Jan. 24, 1967 A. H. WILKINS 3,299,585

BUILDING CONSTRUCTION

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Fig. 1.

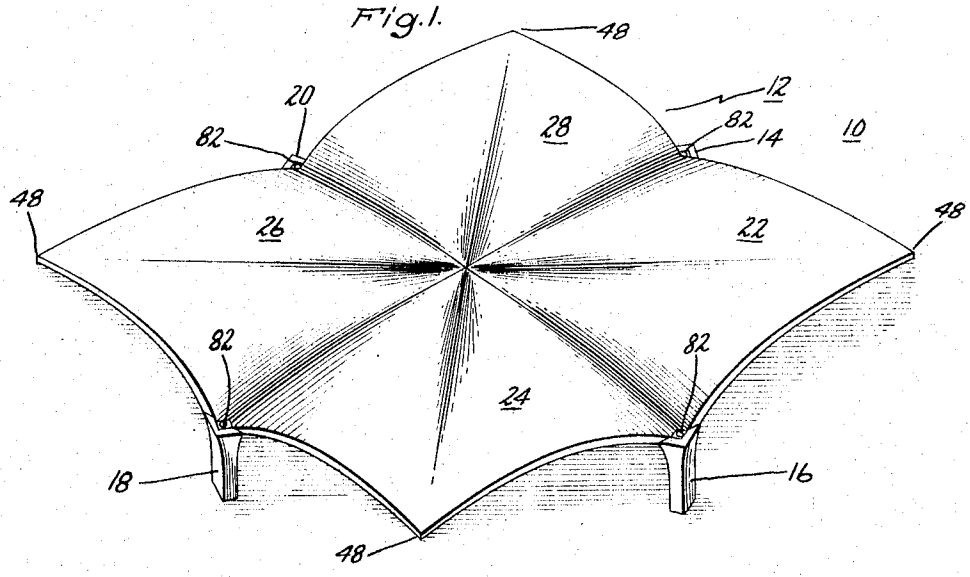
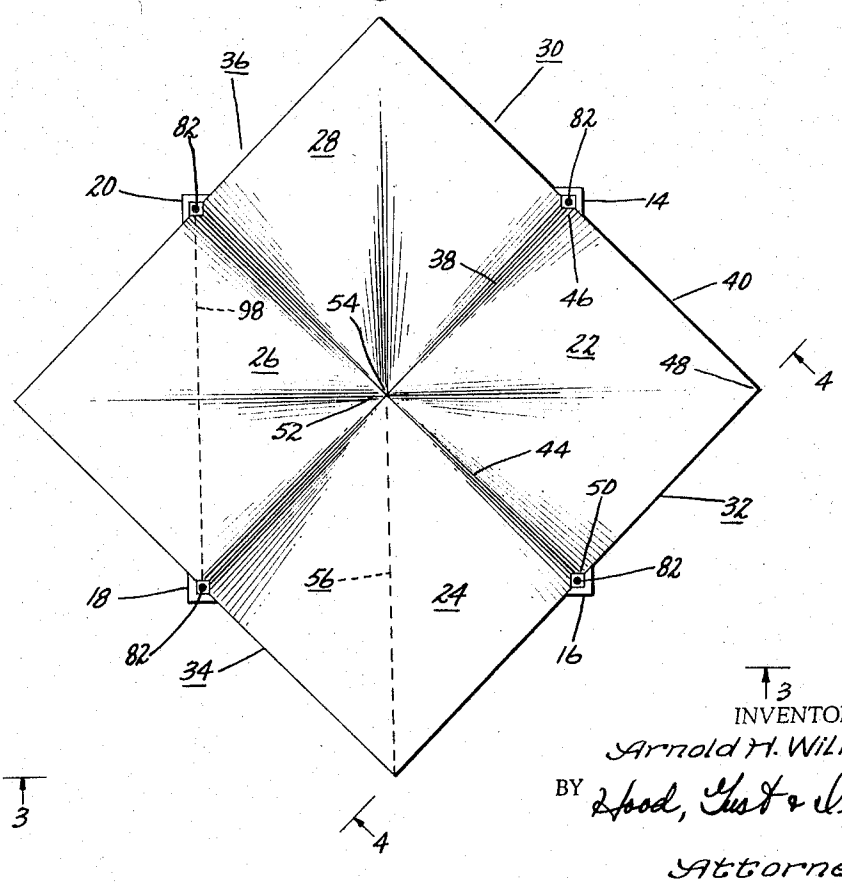


Fig. 2.



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INVENTOR.
Arnold H. Wilkins,
BY Hood, Gust & Irish
Attorneys.

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Fig. 3.

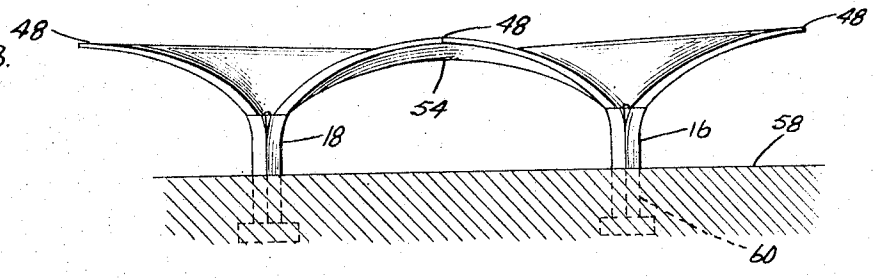


Fig. 4.

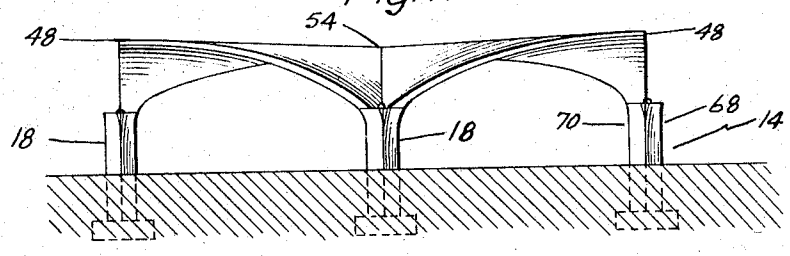
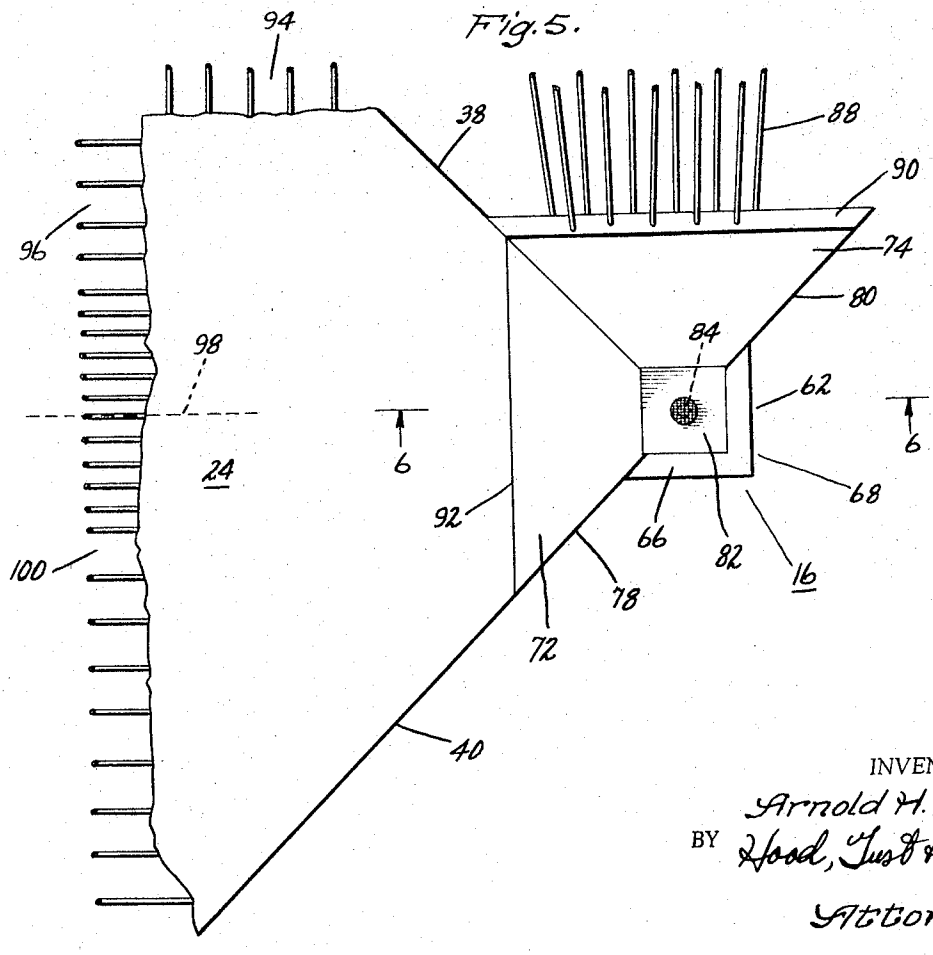


Fig. 5.



INVENTOR.
Arnold H. Wilkins,
BY Hood, Just & Irish
Attorneys.

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Fig. 6.

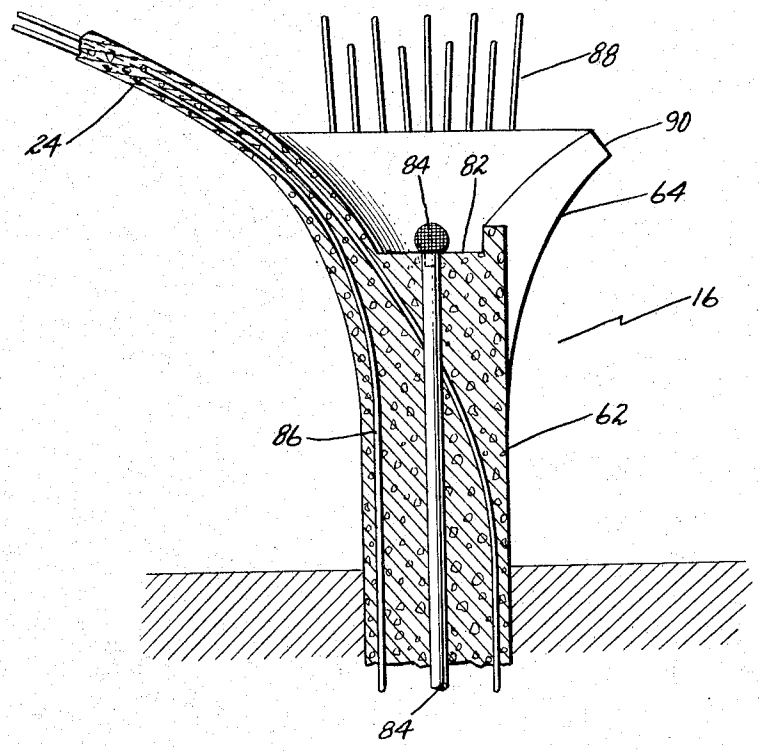
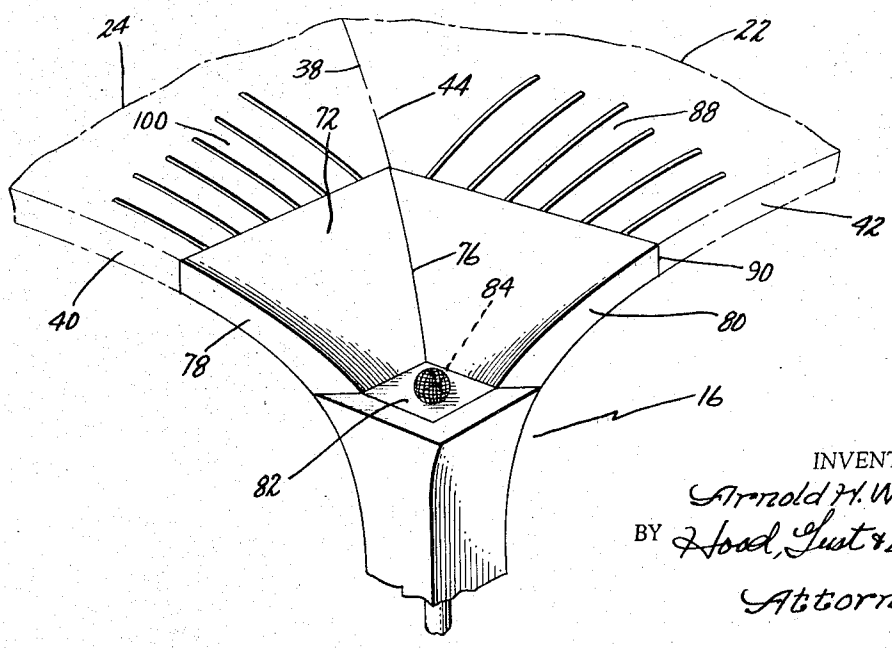


Fig. 7.



INVENTOR.
Arnold H. Wilkins,
BY Hood, Gust & Irish
Attorneys.

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3,299,585

BUILDING CONSTRUCTION

Arnold H. Wilkins, 2002 Kem Road, Marion, Ind. 46952

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10 Claims. (Cl. 52—13)

This invention relates generally to building structures, and more particularly to a sectionalized concrete roof and supporting pillar construction.

In the design and construction of modern buildings, it is frequently desirable to provide the greatest possible area under roof unobstructed by interior load-supporting pillars. In the past, the provision of such large unobstructed areas has necessitated the employment of large and costly truss members for supporting the roof structure. Developments in the field of reinforced concrete and the techniques of casting the same lend themselves to use in building construction, however, the employment of cast concrete in most conventional building structures has not realized all of the advantages potentially available, particularly with respect to simplicity of design and economy of erection. Furthermore, conventional building constructions are generally restricted to buildings of more or less conventional design.

It is therefore desirable to provide a building structure which lends itself to the employment of cast concrete, which provides the greatest possible unobstructed area under the roof without requiring the use of truss or other structural roof-supporting members, and which is simple and inexpensively erected.

It is accordingly an object of my invention to provide an improved building structure.

Another object of my invention is to provide an improved building structure particularly adapted for fabrication with cast concrete.

A further object of my invention is to provide an improved building structure which provides maximum unobstructed interior space under the roof of the structure without requiring roof-supporting structural members.

A still further object of my invention is to provide an improved building structure characterized by its simplicity and ease of erection.

Further objects and advantages of my invention will become apparent by reference to the following description and the accompanying drawings, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

My invention in its broader aspects provides a building structure having at least one section which comprises an extended area roof member and two spaced-apart pillar members supporting the roof member at two diametrically opposite points thereon and constituting the principal vertical support therefor.

In the preferred embodiment of my invention, four such sections are provided, each roof member in plan view having four equal-length sides defining a quadrangle, the roof members being disposed in abutting relationship with the resulting roof structure in plan view, also defining a quadrangle. In this sectionalized construction, a total of four pillar members are provided respectively disposed on the outer perimeter of the roof structure and each supporting adjacent corners of two adjacent roof members, each roof member thus being independently verticallly supported at diametrically opposite corners by a pair of pillar members, the entire interior area of the structure under the roof thus being unobstructed by virtue of the positioning of the pillar members at the outer perimetral edges of the roof structure.

In the drawings:

FIG. 1 is a view in perspective showing a preferred embodiment of the improved building structure of my invention;

FIG. 2 is a top plan view of the building structure of FIG. 1;

FIG. 3 is a side elevational view of the building structure of FIGS. 1 and 2 taken along the line 3—3 of FIG. 2;

FIG. 4 is a side elevational view of the building structure of FIGS. 1 and 2 taken along the line 4—4 of FIG. 2;

FIG. 5 is an enlarged fragmentary top view, partly broken away, illustrating one of the pillar members and a section of one of the roof members supported thereon;

FIG. 6 is a fragmentary cross-sectional view taken along the line 6—6 of FIG. 5; and

FIG. 7 is a fragmentary view in perspective further illustrating one of the pillar members of the invention.

Referring now to the figures of the drawing, in the illustrated embodiment, the improved building structure of my invention, generally indicated at **10**, comprises a roof structure **12**, preferably formed of cast concrete as will be hereinafter more fully described, supported on four pillar members **14**, **16**, **18** and **20**. The roof structure **12** is formed of four abutting roof sections **22**, **24**, **26** and **28**, each roof section being substantially independently vertically supported by a pair of the pillar members.

Referring particularly to FIG. 2, it will be seen that the roof structure **12** has four equal-length perimetral sides **30**, **32**, **34** and **36** respectively lying in four vertical outer planes which, in plan view, define a quadrangle. While in the illustrated embodiment the sides **30**, **32**, **34** and **36** of the roof structure **12** are shown as defining, in plan view, a square, it will be understood that they may also define a diamond-shaped figure.

Each of the four roof sections **22**, **24**, **26** and **28** has four perimetral sides **38**, **40**, **42** and **44** likewise lying in vertical planes which define, in plan view, a quadrangle which may be a square, as in the illustrated embodiment, or a diamond. It will be seen that the four side edges **38**, **40**, **42** and **44** of each roof member **22** respectively define corners **46**, **48**, **50** and **52**. It will further be seen that the inner sides **38**, **44** of each roof member respectively abut the corresponding inner sides of the two adjacent roof members and that the outer sides **40**, **42** respectively lie in two adjacent ones of the aforementioned outer vertical planes. Thus, the inner abutting sides **38**, **44** of the roof sections **22**, **24**, **26** and **28** respectively lie in two inner vertical planes which respectively intersect at the center **54** of the roof structure **12** and which bisect the aforementioned outer vertical planes.

As will be hereinafter more fully described, each of the roof sections **22**, **24**, **26** and **28** is vertically supported at its corners **46**, **50** by a pair of pillars **14** and **16**, **16** and **18**, **18** and **20** and **20** and **14**, respectively. It will now immediately be seen that the four pillar members **14**, **16**, **18** and **20** are respectively disposed in the aforementioned four vertical outer planes defined by the sides **30**, **32**, **34** and **36** of the roof structure **12**, and thus that the entire area under the roof structure **12** is unobstructed.

Each of the roof sections **22**, **24**, **26** and **28** is outwardly arched about an axis extending between its outer corner **48** and its inner corner **52**, as shown by the dashed line **56** in FIG. 2. Reference to FIGS. 3 and 4 will clearly show that with the corners **46**, **50** of each of the roof sections **22**, **24**, **26** and **28** supported

by the respective pillars 14, 16, 18 and 20 at a predetermined height above the ground plane 58, the outer corners 48 are vertically spaced from the ground plane 58 by a greater distance by virtue of the arched configuration of the respective roof sections. It will further be seen that the axes 56 respectively slope inwardly toward the center 54 of the roof structure 12, however the inner corners 52 of the respective roof sections and the center 54 are still vertically spaced above the ground plane 58 by a distance greater than the vertical spacing of the corners 46, 50. It will be seen that adjacent roof sections slope from the respective axes 56 toward the respective pillar member, that the upper surfaces of adjacent roof sections mutually define troughs which also slope toward the respective pillar member, and that the junctions of the inner sides 38, 44 of adjacent roof sections slope downwardly from the center 54 of the roof structure 12 to the respective pillar member. It will be understood that the pillar members 14, 16, 18 and 20 will be supported by suitable conventional footings below the ground plane 58, as shown by the dashed lines 60.

It will further be seen that the roof sections 22, 24, 26 and 28 conjointly form an arch structure and that while the principal vertical support for each roof section is provided by its respective pair of pillar members 14, 16, 18 and 20, the inward and downward slope of the roof sections along their axes 56 and the abutment of their inner sides 38, 44 provides the requisite lateral support for the roof sections and particularly provides a total roof structure 12 which will withstand substantial roof loading as for example caused by an accumulation of snow.

Referring now particularly to FIGS. 5, 6 and 7, in which one of the pillar members, for example pillar member 16, is shown with portions of the roof sections 22, 24 supported thereby, each of the pillar members comprises a vertically upstanding base section 62 and a top section 64 extending upwardly and outwardly from the upper end 66 of the base section. In the illustrated embodiment, the base section 62 is square in cross-section and is disposed with the respective outer vertical plane defining side 32 of roof 12 extending diagonally therethrough thereby vertically dividing the base section 62 into outer and inner portions 68, 70.

The top section 64 of each pillar member comprises two walls 72, 74 respectively extending upwardly and outwardly from the inner portion 70 of the upper end 66 of the base section 62. Walls 72, 74 respectively have inner sides 76 which are joined and lie in the inner vertical plane defined by the abutting inner sides 38, 44 of the respective roof sections 24, 22. Walls 72, 74 respectively have outer sides 78, 80 which lie in the outer vertical plane defined by the outer side 32 of the roof 12 (and also the outer sides 40, 42 of the roof sections 24, 22).

A catch basin 82 is formed in the upper end 66 of the pillar member and has a suitable drain 84 communicating therewith for draining water therefrom. Each of the pillar members is preferably formed of cast concrete and has a plurality of reinforcing rods, generally identified at 86, cast therein which extend upwardly through the base section 62 and the walls 72, 74 with elongated ends 88 respectively projecting from the respective beveled top edges 90 of the walls 72, 74.

Each of the roof sections 22, 24 has end edges 92 respectively joining the inner and outer sides 38, 40 and 44, 42, end edges 92 in essence truncating the respective corners 46, 50. End edges 92 respectively abut the top edges 90 of the walls 72, 74 of the respective pillar member thereby supporting the respective roof section. As best seen in FIG. 6, the projecting ends 88 of the reinforcing rods 86 of the respective pillar members extend into the respective roof section 22, 24.

Each of the roof sections, being preferably formed of cast concrete, has a first group 94 of transversely spaced-apart reinforcing rods formed therein which extend on either side of and parallel with its axis of curvature 56. Each of the roof sections has a second group 96 of transversely spaced-apart reinforcing rods formed therein extending on either side of and parallel with axis 98 (FIGS. 2 and 5) which extends between the corners 46, 50, the groups 94 and 96 of reinforcing rods thus being disposed at right angles to each other. The rods of group 96 of reinforcing rods are more closely spaced adjacent the axis 98, as at 100, thus providing in essence a crown beam integrally formed with the respective roof section.

It will now be seen that the outer surfaces of roof section 24 and wall 72 merges smoothly and slope downwardly into the catch basin 82 and likewise that the outer surfaces of the roof section 22 and the wall 74 merge smoothly and slope downwardly into the catch basin, the two adjacent roof sections 22, 24 defining a trough sloping downwardly into the catch basin thereby draining water from the roof into the catch basin from which it is removed by the drain 84. It will be recalled that the junctions of the abutting inner sides 38, 40 of the respective roof sections slope continuously downwardly from the center 54 of the roof 12 to the respective catch basin and thus it will be seen that no pocket or recess is formed on the upper surface of the roof 12 in which water can collect, but on the contrary that all water will be drained from the roof into the catch basins.

In the erection of the building structure of the invention, the pillar members 14, 16, 18 and 20 are preferably first cast in situ, although it will be understood that the pillar members may be precast and installed in any suitable fashion at the site. One of the roof sections 22, 24, 26, 28 may then be cast in place using suitable forms supported, at least in part, from the respective pair of pillar members. When this roof section has been cast, and since the roof sections are identical and thus the forms will be identical, the forms may then be dismantled and reerected between another pair of pillar members so as to form the next roof section.

While the roof structure 12 has been shown as comprising four roof sections, it will be readily seen that further sections may be added at any one of the outer sides 40, 42 of any of the roof sections 22, 24, 26, 28 by merely providing one additional pillar for each additional roof section.

It will now be seen that I have provided an improved building structure suited for formation with cast concrete in which the maximum unobstructed interior area under the roof is provided without necessitating the employment of separate load bearing means or trusses. It will further be seen that the structure of my invention is readily and inexpensively erected and that it presents a simple and uncluttered appearance. Furthermore, it will be seen that means for roof drainage is provided as an integral part of the structure thus eliminating all need for auxiliary gutters, downspouts and the like.

While I have illustrated and described a specific embodiment of my invention, further modifications and improvements will occur to those skilled in the art and I desire therefore in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

I claim as my invention:

1. A free standing building unit comprising a continuous, monolithic, self-supporting, extended area roof member formed of cementitious material and having four perimetral sides respectively lying in vertical planes which define a quadrangle, said roof member being outwardly arched about a straight axis extending between a first two diagonally opposite corners thereof, and two spaced apart pillar members respectively having upper ends supporting the other two diagonally opposite corners of said roof member at substantially equal distances above a ground plane, said pillar members being the sole vertical support

for said roof member, said first corners being spaced from said ground plane by distances greater than said other corners, said roof member including reinforcing means therein and forming therewith an arched crown beam extending continuously between and into said pillar members for providing cantilever support for said first corners.

2. The building unit of claim 1 wherein said reinforcing means comprises at least one elongated continuous reinforcing member embedded in said cementitious material.

3. The building unit of claim 1 wherein said reinforcing means comprises a plurality of transversely closely spaced, parallel, elongated continuous reinforcing rods embedded in said cementitious material.

4. The building unit of claim 3 wherein said roof member is of substantially uniform thickness throughout its area.

5. The building unit of claim 1 wherein said roof member is of substantially uniform thickness throughout its area, said reinforcing means comprising a first plurality of transversely closely spaced, elongated, continuous reinforcing rods embedded in said cementitious material; and further comprising a second plurality of transversely spaced, elongated reinforcing rods embedded in said material extending parallel with and respectively on either side of said first plurality, and a third plurality of transversely spaced, elongated reinforcing rods embedded in said material extending parallel with and on either side of said axis, the spacing between said second and third plurality of rods being substantially greater than between said first plurality of rods.

6. In a building: a roof structure including two discrete extended area roof members, each of said roof members being continuous, monolithic, self-supporting and free standing, each of said roof members being formed of cementitious material and having four perimetral sides respectively lying in vertical planes which define substantially a square, said roof members being disposed in end-to-end relationship with their adjacent sides abutting; a first pillar member having its upper end supporting a first pair of adjacent corners of said two roof members at a predetermined distance above a ground plane; and second and third pillar members having their upper ends respectively supporting second corners of said two roof members respectively diagonally opposite said first pair of adjacent corners at said predetermined distance above said ground plane whereby each of said roof members is independently vertically supported by said first pillar member and one of said second and third pillar members; each of said roof members being outwardly arched along a straight axis extending between the other two diagonally opposite corners thereof with said other two opposite corners being vertically spaced from said ground plane by distances greater than said predetermined distance; each of said roof members including reinforcing means forming therewith an arched crown beam extending continuously between and into said first pillar member and the respective one of said second and third pillar members for providing cantilever support for said other two corners.

7. The structure of claim 5 wherein the surfaces of each of said roof members on either side of said axis respectively curvedly slope downwardly toward said pillar members, the junction of said abutting sides sloping downwardly toward said first pillar member.

8. The structure of claim 6 wherein said first pair of adjacent corners are respectively truncated by end edges which define an outwardly facing angle therebetween, said first pillar member being monolithic and comprising an upstanding base section and a top section joined to the upper end of said base section, said top section comprising two wall portions respectively extending upwardly and outwardly from said upper end of said base section, said wall portion having respective sides joined and defining an angle therebetween, the junction of said wall portion sides being in alignment with the junction of said abutting side edges of said roof members, said wall portions having top edges respectively abutting said end edges of said two roof members thereby respectively supporting said adjacent corners.

9. The structure of claim 8 wherein said first pillar member has catch basin means formed in its said upper end with drain means communicating therewith, said wall portions curving downwardly smoothly from said roof members and extending into said catch basin means for draining water thereto from said roof members.

10. The structure of claim 6 wherein said reinforcing means of each of said roof members comprises a plurality of transversely closely-spaced, parallel, elongated, continuous reinforcing rods embedded in said cementitious material.

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