Aug. 14, 1945. P. L. WIENER 2,382,361

BUILDING STRUCTURE

Filed March 6, 1944 3 Sheets-Sheet 1

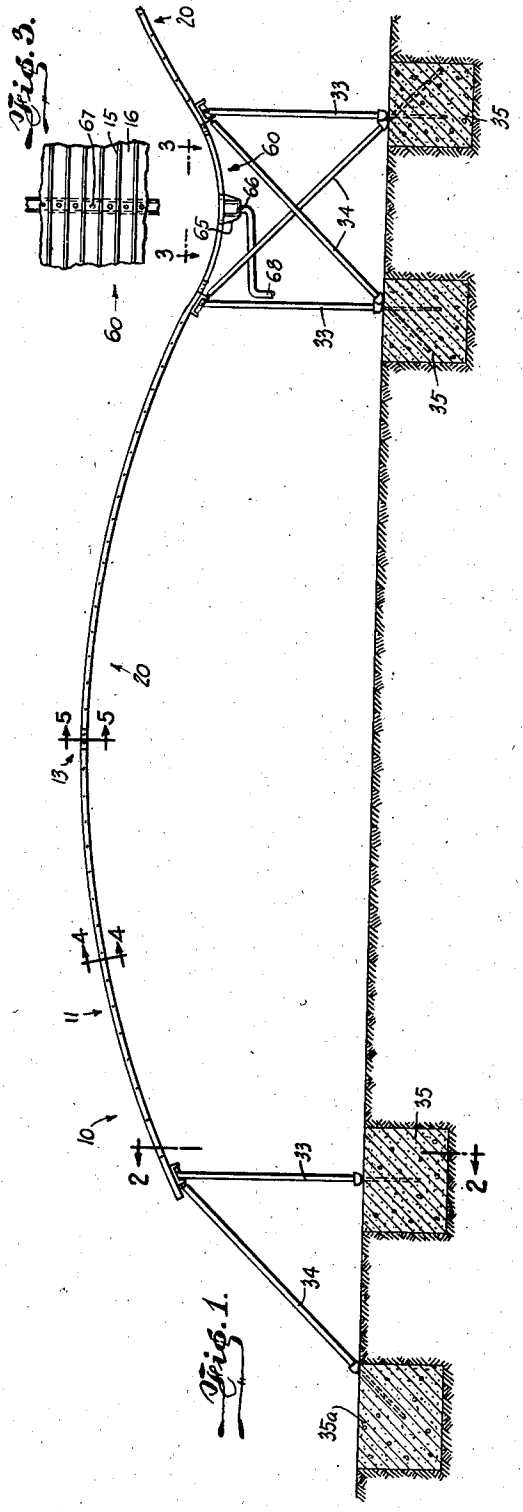


Fig. 3.

Fig. 1.

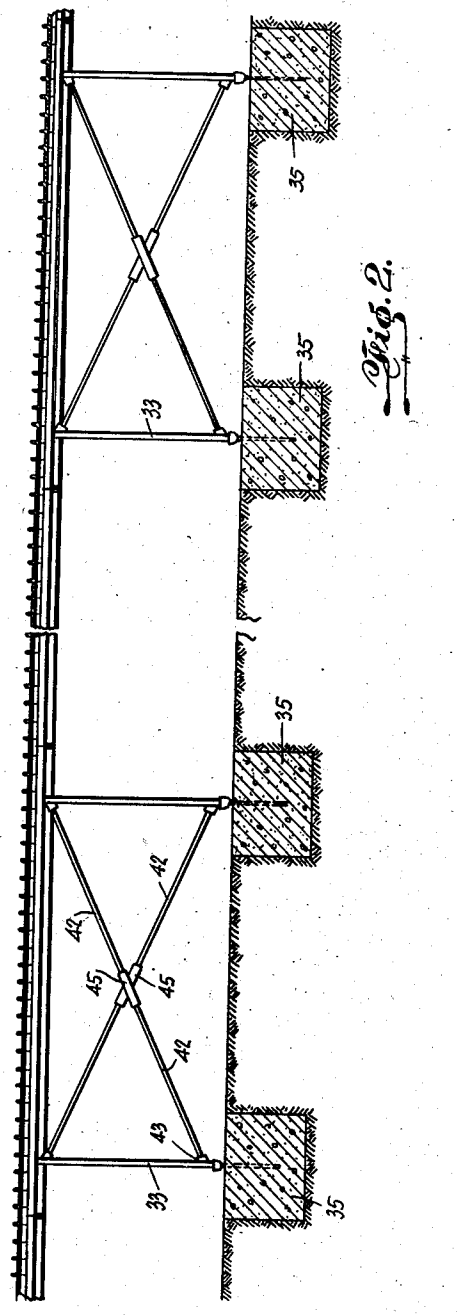


Fig. 2.

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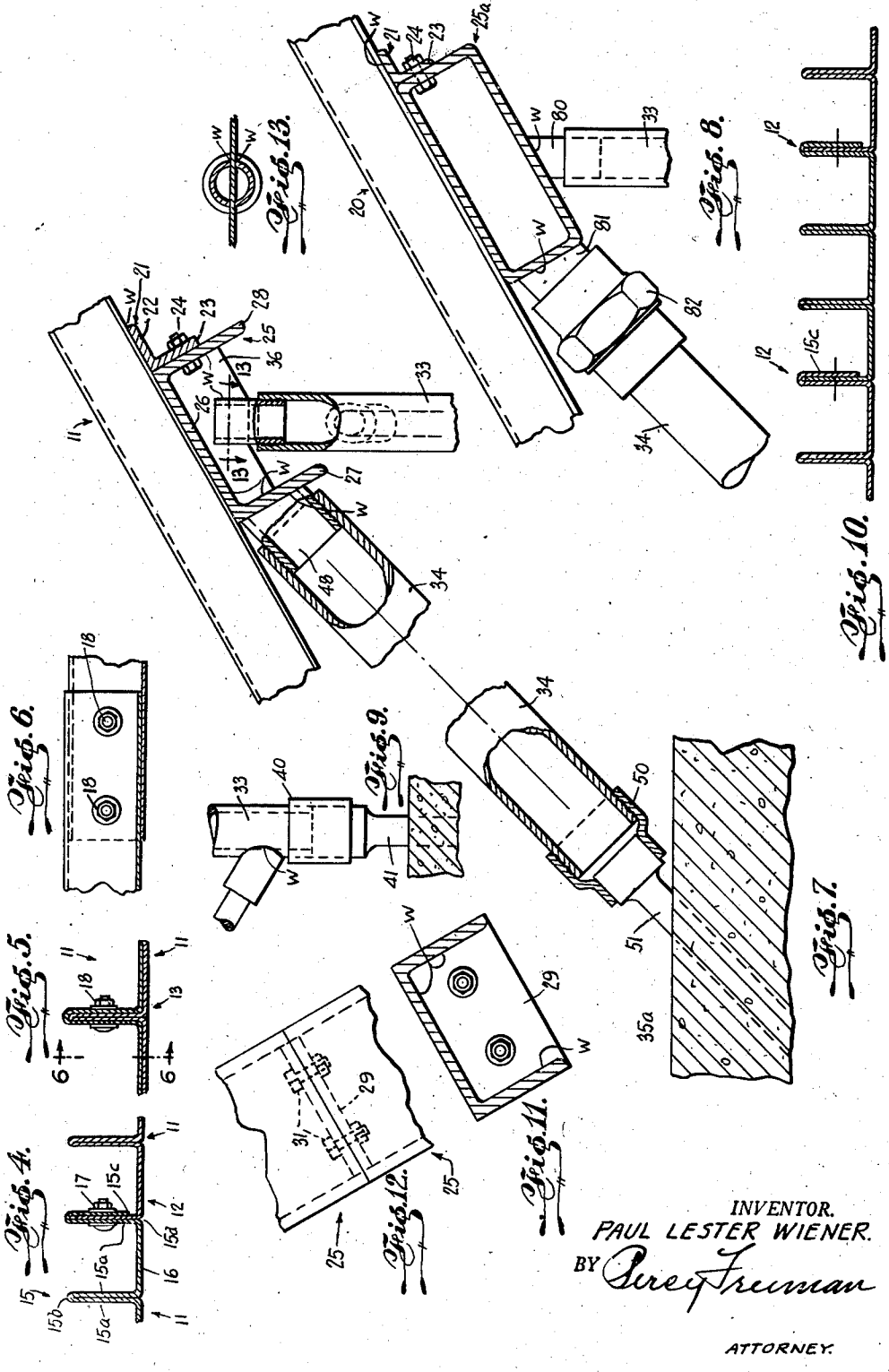
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Aug. 14, 1945. P. L. WIENER 2,382,361

BUILDING STRUCTURE

Filed March 6, 1944 3 Sheets-Sheet 2



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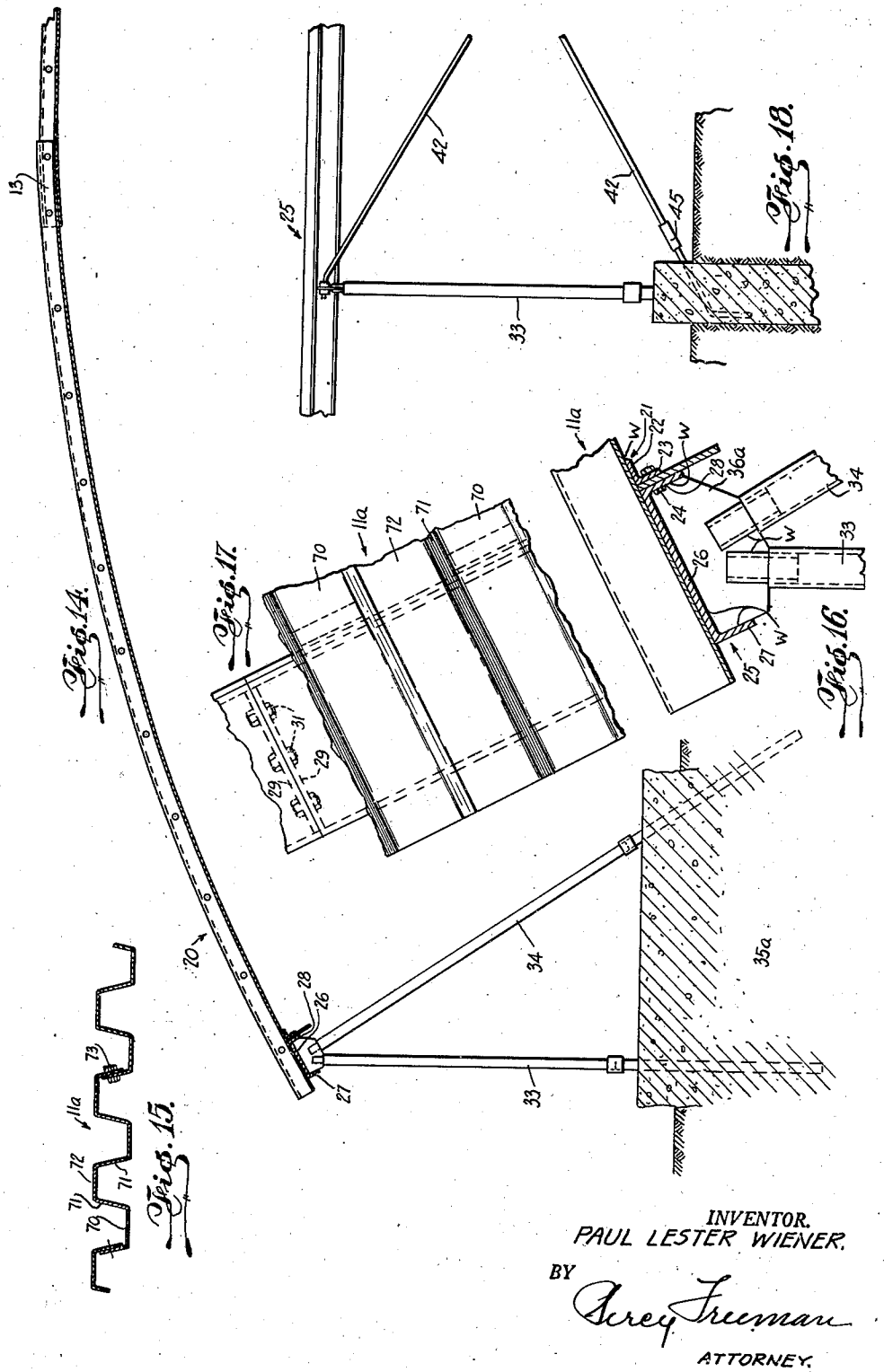
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BUILDING STRUCTURE

Filed March 6, 1944

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,382,361

BUILDING STRUCTURE

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Application March 6, 1944, Serial No. 525,165

7 Claims. (Cl. 108—1)

This invention relates to shed construction for quick relief shelters. It is particularly directed to an emergency relief shed for the most immediate relief required for all climates, and requiring the least amount of shipping space.

An object of this invention is to provide a shed construction of the character described comprising a sheet metal arched roof and provided with exterior diagonal bracing members which take wind loading and arch thrust, thereby giving unobstructed floor space and head room under the roof, and eliminating necessity for horizontal tie beams and interior bracing.

Another object of this invention is to provide in a structure of the character described, arched roof panels having reinforcing ribs projecting on the roof or weather side of the panels.

Another object of this invention is to provide in a shed construction of the character described, arched roof panels which interlocked in tandem and also side by side in such a manner as to give weathering protection against rain and snow, whereby the roof does not require roofing paper or any additional roof covering other than the steel roof decking itself.

Another object of this invention is to provide a shed construction of the character described comprising arched roof panels which are spliced in the center of the arched roof, and wherein the roof panels are connected to eave members by means of screw connections through small clip angles which are shop welded to the roof angles, the structure furthermore comprising pipe columns and struts connected to the eave members by means of screw connections to sleeves which are shop welded to the eave members, and said pipe columns and struts being connected to foundations by means of unions or couplings connecting to said pipes and struts, anchors which are set in concrete footings.

A further object of this invention is to provide a strong, rugged, durable and economical shed construction which can be used for many emergency shelter purposes such as public markets, storage sheds, vehicle shelters and the like, the construction being such that all of the parts except the footings, may be prefabricated and quickly erected and as quickly dismantled, and which shall yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which is shown various possible illustrative embodiments of this invention,

Fig. 1 is a partial front end view of a shed constructure embodying the invention and showing the footings in cross-section.

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary top plan view taken on line 3—3 of Fig. 1.

Fig. 4 is a partial cross-sectional view taken on line 4—4 of Fig. 1, showing a splice between a pair of arched roof panels.

Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 1.

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is an enlarged vertical view illustrating the assembly of the vertical columns, struts and eaves with an arched roof panel.

Fig. 8 is a partial view similar to the upper end of Fig. 7 but illustrating a modified construction.

Fig. 9 is a vertical view illustrating the attachment to a concrete footing of a column, having attached thereto, one end of the cross bracing.

Fig. 10 is a view similar to Fig. 4 and illustrating the method of assembling arched roof panels side by side.

Fig. 11 is a transverse, cross-sectional view of an eave channel illustrating the method of attaching eave sections in end to end relation.

Fig. 12 is a fragmentary top plan view showing the joint between two eave sections.

Fig. 13 is a cross-sectional view taken on line 13—13 of Fig. 7.

Fig. 14 is a partial vertical view similar to one side of Fig. 1 and illustrating a modified construction.

Fig. 15 is a view similar to Fig. 10 but illustrating a modified form of roof panel.

Fig. 16 is an enlarged vertical view, partly in section and illustrating the assembly of the vertical columns, struts, eaves and roof panels shown in the modification in Fig. 14.

Fig. 17 is a fragmentary top plan view of Fig. 16.

Fig. 18 is a partial side view of one end of the modification shown in Fig. 14.

Referring now in detail to the drawings, 10 designates a shed embodying the invention. The same comprises arched roof panels 11 spliced to-

gether in side to side relation as shown at 12 in Figs. 4 and 15, and in end to end relation at the center of the arch as shown at 13 in Figs. 1, 5 and 6. The length of each panel is preferably such as to extend from one side edge to the middle of the arch span so that the width of an arch is equivalent to a pair of arch panels spliced together end to end. The panels 11 may be made from sheet metal such as 20-guage steel, such as is known in the trade as "Tri-Rib" decking.

Each panel is provided with spaced ribs 15 formed by upwardly extending contacting portions 15a interconnected by a bent edge 15b at the top. Interconnecting the walls 15a are bottom wall trough portions 16.

To splice together a pair of panels 11 in side to side relation, one side of one panel terminates in a downwardly bent wall 15c spaced from the other wall 15a of the end rib, and receiving an upwardly extending wall 15d at the adjacent side of the next panel. At the splice the rib has three thicknesses and they may be secured together by bolts 17 or in any other approved manner.

The end-to-end splice 13 may be formed by opening up the ends of ribs 15 at one end of one panel and interfitting into the open ends, the closed ribs of the adjacent end of the other panel 11; the fitted together ribs then being secured together by bolts 18 as shown in Figs. 5 and 6 of the drawings.

The arched panels 11 are readily prefabricated and assembled into an arched roof 20 in the manner heretofore explained.

Means is provided to support the roof 20. To this end there is shop welded to the undersides of the outer ends of panels 11, clip angles 21. Said angles 21 comprise legs 22 contacting and welded to the undersides of panels 11 and projecting towards the center of the arch, and legs 23 extending at right angles to legs 22. Secured to legs 23 by screws 24 and contacting said angles 21 are longitudinally extending eaves 25. The eaves may be of channeled cross-section, each having a top wall 26 and side flanges 27 and 28. Flanges 28 of the eaves contact legs 23 of the angles 21. Wall 26 contacts the undersides of panels 11. The ends of the eaves are preferably provided with end walls 29. A pair of eave sections 25a may be assembled together by means of bolts 31 passing through the end walls 29.

For rigidly supporting the eaves there are provided vertical columns 33 and inclined struts 34. To support the columns 33 there is preferably built a plurality of concrete footings 35 beneath each side of the roof. Said footings may be spaced apart about 15 feet or any other suitable distance. One column 33 is preferably provided for each footing. The columns 33 may comprise hollow pipes having internal screw threads at their upper ends.

Means is provided to connect the upper ends of columns 13 to the eaves 25. To this end each eave is provided with a transverse web 36 for each column, preferably shop welded within the channel. Welded to the web is a short sleeve or pipe 37 slit at its upper end, as at 38, to receive the web. Pipe 37 is preferably shop welded to the web 36 at the slit 38. It projects downwardly from the web in vertical position and its lower end is externally screw threaded so that in assembly column 33 may be screwed thereto. Attached to the lower end of column 33 by means of a union 40 is an anchor rod 41, the lower end whereof is embedded in the concrete web or footing 35. The shed may be of any desired length.

Preferably the columns of each fourth or fifth bay are interconnected by cross braces 42. The cross braces may comprise rods having external screw threads at the ends thereof. Welded to the uprights or columns 33 are short internally screw threaded pipes or sleeves 43 to which the rods 42 are screwed. If desired, the rods 42 may be made in shorter lengths interconnected by internally screw threaded sleeves or turnbuckles 45. The pipe sections 43 are preferably shop welded to the columns 33 to facilitate assembly.

The struts 34 interconnect the eaves 25 with concrete footings or piers 35a which may be located on the outside of piers 35. The struts 34 likewise consist of metal pipes internally screw threaded at their upper ends.

Shop welded to flanges 27 of eaves 25 are short pipe lengths or sleeves 48 externally screw threaded for attachment to the upper ends of pipes 34. Pipes 34 furthermore have external screw threads at their lower ends and screwed thereto are reducers 50. The reducers 50 serve to attach to the lower ends of pipes 34, anchors 51, the lower ends whereof are embedded in the footings 35a. As shown in Fig. 1, the struts 34 are inclined downwardly and outwardly from the sides of the arch roof 20, thus leaving unobstructed the entire floor area under the roof and between the upright columns 33. If it be desired to utilize two or more structures side by side, their arched spans may be interconnected by a roof portion 60, blending in a smooth curve with the arched roof decks of the adjacent structures. In such case, the struts 34 at the adjacent sides of the arched spans 20 extend past each other and are anchored to the opposite respective piers 35.

The roof portion 60 is concave and is likewise made of Tri-Rib deck, that is of sheet metal provided with upwardly extending ribs 15 interconnected by bottom walls or troughs 16. The ends of roof sections or panels 60 may be spliced to the adjacent ends of arched span 20 by splice 13, similar to that used to splice the roof panels 11 at the top of the arch, but with the ends of the roof panels 11 overlying the ends of panel 60. Panel 60 may be attached together in side-to-side relation by means of splice 12.

Attached to the underside of the middle of roof portion 60 are hangers or straps 65 supporting a longitudinal gutter 66. The bottom walls or troughs 16 of roof 60 may be formed with openings 67 to permit water to pass down to the gutter 66 and through the gutter to drain pipes 68 extending to any suitable drain.

Sometimes it is desired to have no projections at the sides of the shed 10. Thus, for example, two sheds may be constructed side by side with a space therebetween, which is desired for a road or a railroad siding. In such case the struts 34 are made to project inwardly within the shed, as shown in Fig. 15, instead of outside the shed as shown in Fig. 1. In such case, the footing 35a must be constructed in the shed instead of outside the shed.

In Fig. 14, there is shown a roof panel 11a made of corrugated sheet metal and the same may replace the ribbed sheet metal roof panel 11. Each panel 11a comprises bottom walls 70, upwardly and inwardly inclined walls 71, and top walls 72. The panels 11a may be interspliced by overlapping end walls 71 and attaching them together by means of bolts 73. Said panels may furthermore

be spliced in end-to-end relation by merely interfitting the ends and bolting.

In Fig. 8, there is shown a modified form of eave. In Fig. 8, there is shown an eave **25***a* to replace the eave **25**. The same is made of tubular construction of rectangular shape. The eaves **25***a* likewise contact beneath the arched span **20** adjacent the side edges thereof and extend longitudinally of the span. They are screwed to the angles **21** by screws **24**. They are also provided with welded pipes **80** screwed to the upper ends of columns **33**. Also welded to said eaves **25** are short pipes **81** which may be connected to the struts **34** by unions **82**.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

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

1. A shed comprising arched roof panels made of sheet metal and provided with ribs extending upwardly from a substantially continuous undersurface, said panels being spliced together side by side in overlapping interlocking relation and in end-to-end telescopic relation to form a longitudinally extending arched span, angles welded to the undersurfaces of said span adjacent the side edges thereof, eaves against which said angles abut, said eaves extending longitudinally of the span at the side thereof, and columns connected to said eaves for supporting the eaves and hence the arched span, and exterior struts connected to and extending downwardly and outwardly from said eaves to anchorages to take up wind loading and arch thrust.

2. A shed comprising a longitudinally extending transversely arched roof made of sheet metal and having upwardly extending transverse ribs, members welded to the underside of the arch adjacent the sides thereof, eaves against which said welded members and the underside of said roof abut, said eaves extending longitudinally of said roof, and means connected to said eaves for supporting said eaves and hence said roof, said means comprising pipes welded to said eaves and tubular columns connected at their upper ends to said pipes, and anchors connected to the lower ends of said columns, and adapted to be embedded in footings, inclined pipes welded to said eaves and inclined struts connected at their upper ends to said inclined pipes, and anchors connected to the lower ends of said struts and adapted to be embedded in footings, said struts extending exteriorly of said roof.

3. A pair of arched roofs made of sheet metal having upwardy extending transverse ribs and troughs between the ribs, the lower surface of said roof being substantially continuous, a concave roof section having the same cross-section as the arches and interconnecting the adjacent ends of said arched roofs to produce a substantially continuous and unbroken roof structure, eaves extending longitudinally of said arched roofs and attached to the underside of said arched roofs adjacent the sides of the latter, columns supporting said eaves, footings for the lower ends of said columns, and struts interconnecting the eaves and inclined downwardly and outwardly and having their lower ends embedded in footings.

4. A pair of arched roofs made of sheet metal having upwardly extending transverse ribs and troughs between the ribs, a concave roof section having the same cross-section as the arches and interconnecting the adjacent ends of said arched roofs to produce a substantially continuous and unbroken roof structure, eaves extending longitudinally of said arched roofs and attached to the underside of said arched roofs adjacent the sides of the latter, columns supporting said eaves, footings for the lower ends of said columns, and struts interconnecting the eaves and inclined downwardly and outwardly and having their lower ends embedded in footings, a longitudinal gutter attached to the underside of said concave roof section, holes in said concave roof section communicating with said gutter, and a drain connected to said gutter.

5. In combination, a sheet metal roof panel, angle members welded to the undersides thereof, a channel-shaped eave contacting the underside of said panel and against which said angle members abut, means to connect said eave to said angles, said eave being provided with transverse webs, split pipes receiving said webs and welded thereto, and pipe columns screwed to said pipes.

6. In combination, a sheet metal roof panel, angle members welded to the undersides thereof, a channel-shaped eave contacting the underside of said panel and against which said angle members abut, means to connect said eave to said angles, said eave being provided with transverse webs, split pipes receiving said webs and welded thereto, and pipe columns screwed to said pipes, an inclined pipe welded to a side wall of said eave, and an inclined strut comprising a hollow pipe screwed to said inclined pipe.

7. In combination, a sheet metal roof panel, angle members welded to the undersides thereof, a channel-shaped eave contacting the underside of said panel and against which said angle members abut, means to connect said eave to said angles, said eave being provided with transverse webs, split pipes receiving said webs and welded thereto, and pipe columns screwed to said pipes, an inclined pipe welded to a side wall of said eave, and an inclined strut comprising a hollow pipe screwed to said inclined pipe, anchors at the lower ends of said columns, and struts adapted to be embedded in concrete footings.

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