April 20, 1954 C. D. DOSKER 2,675,769

CONTRACTILE-EXPANSIBLE ROOF SUPPORT

Filed April 23, 1952 5 Sheets-Sheet 1

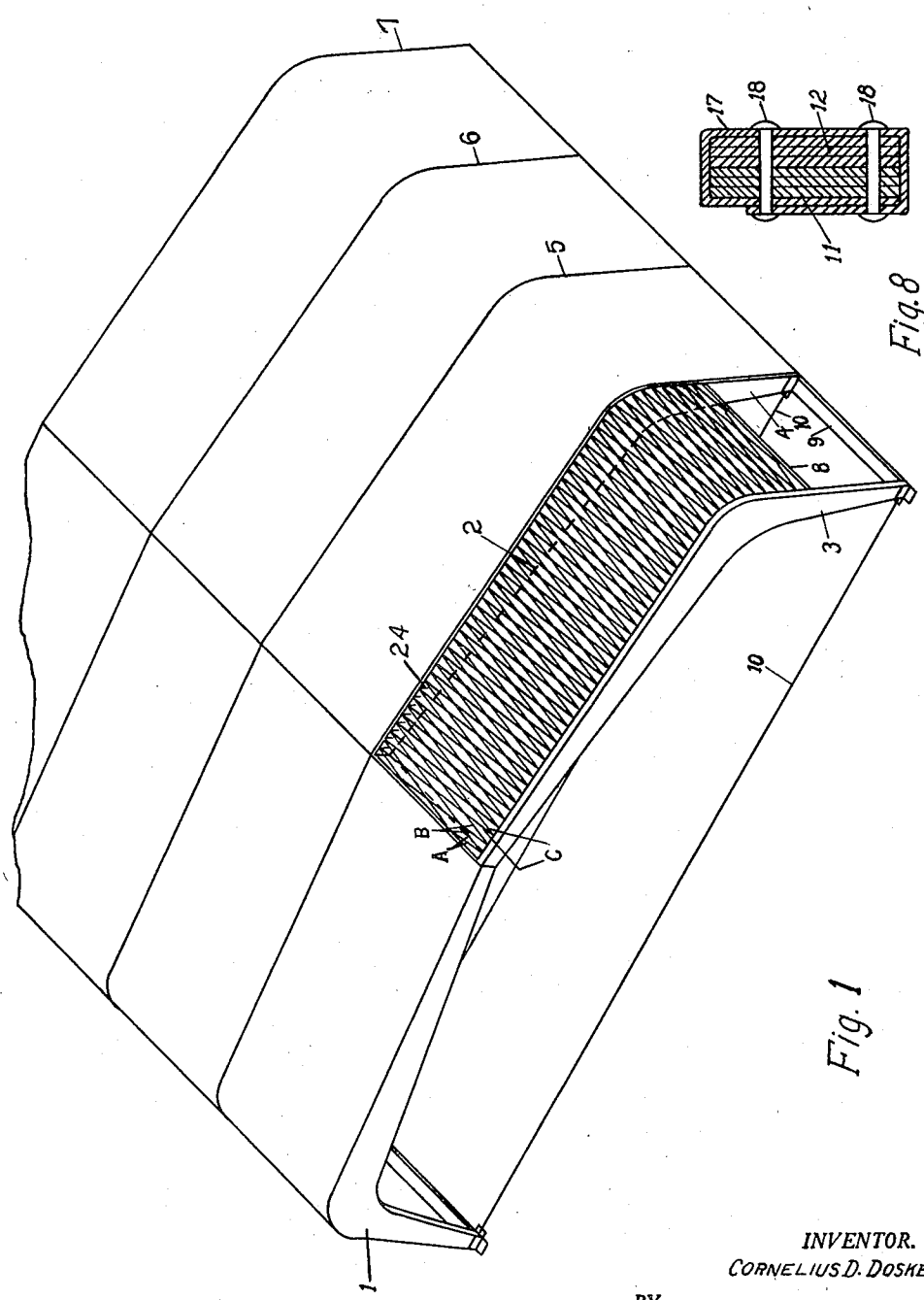


Fig. 8

Fig. 1

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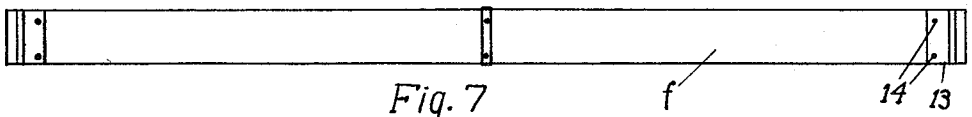


Fig. 7

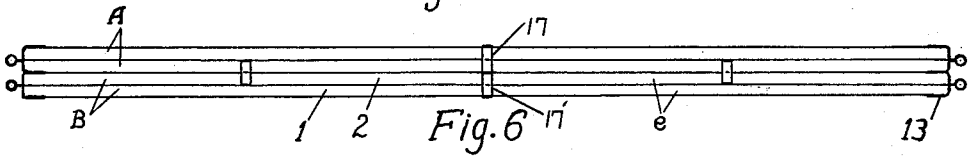


Fig. 6

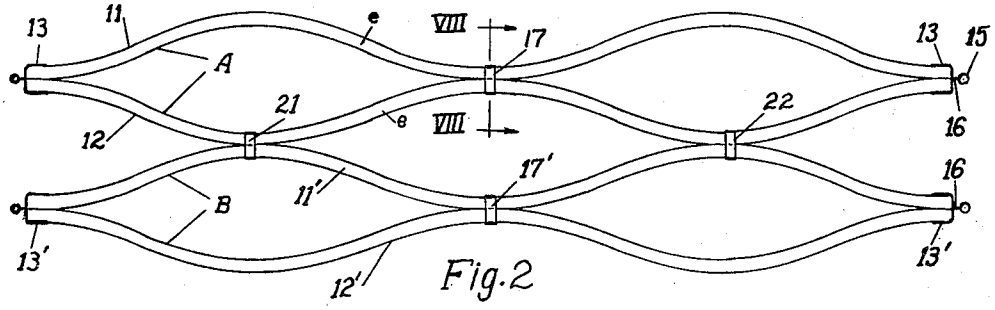


Fig. 2

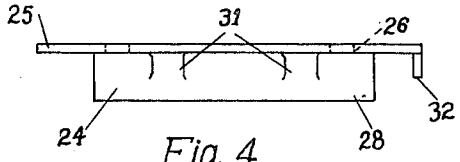


Fig. 4

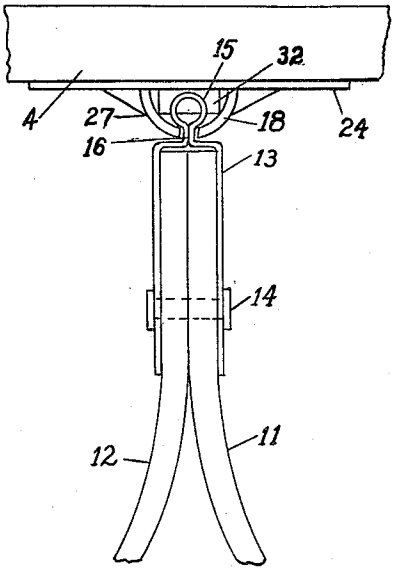


Fig. 3

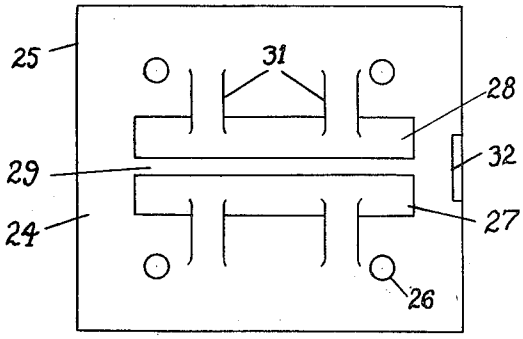


Fig. 5

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CONTRACTILE-EXPANSIBLE ROOF SUPPORT

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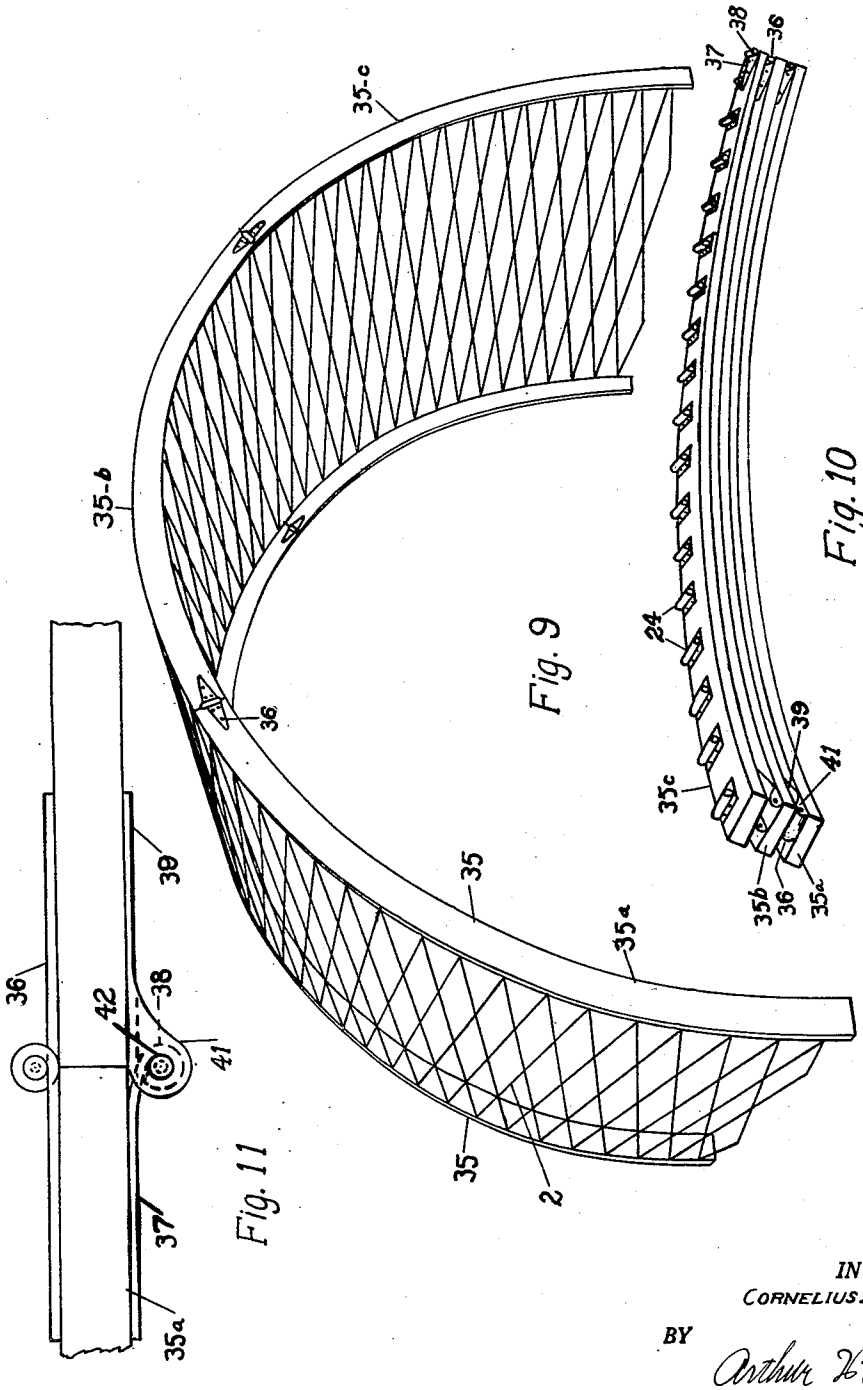


Fig. 11

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CONTRACTILE-EXPANSIBLE ROOF SUPPORT

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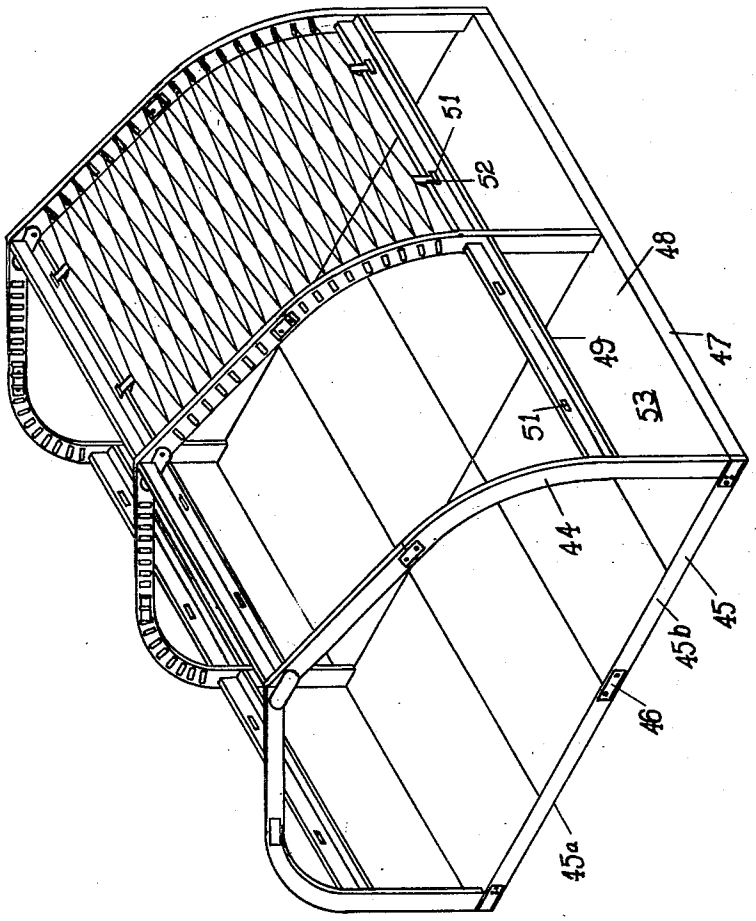


Fig. 12

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CONTRACTILE-EXPANSIBLE ROOF SUPPORT

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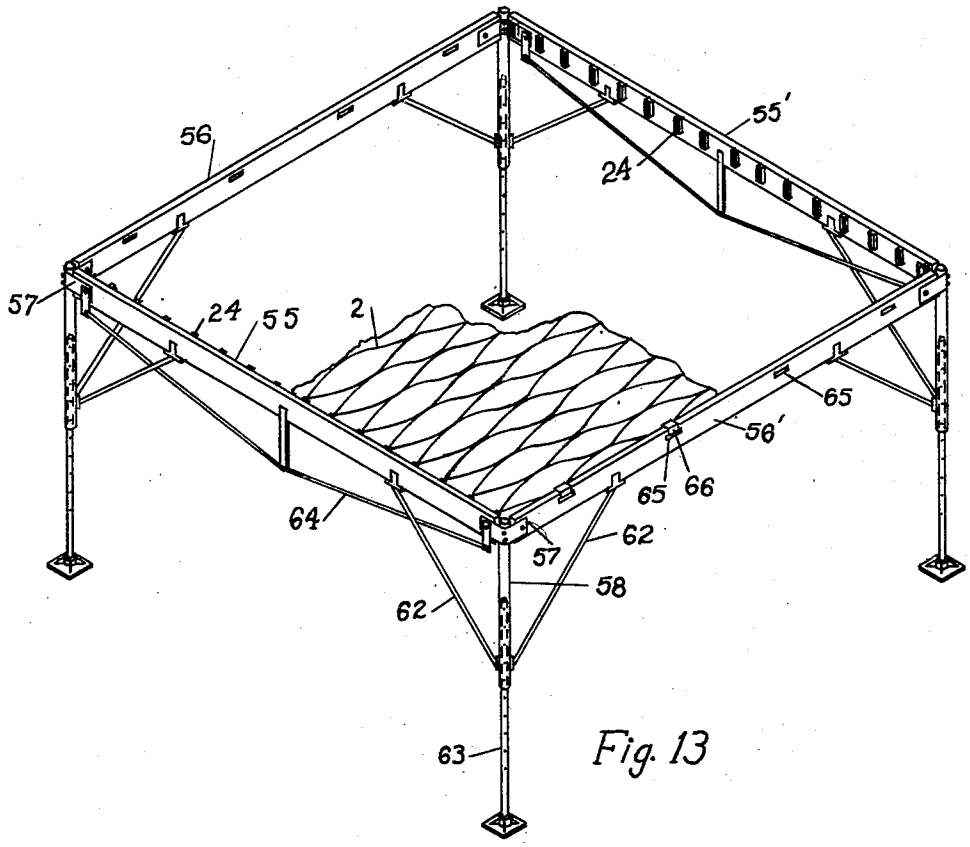


Fig. 13

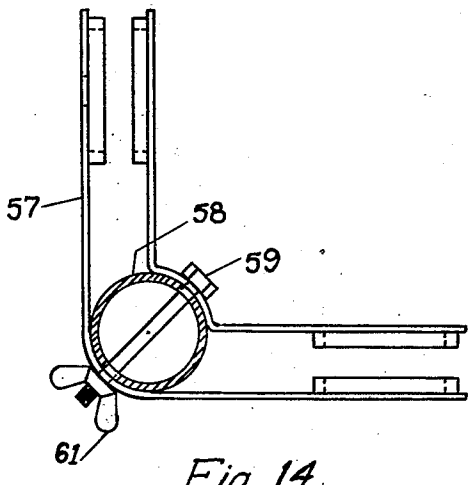


Fig. 14

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2,675,769

UNITED STATES PATENT OFFICE

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CONTRACTILE-EXPANSIBLE ROOF SUPPORT

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Application April 23, 1952, Serial No. 283,953

13 Claims. (Cl. 108—1)

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The present invention relates to a portable or prefabricated building structure, and relates in particular to a roof supporting structure adapted to receive and support a weatherproof covering.

It is an object of the invention to provide a lightweight strong lattice structure of sufficient rigidity to support a weatherproof roof covering, and which is collapsible to a relatively small bulk, for transportation.

Another object of the invention to provide a strong, lightweight roof support structure capable of withstanding shock and supporting high unit loads.

A further object is the provision of a portable building providing a roof frame adapted to receive and hold in expanded condition a collapsible lattice member.

Another object is the provision of a strong collapsible-expansible lattice support member for a weatherproof roof covering, which member can be shipped in collapsed form to conserve space, and which can be easily, and rapidly, secured to the roof frame as it is progressively expanded to supporting position.

Another object is to provide a lattice roof cover supporting structure which can be used with flat, peaked, or arched roof frameworks, which imparts strength and rigidity to the roof when assembled, which provides a non-sagging support for the roof covering material and which maximizes the inside clearance; that is to say, the useable space below the inner surface or ceiling of the roof.

The invention will be described in connection with the accompanying drawing wherein are illustrated preferred embodiments of the invention, by way of example, and wherein:

Figure 1 is a perspective view of a portable airplane hangar embodying the invention;

Figure 2 is an enlarged plan view showing the roof support lattice structure of the hangar in expanded condition;

Figure 3 is an enlarged plan view of a detail showing the attachment of the roof support lattice structure to a roof beam;

Figure 4 is an end view of the coupling member on the roof beam shown in Figure 3;

Figure 5 is a bottom view of Figure 4;

Figure 6 is a plan view similar to Figure 2 with the roof support lattice structure in contracted or collapsed condition;

Figure 7 is a side elevation view of Figure 6;

Figure 8 is an enlarged sectional view taken on line VIII—VIII of Figure 2;

Figure 9 is a perspective view of a simple form

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of arched roof utilizing my roof support structure;

Figure 10 is a perspective view showing an arch member in folded condition;

Figure 11 is a plan view showing a hinge lock;

Figure 12 is a perspective view of one type of peaked roof building utilizing my roof support structure;

Figure 13 is a perspective view, with part broken away, of an open-sided, open-ended, flat-roofed shelter provided with my improved weatherproof cover supporting structure, and

Figure 14 is a plan view of a corner connector of the Figure 13 with the corner post shown in section.

Referring to the drawing, Figure 1, there is shown an airplane hangar 1 having a roof support lattice structure 2. This hanger comprises any desired number of arch members 3, 4, 5, 6, and 7 which may be made up in hinged or separable sections, if desired, and the arch members are suitably braced by interposed bars or struts, 8, 9 or the like. Cables 10 suitably fastened to the ends of the arch members support them against spreading, and as the cables are on or close to the ground, they present no obstruction to free entrance or egress. However, any other desired arrangement may be provided to prevent spreading of the arch. The roof support lattice structure 2 is composed of a plurality of bent discrete sinuous laths clamped together at their ends in pairs to form sections A, B, C, etc., and adjacent laths also are clamped together at spaced intervals between the ends. This lattice structure is shown in expanded position in Figure 2 and comprises slats or laths 11, 12 which are rectangular in cross section providing edges *e* and faces *f*. At each end each pair of laths have inter-pair connections, such as an embracing clip 13, which may be constructed of bent sheet metal, and rivets 14 clamp together the ends of the pairs of laths and hold the clip in place. The clip extends somewhat beyond the rivets so as to take the strain away from the laths at the rivet holes when the lattice is expanded. Each clip preferably has a bight or loop portion 15 and a neck or connecting portion 16. Each pair of laths so secured together may be considered as a section. Intermediate the ends, the pair of laths receive another inter-pair connection in the form of a circumscribing band 17, and the laths are clamped together by rivets 18 passing through said band and laths. The band 17 is of sufficient width so that when the laths

are bent in expanding the lattice the bending strain is not concentrated at the holes for the clamping rivets, thus insuring against breakage in installation or in service. I have shown only one band 17 for the section A or pair of laths 11, 12 located at about the middle, but it will be understood the number and spacing of the bands or clamps may be varied and will depend upon the rigidity of the laths, their length, and the desired strength and resilience.

The second section B has laths 11', 12' substantially identical with the first pair, and has similar inter-pair rivets and end clips 13' and an intermediate inter-pair rivets and fastening band 17', and need not be described in further detail. The second section B is fastened to the first section A by an intersection fastening comprising clamping means comprising bands 21, 22 wrapped around adjacent laths 12, 11' and fastened by rivets, in the same way as bands 17. Any desired number of sections like sections A, B, C, etc., may be provided the sections being fastened together in a similar manner to form a staggered series of connections.

In expanded position the lattice structure is suitably supported at the ends of the laths on the arch members 3, 4, etc., preferably by coupling members 24 arranged in predetermined spaced relation on the arch members. As shown in Figures 3 to 5, each coupling member comprises a plate 25 suitably fastened to the side of an arch member 4 by screws or the like passing through holes 26 provided therein. Struck up portions 27, 28 are curved to form a socket with a space 29 between. Integral embossed reenforcing ribs 31 also may be provided, and the lower end of the base plate is struck out to provide a stop 32. To assemble the lath end to the support member 24, the loop portion 15 is inserted into the socket formed by portions 27, 28 with the neck 16 extending through space 29, and the stop 32 prevents the lattice coupling member dropping through the socket. To install the roof support lattice structure, the arch members 3 to 7 are raised and suitably braced, and the ends of the first section A are positioned in the first sockets of coupling members 24 on arch members 3 and 4. The lattice is expanded and the ends of the next section B are positioned in the next pair of coupling members 24, and so on, until the ends of the last lattice section have been anchored. Any suitable weatherproof covering, such as canvas, sheet metal, or the like now may be positioned on the lattice structure and is supported thereby.

The ordinary beam or girder construction under a bending load must be deep enough to support the load and also must be made wide enough to resist torsion, and frequently bracings are employed at intervals to prevent torsion. The necessity to resist torsion requires that the beam be made wider and heavier than if the beam were braced against torsion uniformly throughout its length. However, in the present invention the sinuous form of the individual laths not only increases the resistance of the individual laths to torsion but the interconnection between adjacent laths provides a mutual bracing against torsion that results in an increase in load supporting power. That is, the deflection due to load tends to twist the sinuous laths but this twist is resisted by the adjacent laths, so that the load is distributed over a large area. As a result, the expanded lattice will support a total concentrated load far in excess of that which a beam

equal to the combined widths of the laths would support.

The individual laths making up the lattice have great rigidity in depth so as to be self sustaining and are easily bendable sidewise, so that the lattice may be easily expanded. The means holding adjacent laths together must resist separation of the laths when they are expanded, and must also resist separation of the laths under load so as to prevent torsion or twisting of the laths. The clamping rivets illustrated accomplish this. The rivets hold together the laths, and the circumscribing bands act as shields to prevent the strain from the load concentrating at the rivet holes, and also prevent the rivet heads pulling through under the torsional stress when the lattice is loaded. If desired, a larger number of smaller diameter rivets than illustrated may be used.

The laths may be made of wood or other suitable resilient material. Where wood laths are employed they are preferably constructed of substantially parallel grain laminations, adhesively bonded together so as to render the laths more bendable and less subject to failure due to localized imperfections in the pieces of wood, cracking or other accidental causes. It is preferred to employ laths which have a depth as represented by face *f* greater than the thickness represented by face *e*. For example, each lath may be composed of three laminations one-sixteenth inch thick and about 2¾ inch deep, or the laminations may be 5½ inches deep, or any other desired width and depth.

The number of ties or clamps employed and their spacing apart may be varied as desired, depending on the length of the lath, the percent stretch or expansion desired, and the load bearing strength desired. For example, by reducing the spacing between the clamps the rigidity of the expanded lattice is increased, but the percent expansibility is also reduced.

In Figure 9 I have shown a modification applicable to the construction of a Quonset type hut. In this embodiment the arch members 35 are more or less semi-circular and each arch member is composed of a plurality of segments 35*a*, 35*b*, 35*c*, which are secured together by hinges 36, located on one side or face of the arch member. On the opposite side a locking structure is provided comprising a removable pin type of strap hinge. This comprises a strap 37 on one arch segment 35*a* having a loop 38 and a strap 39 having apertured lugs 41. A pin 42 passes through the apertured lugs 41 and loop 38 to lock the segments in alignment, and prevent pivoting at the hinges, to provide a rigid arch member. The arch members carry coupling members 24 to receive the lattice structure 2 to provide a roof support.

The building structure herein described is collapsible to a relatively small bulk and as it is composed of lightweight materials, it is easily transported as required. The arch segments are hinged together so that they can be folded into a compact unit as shown in Figure 10, and they can be assembled into a formed arch merely by aligning and locking the segments against pivoting at the hinges. The roof support lattice collapses to a small bulk, as shown in Figure 2, but is easily extended to a wide area. By arranging coupling members on the arch at predetermined intervals, the assembly of the lattice to the arch members is facilitated and the structure can be assembled very quickly by unskilled workmen.

In the embodiment shown in Figure 12 the arch members **44** are of modified shape and are braced at the bottom by wooden struts **45** suitably fastened to the bottoms of the arch members. These struts are hinged at **46** to provide two folding sections **45***a* and **45***b* but any desired number of hinged sections similarly joined, may be provided. The struts **45** and spacers **47** provide a support for sheets **48** of suitable rigid material that is laid thereon to provide a raised floor. The intermediate bars or struts **49** are T-shaped in cross section and have slots **51** therein, and the terminal lath of the roof lattice **2** is anchored thereto by straps or bands **52** passing through the slots and around the terminal lath. This arrangement provides an opening **53** which can be left as such or can be closed in by a lattice structure, canvas or any suitable material.

In the modification shown in Figures 13 and 14 a portable shelter is illustrated. The roof frame of this shelter comprises end rails **55, 55'** and struts **56, 56'** which are fastened together at their ends by suitable fastening straps **57** to form a rectangle. The corner straps each receive a post **58** which is held in place by a bolt **59** and thumb screw **61**, and suitable corner straps **62** may be provided to brace the posts **58**. Each post telescopically receives an extension **63** so that the height of the roof frame may be adjusted. Strap **64** also may be provided to reenforce the end rails. The end rails carry coupling members **24** and the lattice structure **2** is supported by the coupling members. The struts **56, 56'** have slots **65**, and bands **66** pass through the slots and around the terminal laths to secure the terminal laths thereto.

I claim as my invention:

1. A portable roof structure comprising in combination: a pair of beams in substantially parallel relation; a contractile-expansible lattice comprising a plurality of bendable laths secured together at their ends in pairs and secured together intermediate their ends in alternate pairs; coupling members carried at the ends of said laths; and a plurality of complementary coupling members on each of said beams arranged in predetermined spaced relation for cooperation with said first coupling members to support said lattice by said beams in expanded condition.

2. A portable roof structure as specified in claim 1 wherein said laths are discrete.

3. A panel structure comprising: a pair of beams; strut members maintaining said beams in predetermined spaced relation; a contractile-expansible lattice structure comprising bendable laths connected in series and connected in adjacent pairs at the ends; coupling members at the ends of said laths; and complementary coupling members arranged on each of said beams in predetermined spaced relation cooperating with the coupling members on said lath ends for supporting said lattice in expanded condition.

4. A transversely collapsible and expansible structural roof member comprising: two pairs of individually separate longitudinally extending ribbons of material having self-sustaining resilient rigidity and being capable of flexure to undulating form, said pairs and the separate ribbons on each pair being arranged in adjacent face-to-face relationship with each other; first and second intra-pair connections rigidly securing the separate ribbons of one pair together at two spaced points to form a section, the first intra-pair connection being located adjacent one end of its section; corresponding first and second intra-pair connections similarly securing the separate ribbons of the other pair together at correspondingly spaced and located points to form an adjacent section; an inter-section connection rigidly securing the adjacent ribbons of said adjacent sections together at a point relatively intermediate said first and second intra-pair connections; said ribbons extending, when said roof member is collapsed, in close succession and in substantially parallel relationship with each other; said intra-pair and inter-section connections cooperating, when said roof member is transversely expanded, to cause all ribbons to extend in undulating form in the direction of their respective lengths; and a coupling element on each end of each section, each element being adapted, when the roof structure is expanded, for inter-engagement with a cooperative coupling member on a supporting framework to anchor its end of its expanded section on such framework.

5. An assembly for a roof structure comprising: a transversely collapsible and expansible structural roof member of the character specified in claim 4; a pair of tie beams adapted to be longitudinally spaced and transversely arranged in a roof framework in position to outline two sides of a roof opening to be covered; and a series of coupling members mounted on and spaced along each tie beam, one coupling member for each coupling element of said structural roof member, the spacing of the coupling members corresponding to the spacing of the coupling elements when the structural roof member is transversely expanded.

6. In a roof structure: a roof framework having two longitudinally-spaced, transversely-arranged tie beams outlining two sides of a roof opening to be covered; a transversely collapsible and expansible structural roof member of the character specified in claim 4, arranged in said roof opening with its sections extending longitudinally from one tie beam to the other, said roof member being transversely expanded along the tie beams; and a series of coupling members mounted on and spaced along each tie beam, one coupling member for each coupling element of said roof member, the spacing of the coupling members corresponding to the spacing of the coupling elements on the transversely expanded roof member, each coupling member inter-engaging its coupling element.

7. A transversely collapsible and expansible structural roofing-material support comprising: a succession of individually separate longitudinally extending ribbons of material having self-sustaining resilient rigidity so as to be capable of flexure from original form to undulating form when forced and of automatic return to original form when released, each successive ribbon being arranged in adjacent face-to-face relationship with the preceding ribbon; and a multiplicity of separate mechanical connectors aligned to form a succession of three or more uniformly longitudinally-spaced series extending transversely across the ribbons, the connectors in each alternate series functioning as intra-pair connectors securing successive pairs of ribbons together to form each pair into a section and the connectors in each remaining series functioning as inter-section connectors securing the adjacent ribbons of successive sections together to interconnect the sections; said ribbons extending, when said roof member is collapsed, in close succession and in substantially parallel relationship

with each other; said intra-pair and inter-section connectors cooperating, when said roof member is transversely expanded, to cause all ribbons to extend in undulating form in the direction of their respective lengths.

8. The support of claim 7 including: anchoring means carried by said ribbons for anchoring said support, in expanded form, upon a roof framework.

9. The support of claim 8 wherein said anchoring means includes: a coupling element extending beyond the end of a ribbon and secured thereto.

10. The support of claim 8 wherein: said support terminates at one end along one series of connectors and at its opposite end along another series of connectors; and said anchoring means includes, at each end of said support, a transverse series of coupling elements, one element for each of a corresponding series of end connected ribbons, each element being connected to its corresponding end connected ribbons.

11. The support of claim 10 wherein: each element extends beyond, and in vertical alignment with, the ends of its corresponding end connected ribbons.

12. An assembly for a roof structure comprising: the collapsible and expansible support of claim 7; a pair of tie beams adapted to be longitudinally spaced and transversely arranged in a roof frame-work in position to outline two sides of a roof opening to be covered by said support; and anchoring means for anchoring said support, in expanded form, to said tie beams.

13. The assembly of claim 12 wherein said anchoring means includes: a series of coupling members for each tie beam; and a corresponding series of coupling elements for each end of said support, each coupling element being adapted for anchoring interengagement with one of said coupling members.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
352,424	Owen	Nov. 9, 1886
833,358	Wales	Oct. 16, 1906
1,160,044	Coakley	Nov. 9, 1915
1,356,151	Jackson	Oct. 19, 1920
1,727,214	Niccum	Sept. 3, 1929
1,773,851	Pantke	Aug. 26, 1930
1,878,992	Shelton	Sept. 20, 1932