a brace, small holes **34** and **35**, for instance, are drilled diagonally through the bi-concave element **32** and a similar hole **36** is drilled through the cylindrical element **31**. The pin **33**, for instance, passes through the holes, and has a tapered end **33'** driven into wedging relationship in aperture **36** formed in the cylindrical member **31**. The apertures **34** and **35** are provided respectively through the accessible flat side of the bi-concave member **32** and one concave portion **32*a***. Pins engaging the cylindrical element at the opposite concave portion **32*b*** are also provided, preferably in staggered relationship with those engaging the element **31** at the concave portion **32*a***.

As many pins **33** are provided along the length of the adjacent elements as are required suitably to hold the elements together.

In the form shown in Fig. 9, a series of elements **37** are provided, each of the elements being alike. At one side of each element is a cylindrical concavity **37*a***. A cylindrically convex portion **37*b*** of corresponding curvature is formed at the opposite side of each element.

The elements are placed in side-by-side relationship as in the previous forms. The concavity **37*a*** of each element interfits the convex portion of the adjacent element. The elements can be relatively angularly adjusted about longitudinal axes to conform to the configuration of the standards as in the previous forms. The concavities **37*a*** have an arcuate extent of approximately 120°, and the convex portions **37*b*** have an arcuate extent of approximately 180°. This permits an adjustment of approximately 60° between adjacent elements without detracting from the fitted relationship between the elements.

The elements **37** may be secured together by an adhesive, as in the form shown in Fig. 3, or any other suitable means.

The inventor claims:

1. In a roof or wall construction for buildings: a series of elongate members placed in side-by-side relationship to form a roof or wall having a weather side and a sheltered side, adjacent members having interfitting parts permitting relative longitudinal angular movement of adjacent members with respect to each other about their interfitting parts prior to the members being secured; the interfitting parts of each member being symmetrical with respect to a plane parallel to the corresponding elemental part of the roof or wall formed by that member whereby a convex or concave configuration to the roof or wall may be provided without requiring reversal of the members.

2. In a roof or wall construction for buildings: a first series of longitudinal members; a second series of longitudinal members alternating with those of the first series; said members extending in side-by-side relationship; said two series having interfitting convex and concave surfaces for adjusting the relative angular positions of the members of both series before the members are secured; and means for attaching the members together.

3. In a roof or wall construction for buildings: a first series of longitudinal members; a second series of longitudinal members alternating with those of the first series; said members extending in side-by-side relationship; said two series having interfitting convex and concave cylindrical surfaces for adjusting the relative angular positions of the members of both series before the members are secured; and adhesive between the adjacent members for securing said members against relative angular movement.

4. In a roof or wall construction for buildings: a first series of hollow longitudinal members; and a second se-

ries of hollow longitudinal members alternating with those of the first series; said members extending in side-by-side relationship; said two series having interfitting convex and concave cylindrical surfaces for adjusting the relative angular positions of the members of both series before the members are secured; the members of one of said series having arcuately extending slots, and the members of the other series having fingers capable of entering the slots upon alignment between the slots and the fingers, and operative to secure the adjacent members together upon relative longitudinal movement between adjacent members.

5. In a roof or wall construction for buildings: a first series of longitudinal members; a second series of longitudinal members alternating with those of the first series; said members extending in side-by-side relationship; said two series having interfitting convex and concave surfaces for adjusting the relative angular positions of the members of both series before the members are secured; and a series of pins interconnecting the adjacent members for securing said members against relative angular movement.

6. In a roof or wall construction for buildings: a series of elongate members in side-by-side relationship, each of the elements having a concave portion at one side and a convex portion at the other side, the concave portion of each element fitting the convex portion of the adjacent element, to permit angular adjustment of the members before they are secured, the concave and convex portions of each member being symmetrical with respect to a plane parallel to the corresponding elemental part of the roof or wall formed by the member whereby a convex or concave configuration to the roof or wall may be provided without requiring reversal of the members.

7. In a roof construction for buildings: a pair of posts for a roof structure, each having upper supporting members; a series of elongate elements of uniform cross-section extending across the supporting members and each resting upon the supporting members in side-by-side relationship, there being two end elements of the series defining opposite boundaries of the roof, adjacent elements having interfitting cylindrical surfaces permitting relative angular movement of adjacent elements with respect to each other about their longitudinal axes; and means securing each of the elements in place upon the supporting members.

8. In a roof or wall construction for buildings: a first series of elongate elements having convex cylindrical surfaces on opposite sides; a second series of elongate elements alternating with those of the first series and having means on opposite sides defining sockets for reception of the convex surfces; said elements extending in side-by-side relationship; each of the second series of elongate elements being angularly adjustable about the adjacent elements of the first series; and means for securing the elements together.

9. The method of forming a curved roof or wall construction for buildings utilizing elongate members of uniform cross-section having interfitting parts permitting angular adjustment between the members about a longitudinal axis, which comprises: locating a series of supports having curved supporting surfaces in horizontally spaced relationship with respect to each other so that their supporting surfaces extend transversely relative to a line between the supports; placing spaced portions of an elongate member of uniform cross-section in engagement respectively with a plurality of supports; successively and similarly placing members of uniform cross-section upon a plurality of supports and in side-by-side relationship to the preceding member so that portions of the member fit the preceding member at the angular positions of the member relative to the preceding member determined by the curvature of the supports; and securing the members in place on the supports.

10. The method of forming a curved roof or wall construction for buildings utilizing elongate flexible members of uniform cross-section having interfitting parts permitting angular adjustment between the members about a longitudinal axis, which comprises: locating a series of supports having differently curved supporting surfaces in horizontally spaced relationship with respect to each other so that their supporting surfaces extend transversely relative to a line between the supports; flexing an elongate flexible member of uniform cross-section so that spaced portions of the member are placed in engagement respectively with a plurality of supports; successively and similarly placing flexible members of uniform cross-section upon a plurality of supports and in side-by-side relationship to the preceding member so that portions of the member fit the preceding member at the angular positions of the member relative to the preceding member determined by the curvature of the supports; and securing the members in place on the supports.

11. The method of forming a curved roof or wall construction for buildings utilizing elongate flexible members of uniform cross-section having interfitting parts permitting angular adjustment between the members about a longitudinal axis, which comprises: locating a series of supports having curved supporting surfaces in horizontally spaced relationship with respect to each other so that their supporting surfaces extend transversely relative to a line between the supports and so that corresponding portions of the surfaces are located along a curved line; placing spaced portions of an elongate flexible member of uniform cross-section in engagement respectively with a plurality of supports; successively and similarly placing flexible members of uniform cross-section upon a plurality of supports and in side-by-side relationship to the preceding member so that portions of the member fit the preceding member at the angular positions of the member relative to the preceding member determined by the curvature of the supports; and securing the members in place on the supports.

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