March 29, 1966 H. W. KAISER 3,242,620

CANTILEVERED ROOF STRUCTURE AND SUPPORTING MEANS THEREFOR

Filed Nov. 12, 1963 3 Sheets-Sheet 1

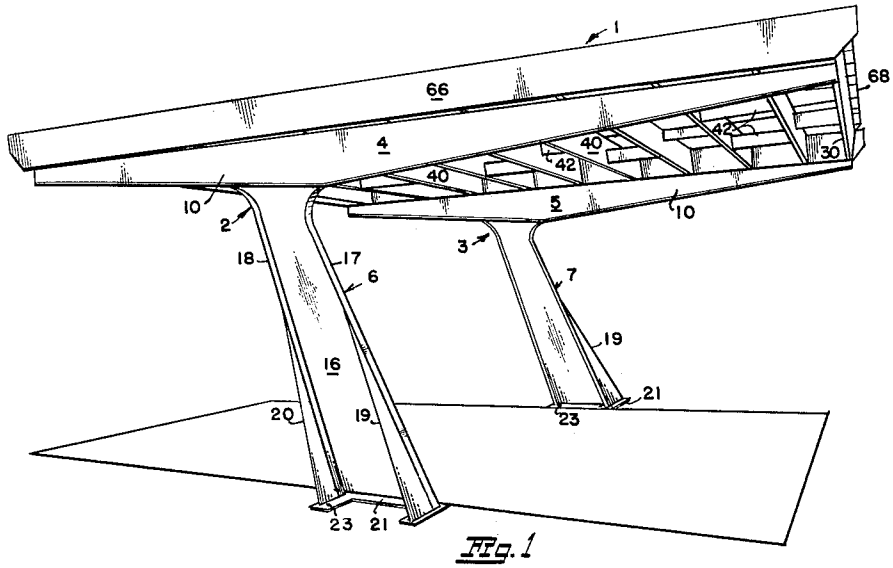


Fig. 1

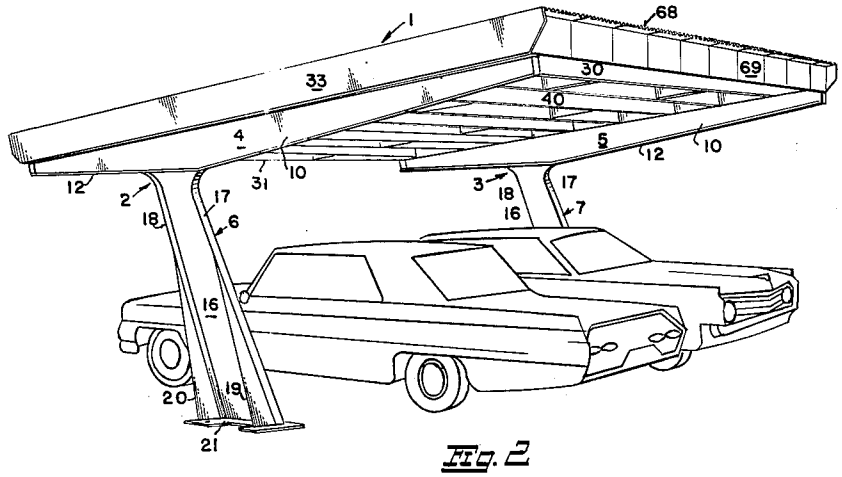


Fig. 2

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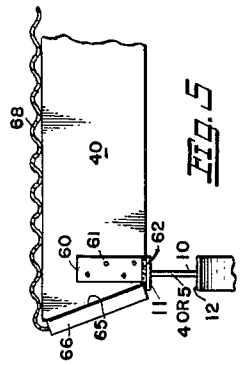


FIG. 5

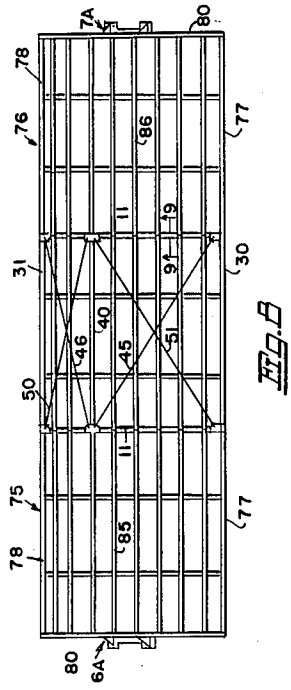


FIG. 8

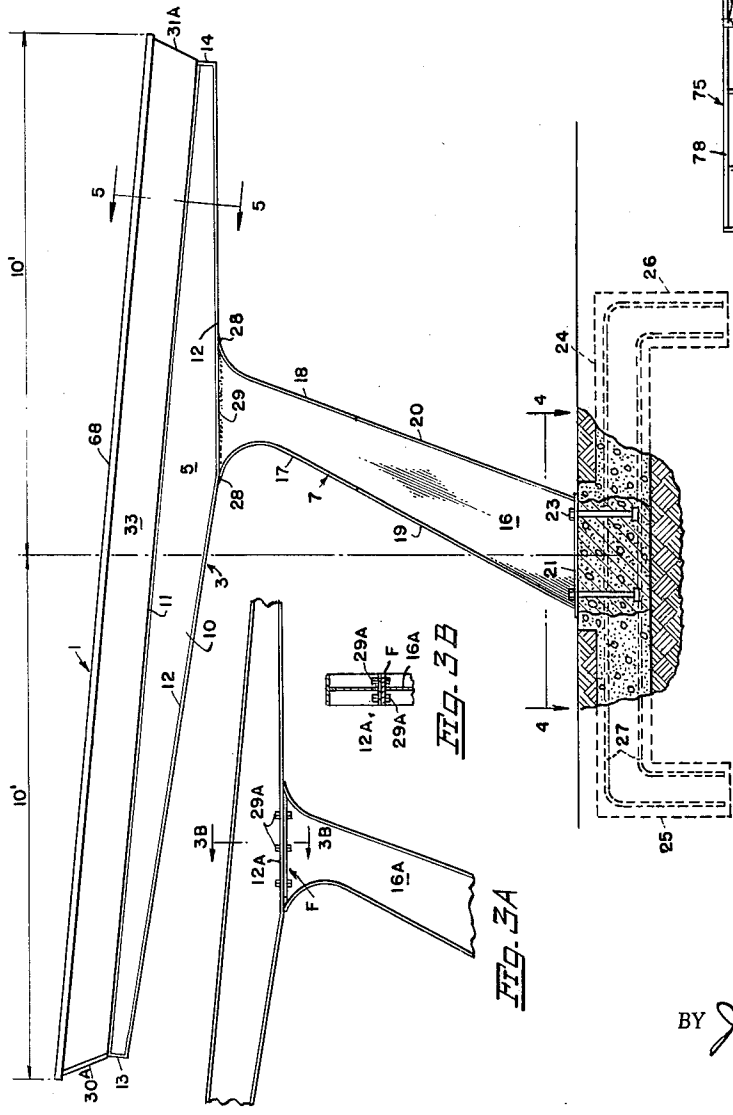


FIG. 3

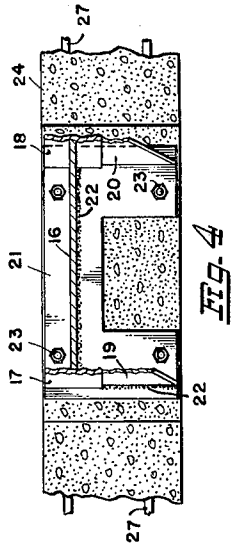


FIG. 4

FIG. 3B

FIG. 3A

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CANTILEVERED ROOF STRUCTURE AND SUPPORTING MEANS THEREFOR

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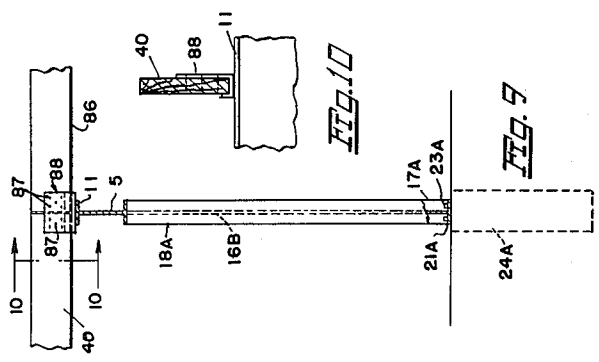


FIG. 10

FIG. 9

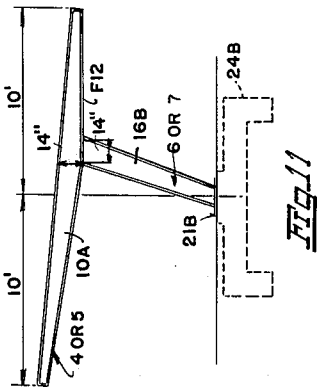


FIG. 11

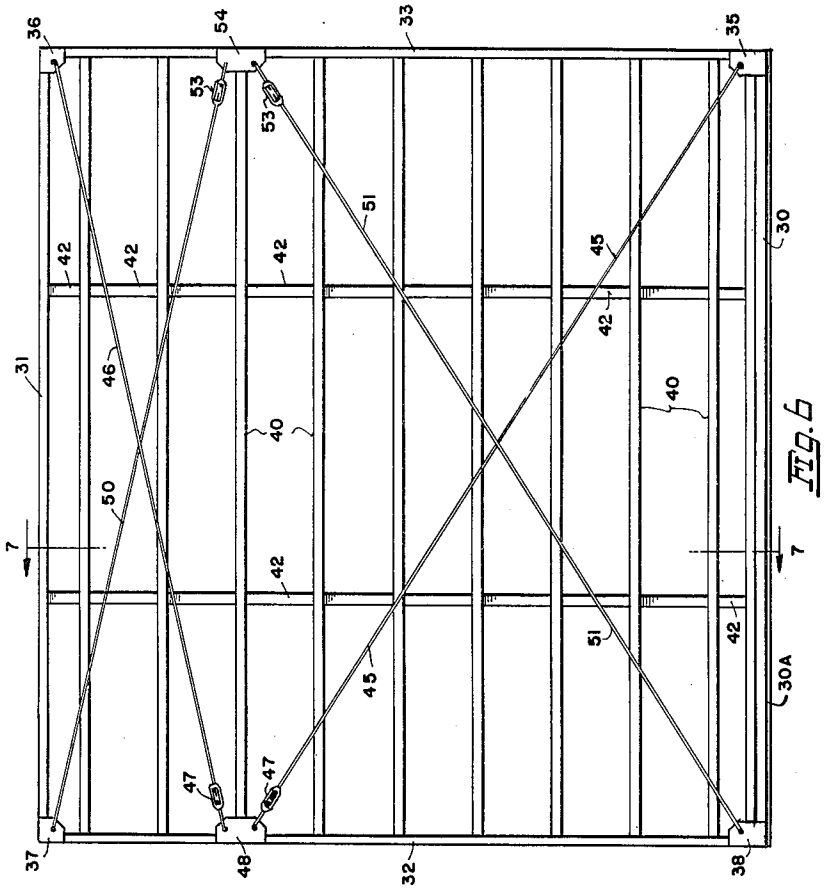


FIG. 6

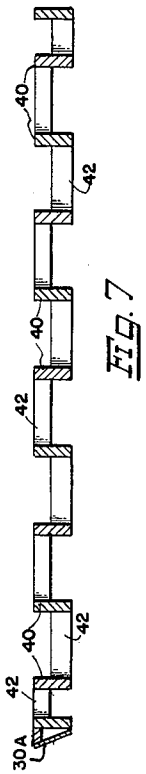


FIG. 7

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United States Patent Office 3,242,620
Patented Mar. 29, 1966

3,242,620

CANTILEVERED ROOF STRUCTURE AND SUPPORTING MEANS THEREFOR

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Filed Nov. 12, 1963, Ser. No. 322,742
2 Claims. (Cl. 52—73)

This invention relates to improvements in building construction and more particularly to a roof structure and supporting means therefor especially adapted for selective use as a carport or as a patio.

One of the principal objects of this invention is the provision of a structure of this character wherein front and rear corner posts are eliminated to thus permit easy access by vehicles when used as a carport, and which when used as a covered patio presents a pleasing ornamental modern appearance with minimum of view obstruction.

A further object is to provide a structure of this character wherein only two supporting posts are used one on each side of the structure with a reinforced concrete beam or base, torsion stiff, under each leg, with pressure pedestals at the ends thereof designed to withstand forces resulting from dead or live loads as well as longitudinal and lateral windforces.

A further object is to provide a structure of this character which is preferably though not restrictively fabricated from steel in flanged webplate design, with the center of gravity at the center of the leg base.

The foregoing and other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof and in which:

FIGURE 1 is a perspective view of the invention adapted for use as a patio.

FIGURE 2 is a similar view showing the invention adapted for use as a carport.

FIGURE 3 is a side elevational view of either FIGURE 1 or FIGURE 2 rotated through 180 degrees and with fragments broken away for convenience of illustration.

FIGURE 3A is a fragmentary side elevational detail view showing a modification of FIGURE 3.

FIGURE 3B is a sectional view taken approximately along the line 3B—3B of FIGURE 3A.

FIGURES 4 and 5 are sectional detail views on an enlarged scale taken respectively along the line 4—4 and 5—5 of FIGURE 3.

FIGURE 6 is a top plan view of the roof structure with some parts omitted to illustrate structural details and roof bracing.

FIGURE 7 is a sectional elevational view taken approximately along the line 7—7 of FIGURE 6.

FIGURE 8 is a top plan view on a reduced scale of a modified form of roof structure.

FIGURE 9 is a sectional detail view on an enlarged scale taken along the line 9—9 of FIGURE 8.

FIGURE 10 is a sectional detail view on an enlarged scale taken along the line 10—10 of FIGURE 9, and

FIGURE 11 is a side elevational view on a reduced scale of a modified form of side frame.

With continuing reference to the drawings wherein like reference characters designate like parts, and particularly FIGURES 1–4 thereof, reference numeral 1 indicates generally a roof structure mounted upon two composite side frames indicated generally at 2 and 3, which are identical except for their right and left hand disposition. The frames comprise longitudinal beams 4 and 5 tapering toward both of their ends as shown and supported upon columns indicated generally at 6 and 7. The beams are of web-plate design having a vertical web 10, top and bottom flanges 11 and 12 and end flanges 13 and 14.

The columns are of similar design having a web 16, side flanges 17–18 and gusset plates 19–20 welded to the lower portions of the flanges 17–18 to increase lateral stability and to bring the point of rigidity of the columns down to base plates 21 to which the webs, flanges and gussets are welded as at 22 (FIG. 4). The base plates are secured by any desired number of anchor bolts 23 to sunken concrete foundations 24 which are torsion stiff and provided at both of their ends with pressure pedestals 25 and 26 all reinforced by reinforcing bars 27.

The foundations 24 are of sufficient length to provide stability against wind forces in a longitudinal direction and the pressure pedestals 25–26 by their depth of penetration into the ground provide stability against lateral wind forces. By establishing a rigid point at the base of each column I eliminate knee bracing between the frame 2–3 and roof structure 1 and thus obtain clear and clean ceiling appearance.

The columns 6 and 7 tilt toward the rear of the structure as shown, to present a modern design and one which engenders strength and rigidity. Although the cantilever effect of the supporting structure was intentionally created, the center of gravity of the structure in its entirety is at the bottom center of the columns at center of the base plates 21 as indicated by the arbitrary but equal dimensions applied to FIGURES 3 and 11.

The top end of each column and its flanges are flared outwardly as at 28 and welded thereacross as at 29 to the underside of the bottom flange 12 of its respective longitudinal beam when the structure is finished and made ready for shipment at the factory, or as illustrated in FIGURES 3A–3B the beams and columns may be shipped as separate items and bolted together into final assembly at the location of erection. For this purpose the top of the column web 16A is provided with a flange F matching the corresponding portion of the flange 12A of its respective longitudinal beam to acommodate bolts 29A on both sides of the beam and column web.

As best illustrated in FIGURES 6 and 7 the unitary roof structure comprises a frame having vertically disposed front and rear parallel members 30–31 interconnected at their ends with side members 32–33 and provided at its corners with anchor plates 35–38.

The front member 30 may be provided with a downwardly and rearwardly sloping eave strut 30A and in addition thereto a similar strut 31A may be secured to the rear member 31 if desired, as shown in FIGURE 3.

The side members 32–33 are interconnected at spaced intervals by transversely arranged steel or wooden roof purlins 40 which are secured in parallel relation at points intermediate their ends by purlin spacers 42. These spacers as shown in FIGURE 7 are alternately arranged on two horizontal planes to produce shadow effects whose artistic appearance is enhanced by corrugated plastic roofing 68 arranged in strips or of sections which may be of different colors to further enhance the overall pleasing and ornamental effect of the structure as viewed from the underside thereof. As a further contribution to this artistic effect I may cover the front and rear frame members 30 and 31 with strips or sections of smooth or corrugated plastic material as indicated at 69 in FIGURE 2.

This roof frame is further reinforced by aircraft cables 45–46 interconnecting the corner anchor plates 35–36 through turnbuckles 47 to an anchor plate 48 secured to the side member 32 and by similar cables 50 and 51 interconnecting the corner plates 37 and 38 through turnbuckles 53 with an opposing anchor plate 54 secured to the other side frame member 33.

The roof frame as best illustrated in FIGURE 5 is secured to the top flanges 11 of the longitudinal beams

4 and 5 by purlin clips 60 secured to the purlins as at 61 and the bottom of each clip is secured to the top beam flange 11 by welding as at 62 or the same way, if desired be secured by means of bolts, not shown, extending through the bottom of the clips and the flanges 11. The outer ends of the purlins may diverge upwardly as at 65 and to these ends may be secured eave struts 66 arranged on a diagonal instead of being vertically disposed as in FIGURES 1, 2 and 6.

In the modified form of structure shown in FIGURE 8 the roof is elongated by two identical end bays or sections 75 and 76 each comprising front and rear frame members 77 and 78 interconnected by end members 80. Each front and rear frame member may be one continuous beam or they may be individual pieces connected to the front and rear members 30 and 31 of the center frame as will be more fully hereinafter described.

This roof structure is supported at both of its ends by columns 6A and 7A identically with those shown and described in FIGURES 1–3 and similarly anchored to sunken foundations 24, as in FIGURES 3 and 4. The center frame is provided with the purlins 40, and reinforcing cables 45–46 and 50–51 as in FIGURE 6, but the side frame members 32–33 are eliminated by securing the inner ends of the purlins 85 and 86 respectively of the outer frames 75–76 with the outer ends of the purlins 40 of the center frame in a manner as illustrated in FIGURES 9 and 10, wherein the end frame purlins are connected to the purlins 40 as at 87 by heavy steel purlin clips 88 welded or bolted to the top flange 11 of the longitudinal beams 4 or 5 of the center section. These last mentioned beams are secured to the top end of columns 16B either by welding or by bolts as shown in FIGURES 3 and 3A but the gussets are eliminated and the base plates 21A are reduced in width and secured by bolts 23A to the foundation 24A.

In the further modification illustrated in FIGURE 11, the columns 6A and 7A are of straight upwardly diverging web and flange formation and secured to the bottom flange F12 of their respective beams 4A or 5A in either the bolted or welded construction as shown and described in connection with FIGURES 3–3A. The bottom of each of these columns is secured to its base plate 21B and by the base plate secured to the sunken foundation 24B as in the other forms of the invention.

Here as in the other forms of the invention the center of gravity of the structure in its entirety is at the bottom center of the columns at the center of their base plates as indicated by the equal dimensions applied to the length of the beams 4A and 5A. It is also to be noted that the depth of the widest part of the web of the longitudinal beams 4A and 5A is equal to the width of the top end of the web 16B of the supporting column as indicated by the equal dimensions applied to both webs.

Although the roof beams and supporting columns have been shown and described as being of welded web and flange construction such disclosure is not intended to prescribe any limitations since obviously said beams and columns may be fabricated by welding or cold forming into beams of various sections such as I, U, C, and Z or any other desired section having sufficient strength and rigidity for the purposes intended.

While I have shown particular forms of embodiment of my invention, I am aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described my invention what I claim as new and desire to protect by Letters Patent is:

1. A building comprising a roof structure having a forward end, a rearward end and inclined downwardly from the forward end to said rearward end,

said roof structure comprising a frame having two parallel beams of top and bottom flanged web members of I-section tapering upwardly and forwardly from a point rearward of the transverse center of the frame and upwardly and rearwardly therefrom to a lesser extent than said forward taper,

supporting columns for said roof structure each comprising upwardly tapering flanged web plates permanently secured at their top ends to said rearward tapering portions of said I-sections and removably secured at their bottom end forwardly and rearwardly of said transverse center of the frame to a subterranean torsion stiff foundation extending forwardly and rearwardly from the bottom end of said supporting columns and downwardly at both of their ends into pressure pedestals whereby to withstand forces resulting from dead or live loads or longitudinal and lateral forces,

means securing said roof structure at its forward and rearward ends to said forwardly and rearwardly tapering beams,

said roof frame comprising parallel side members and parallel front and rear members,

anchor plates interconnecting said roof frame members at the four corners of the frame,

at least one anchor plate secured to each of said side frame members intermediate the ends thereof,

equally spaced apart parallel transverse roof purlins secured at their ends to said side members and interconnected intermediate their ends by purlin spacers,

diagonal reinforcing members interconnecting the two corner anchor plates of one side of the frame with said anchor plate intermediate the ends of the opposite side frame member, and

diagonal reinforcing members interconnecting the other two corner plates with said anchor plate intermediate the ends of said one side of the frame.

2. In a building having two transversely opposed roof-supporting columns, the improvement comprising:

a roof frame having four corners,

means at each of said corners securing the roof frame to said supporting columns,

said roof frame comprising parallel side members and parallel front and rear members,

anchor plates interconnecting said roof frame members at the four corners of the frame,

at least one anchor plate secured to each of said side frame members intermediate the ends thereof,

equally spaced apart parallel transverse roof purlins secured at their ends to said side members and interconnected intermediate their ends by purlin spacers,

diagonal reinforcing members interconnecting the two corner anchor plates of one side of the frame with said anchor plate intermediate the ends of the opposite side frame member, and

diagonal reinforcing members interconnecting the other two corner plates with said anchor plate intermediate the ends of said one side of the frame.

References Cited by the Examiner

UNITED STATES PATENTS

2,033,689	3/1936	Dawson	52—73
2,047,644	7/1936	Mopin	52—73
2,128,539	8/1938	Roach	52—73
2,873,698	2/1959	Hartman et al.	52—11
2,903,752	9/1959	Volk	52—73
3,004,301	10/1961	Francis.	
3,084,479	4/1963	Struben	52—73
3,102,365	9/1963	Whitesell	52—66
3,113,434	12/1963	Phillips et al.	52—11
3,143,827	8/1964	Showalter	52—11

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