United States Patent [19]

Pastorelli et al.

[11] **3,763,616**

[45] **Oct. 9, 1973**

[54] **STRUCTURAL UNIT HAVING AN EXPANDED METAL SHEET AND METHOD FOR MANUFACTURING THE STRUCTURAL UNIT**

[75] Inventors: **Romolo Pastorelli; Paolo Martini,** both of Modena, Italy

[73] Assignee: **Romolo Pastorelli,** Modena, Italy

[22] Filed: **Nov. 5, 1971**

[21] Appl. No.: **195,946**

[30] **Foreign Application Priority Data**

Nov. 6, 1970 Italy 40116 A/70
Nov. 6, 1970 Italy 40117 A/70
Nov. 6, 1970 Italy 40118 A/70

[52] **U.S. Cl.** **52/635,** 52/671, 52/675, 29/6.1

[51] **Int. Cl.** **E04c 3/09,** E04c 5/04

[58] **Field of Search** 52/670-676, 581, 378, 635, 741; 29/6.1

[56] **References Cited**

UNITED STATES PATENTS

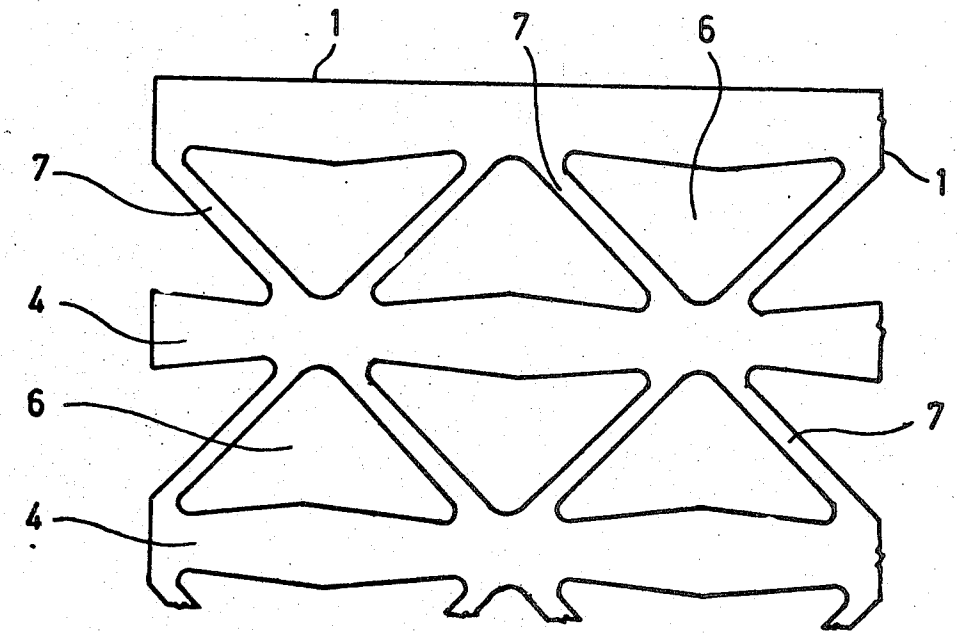
993,851	5/1930	Loucks	52/670
1,164,160	12/1915	Arey	52/581
1,166,107	12/1915	Arey	52/671
1,701,304	2/1929	Jones	52/675
2,218,007	10/1940	Miller	52/670
2,275,056	3/1942	White	52/378
3,046,638	7/1962	Melzer	52/672
3,108,406	10/1963	Ellis	52/670
3,304,685	2/1967	Whetstone	52/674

Primary Examiner—Frank L. Abbott
Assistant Examiner—James L. Ridgill, Jr.
Attorney—Harold D. Steinberg et al.

[57] **ABSTRACT**

A structural unit to be used in a static building structure, and a method for manufacturing the structural unit. The structural unit includes an expanded metal sheet which initially is formed with elongated narrow cut-outs which, when the sheet is stretched transversely of the cutouts, form triangular openings in the expanded metal sheet. The sheet is then bent into a wave-shaped configuration having elongated uninterrupted sheet portions at the crests of the waves and oppositely inclined sheet portions extending between these crests and formed with rows of oppositely oriented triangular openings. This latter expanded metal sheet has fixed to the crests formed by the elongated uninterrupted sheet portions a structure such as beams, concrete slabs, or the like, so that in this way a structural unit is formed, and this structural unit may then be joined with suitable metal or concrete beams, or supported on suitable walls, so that the structural unit can form floors, balconies, or the like.

12 Claims, 18 Drawing Figures



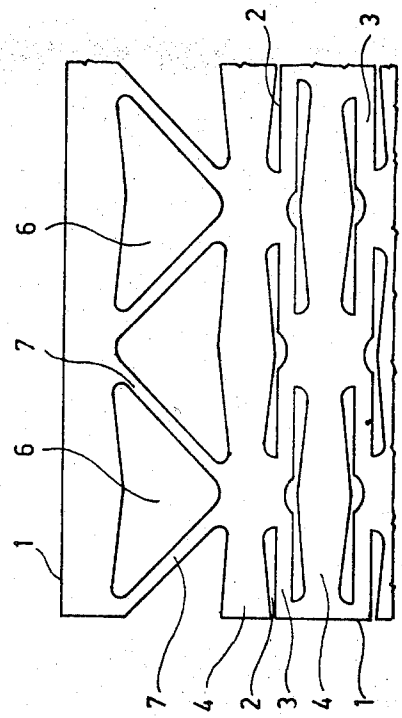


FIG 3

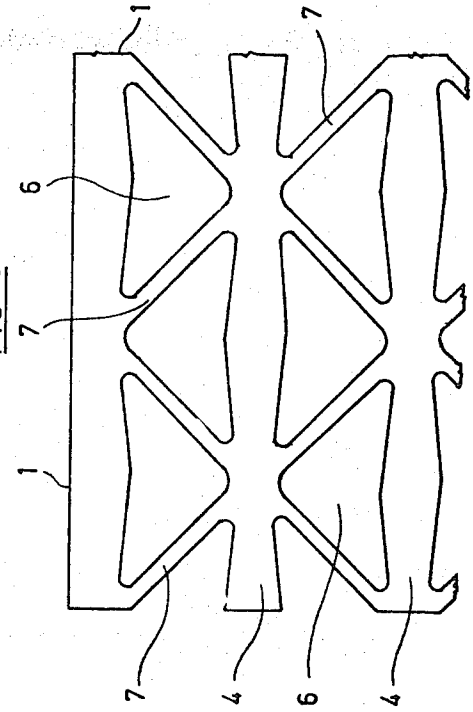


FIG 4

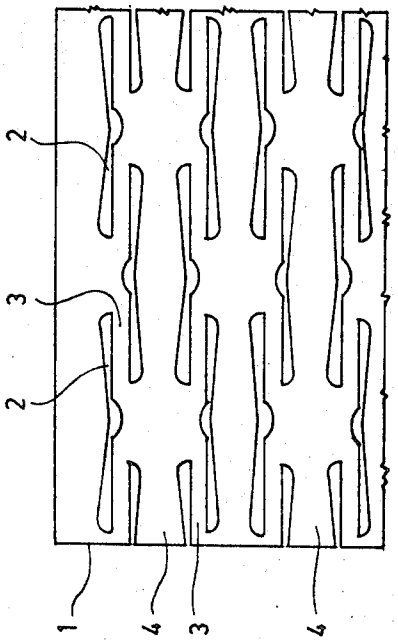


FIG 1

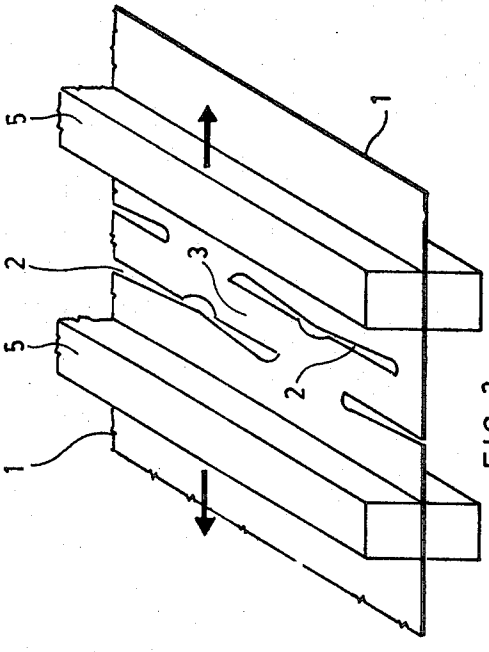


FIG 2

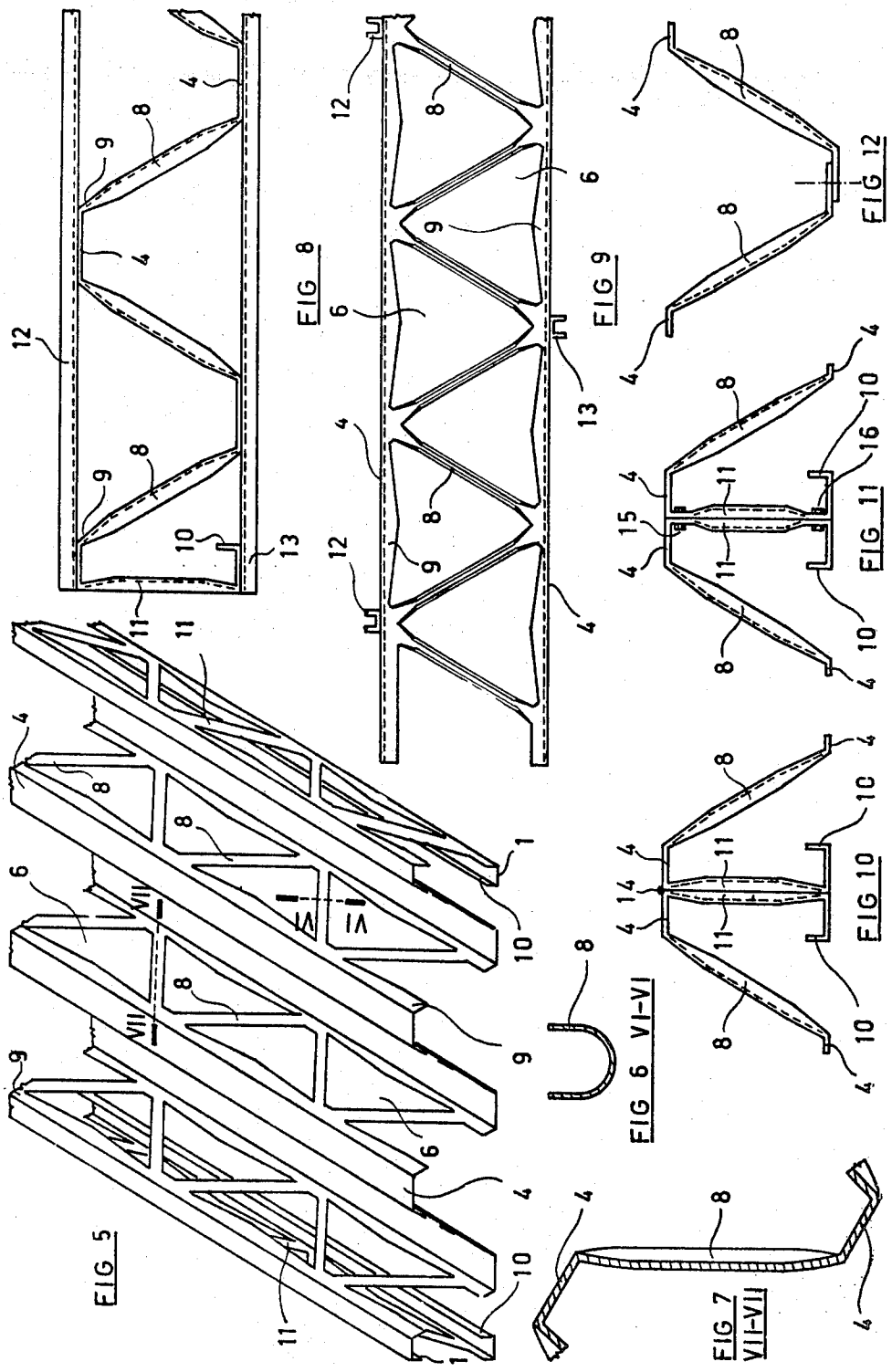


FIG 5
FIG 8
FIG 9
FIG 12
FIG 11
FIG 10
FIG 6 VI-VI
FIG 7 VII-VII

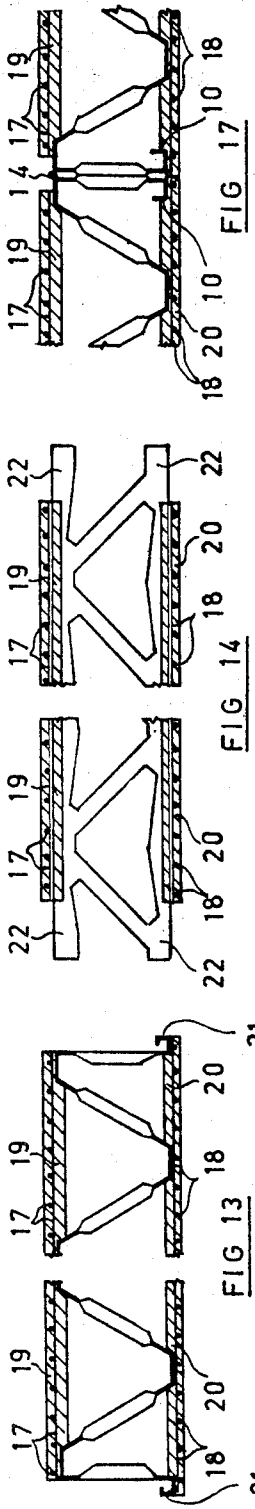
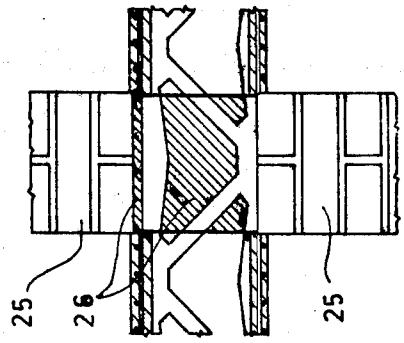


FIG 13

FIG 14

FIG 17



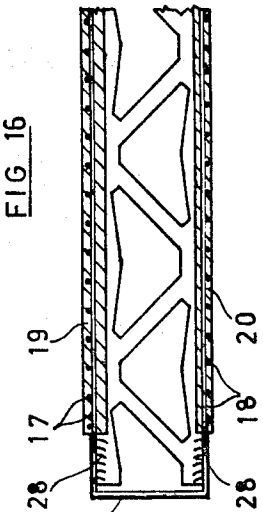


FIG 16

FIG 18

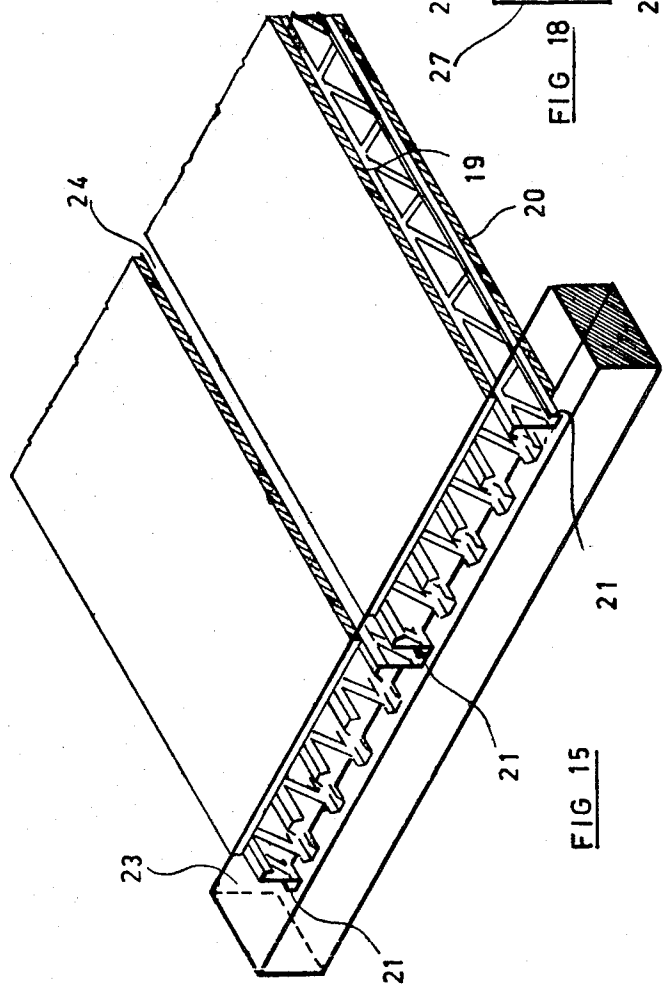


FIG 15

STRUCTURAL UNIT HAVING AN EXPANDED METAL SHEET AND METHOD FOR MANUFACTURING THE STRUCTURAL UNIT

BACKGROUND OF THE INVENTION

The present invention relates to static building structures.

In particular, the present invention relates to structural units to be used in static building structures as well as to a method for manufacturing such structural units.

Thus, the present invention relates to a structural building unit, and a method for manufacturing the same, of the type which is suitable for carrying loads in building structures, the structural unit of the invention being suitable for use in roofs, or for use in floors or balconies of buildings of all types.

There are known load-bearing structures such as double-T Bates beams which have cores which are stretched after incisions are formed with shears, so as to form a reticulated planar framework having elongated portions which normally are inclined at 45°, with respect to each other, these structures being used primaily, with other elements of the same type, to form pylons for carrying electric lines.

Also, there are known structures which include metallic sheets which are not stretched but which are corrugated, for example, so as to form with other elements load-bearing structures for roofs or floors.

These known structures have certain deficiencies and disadvantages because, for example, the stretched Bates beams cannot be used to form a reticulated 3-dimensional structure capable of serving as a load-bearing structural unit in order to support roofs, to form floors, or the like. Also, continuous sheets which are bent so as to have ribs, corrugations, or the like, cannot be constructed economically or conveniently and have serious deficiencies when used as metallic panels for supporting roofs, or when used with reinforced concrete or other materials to form load-bearing panels or floors.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a structural unit and method for manufacturing the same which will avoid the above deficiencies and disadvantages.

Thus, it is an object of the present invention to provide a structural unit and method for manufacturing the same which will form an economical three-dimensional structure which is light in weight and which at the same time can be manufactured at relatively low cost, while at the same time is capable of forming an effective load-bearing element which may be prefabricated in a plant according to mass production techniques.

In particular, it is an object of the present invention to provide a structural unit and method for manufacturing the same which is suitable for supporting roofs as well as to form floors in all types of buildings, whether they are intended for commercial or non-commercial use.

Also it is an object of the invention to provide a structural unit, and method for manufacturing the same, which can be formed in any desired size, with the units of the invention being capable of connection one to another to form any desired magnitude of load-bearing element.

It is also an object of the present invention to provide a structure of the above type, as well as a method for manufacturing the same, which lends itself either to complete prefabrication in a plant of to partial prefabrication, with the final finishing taking place at the site of the construction.

Yet another object of the present invention is to provide a structural unit, and method for manufacturing the same, which has sufficient open space to be capable of accommodating, without any difficulty, elongated pipes for fluids, unit heaters, electrical or air-conditioning systems, or noise or temperature insulating materials as well as anti-vibration materials.

The object of the present invention also include the provision of a structural unit which not only can form conventional floors but also balconies with the structure of the invention being capable of assuming negative moments and forming cantilever types of structures.

The structural unit of the invention includes, as an important part thereof, an expanded metal sheet which is of a generally wave-shaped configuration having elongated uninterrupted sheet portions at the crests of the waves and having oppositely inclined sheet portions extending between these crests and formed with rows of oppositely oriented triangular openings which result from stretching of the sheet which initially is formed with elongated narrow cutouts. A structural means is fixed to the crests where the elongated uniterrupted sheet portions are located, and this structural means may take the form of suitable beams, slabs of concrete, or the like, and this structural unit of the invention is very strong while at the same time being light in weight and has an interior hollow space capable of accommodating any desired piping, insulation, or the like, normally situated between the floors of a building. The expanded metal sheet is made in only one piece and is very strong, giving the structural unit of the invention great rigidity in strenth as well as light weight and low cost and the possibility of prefabrication before being transported to the site of a building. The sheet from which the expanded metal sheet is formed is initially formed with rows of elongated narrow cutouts which, after the sheet is stretched transversely of the cutouts, form the triangular openings separated by elongated narrow sheet portions which, as a result of drawing, have a U-shaped cross section, so that while the expanded metal sheet is light in weight and has large spaces nevertheless it is of great strength.

BRIEF DESCRIPTION OF DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a fragmentary illustration of a metal sheet from which the expanded sheet of the invention is formed

FIG. 2 is a fragmentary perspective view schematically illustrating part of the method of the present invention for manufacturing an expanded metal sheet;

FIG. 3 is a view of the structure of FIG. 1 showing how one of the pairs of rows of eleongated narrow cutouts form triangular openings after stretching of the sheet transversely of these cutouts;

FIG. 4 illustrates the final condition which the stretched sheet takes after it has been stretched transversely of the elongated narrow cutouts;

FIG. 5 shows the configuration which the sheet of FIG. 4 takes after the sheet is bent into a substantially wave-shaped configuration;

FIG. 6 is a fragmentary transverse section taken along line VI—VI of FIG. 5 and showing an elongated narrow sheet portion in cross section;

FIG. 7 is a fragmentary sectional elevation taken along line VII—VII of FIG. 5, illustrating the structure shown in FIG. 6 in a longitudinal view with FIG. 7 also showing the parts of the sheet which are joined to the elongated narrow sheet portion;

FIG. 8 is a fragmentary elevation showing a structural unit of the invention as it appears when looking toward one of the sides thereof;

FIG. 9 sjows the structure of FIG. 8 as it appears when viewed perpendicularly to the view shown in FIG. 8;

FIG. 10 is an end elevation illsutrating one possible way in which a pair of sheets can be joined to each other;

FIG. 11 illustrates another manner of joining a pair of sheets to each other;

FIG. 12 shows yet a third way of joining a pair of sheets to each other;

FIG. 13 is a fragmentary partly sectional elevation showing another type of structural unit of the invention, utilizing concrete slabs rather than beams as shown in FIGS. 8 and 9;

FIG. 14 is a fragmentary elevation of the structure of FIG. 13 as seen when viewed perpendicularly to the view shown in FIG. 13;

FIG. 15 illustrates how the structure of FIGS. 13 and 14 can be supported;

FIG. 16 illustrates how the structure of FIGS. 13 and 14 can be supported by a wall so as to form a floor, for example;

FIG. 17 illustrates how units as shown in FIGS. 13 and 14 can be joined to each other; and

FIG. 18 is a schematic partly sectional elevation fragmentarily illustrating another way in which the structural unit of the invention can be supported in a static building structure.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, there is fragmentarily illustrated therein a part of a metal sheet 1 made of any desired metal which can be expanded in a manner described below to form the expanded metal part of the structural unit of the invention. This metal sheet 1 has a pair of opposed parallel straight end edges, one of which is fragmentarily shown at the upper horizontal edge of FIG. 1. The sheet 1 also has a pair of opposed parallel side edges, one of which appears at the left of FIG. 1, these side edges being perpendicular to the end edges so that the sheet 1 is of a generally rectangular or square configuration.

The sheet 1 is initially formed with a plurality of cutouts 2. These cutouts in the illustrated example are in the form of elongated narrow notches which are punched through the sheet 1 so that these notches have the illustrated configuration. It is to be noted that instead of actually punching notches through the body of the sheet 1, it is also possible to provide extremely thin portions of the sheet 1 which will tear when these thin portions forming grooves in the initial sheet, for example, are transversely stretched. Any cutout structure which has the elongated configuration shown for the notches 2 will suffice. It is only required that when the sheet 1 is stretched transversely of the elongated cutouts, the latter will expand to form openings referred to below.

As is apparent from FIG. 1, the elongated cutouts 2 extend in a direction which is generally parallel to the end edges of the sheet 1. Moreover, these elongated cutouts 2 are arranged in rows which also extend parallel to the end edges. The rows themselves are arranged in pairs which are separated from each other by the elongated sheet portions 4 which are uninterrupted and extend all the way across the sheet between its opposed side edges, these elongated sheet portions 4 also being parallel to the opposed end edges.

Thus, the pairs of rows of cutouts 2 have outer edges adjoining the elongated uniterrupted sheet portions 4 and inner edges which are directed toward each other. In addition it will be noted that the spacing between the cutouts 2 in any one row is such that the distance from one cutout 2 up to the next cutout 2 is substantially shorter than the lengths of the several cutouts, all of which are the same. In addition it will be noted that the cutouts in each pair of adjoining rows of cutouts are symmetrically staggered. The result of this arrangement is that the cutouts 2 of one of the pairs of adjoining rows of cutouts overlap the cutouts 2 of the other of the adjoining pairs of rows of cutouts, so that at each pair of rows of adjoinging cutouts elongated relatively narrow sheet portions 3 are defined between the overlapping inner edges of the cutouts 2. Finally, it will be noted that one of each of the pairs of adjoining rows of cutouts terminates at each of the side edges in a cutout which has only a fractional portion extending up to the particular side edge, and several of these fractional cutout portions are shown along the left side edge in FIG. 1.

Referring now to FIG. 2, the above-described sheet of FIG. 1 is stretched in a manner illustrated in FIG. 2. Thus, according to the method of the invention a suitable clamping means 5, schematically represented in FIG. 2, clamps the sheet 1 at the elongated uninterrupted sheet portions 4 thereof. The action of the clamping bars 5 is such that they prevent longitudinal contraction of the elongated sheet portions 4, while the latter are spread apart from each other. Thus, with clamping elements 5 arranged as shown in FIG. 2, clamping a pair of successive elongated sheet portions 4, these clamping elements are spread apart from each other, as indicated by the arrows shown in FIG. 2, and the result is that the part of the sheet between the pairs of clamping members 5 will assume the configuration shown at the upper part of FIG. 3. Thus, the sheet is stretched transversely of the cutouts 2 between each pair of elongated uninterrupted sheet portions 4, so that the several elongated cutouts 2 form the triangular openings 6 illustrated in FIG. 3. Because of the arrangement of the two adjoining rows of cutouts 2 adjacent each other, the triangular openings 6 are arranged in a series as illustrated in FIG. 3, where the successive triangular openings are oriented oppositely from each other with the bases of the triangles adjoining the elongated uninterrupted portions 4 while the successive oppositely oriented triangular openings 6 of each row are separated from each other by an elongated narrow

sheet portion 7 separating the inclined edges of the successive triangles in the manner shown at the upper part of FIG. 3.

The pairs of clamping members 5 as shown in FIG. 2 may be successively applied to successive elongated uninterrupted sheet portions 4 so as to successivley transversely stretch the sheet to provide a structure as shown in FIG. 4, or an entire series of pairs of clamping members 5 may be applied to all of the elongated transverse uninterrupted portions 4, with all of the clamping units shifted with respect to each other, in a direction parallel to the opposed side edges of the sheet, so as to achieve a structure as shown in FIG. 4 in a single operation.

It is to be understood that while the elongated uninterrupted sheet portions 4 are shown between the successive pairs of adjoining rows of cutouts 2, the elongated uninterrupted portions of the sheet directly adjoining the parallel end edges thereof also form elongated uninterrupted sheet portions which correspond in all respects to the elongated sheet portions 4 and which are treated in the same way, as is apparent from FIG. 2.

Because with this method of the invention the elongated portions 4 of the sheet are prevented from contracting longitudinally, as the triangular openings 6 are formed during stretching of the sheet transversely of the elongated cutouts 2, the narrow sheet portions 3 are longitudinally drawn, while being inclined to form the portions 7. the longitudinal drawing of the narrow portions 3 to form the portions 7 is controlled in such a way that these portions 7 assume a channel-shaped configuration providing the expanded metal sheet with the inclined strut portions 8 shown in FIG. 5 and illustrated in section in FIGS. 6 and 7. Moreover it will be noted from FIG. 4 that during the stretching of the sheet the elongated narrow portions 3 are swung through approximately 45° angles so that the triangular openings 6 have opposed inclined side edges which are substantially at right angles to each other and which form substantially 45° angles with the base edges which join the elongated uninterrupted sheet portions 4.

The expanded metal sheet which is still in a substantially planar condition is then given the substantially wave-shaped configuration shown in FIG. 5. This configuration shown in FIG. 5 is brought about by inclining the sheet portions which are formed with the series of openings 6 oppositely to each other on opposite sides of alternating elongated uninterrupted sheet portions 4, so that the successive portions of the sheet which are formed with the series of openings 6 are oppositely inclined with respect to each other in the manner shown most clearly in FIG. 8. These oppositely inclined portions formed with the openings 6 terminate in longitudinal edge regions 9 which are inclined with respect to the elongated uninterrupted sheet portions 4, and because of this substantially wave-shaped configuration, alternate sheet portions 4 are located in one plane while the remaining sheet portions 4 are located in a parallel plane, giving the expanded metal the three-dimensional configuration shown in FIG. 5. The pairs of sheet portions which are oppositely inclined with respect to the alternate elongated uninterrupted sheet portions 4 are inclined, for example, through an angle 30° form an arrangement as shown in FIG. 5. Also, at its ends the sheet portions formed with the openings 6 are bent into a vertical plane, as viewed in FIG. 8, so as to form end portions 11 from the expanded metal sheet which has the wave-shaped configuration, and the terminal edge regions are further bent to form the flanges 10 illustrated in FIGS. 5 and 8.

After the expanded metal sheet has been given this wave-shaped configuration, the elongated uninterrupted sheet portions 4 which are located at the crests of the waves are fixed with a structural means which serves to complete the structural unit of the invention. In the example shown in FIGS. 8 and 9, this structural means is formed by the beams 12 and 13. Thus, the upper sheet portions 4 are fixed, as by welding, for example, with a series of transversely extending beams 12 which are parallel to each other, and the lower elongated uninterrupted sheet portions 4 are fixed in a similar manner to beams 13. Once these beams 12 and 13 are fixed to the expanded sheet metal, a strong, light-weight structural unit is provided, and this unit is capable of carrying a very substantial load. This unit may be used in a roof structure, for example, or at any part of a standard building structure in order to form part of a load-carrying assembly.

Where the size of the desired structural unit is such that it will require a plurality of the expanded metal sheets, a series of these sheets may be joined to each other in a manner shown in FIGS. 10–12. Thus, FIG. 10 shows how a pair of expanded metal sheets of the invention may be joined to each other in end-to-end relation, by placing the vertical end portions 11 thereof next to each other and by then joining the metal sheets with a weld 14. However, instead of such a weld 14 it is possible to use bolt-and-nut assemblies 15 and 16. In addition it is possible to use an arrangement as shown in FIG. 12 where the ends of the expanded metal sheet are not inclined into a vertical plane and instead are left in the inclined planes illustrated in FIG. 12. Now the end regions are not bent to form the flanges 10, and instead they are simply overlapped and joined to each other as illustrated in FIG. 12.

Instead of utilizing a structural means in the form of beams 12 and 13 which are fixed to the uninterrupted sheet portions 4 at the crests of the wave-shaped configuration of the expanded metal sheet, it is possible to use a structural means as shown in FIGS. 13 and 14. In this case a network of reinforcing rods, wires, or the like, is placed against and/or fixed to the elongated uninterrupted sheet portions at the crests of the waves. Thus, FIGS. 13 and 14 show metallic networks 18 composed of reinforcing elements 17 in the form of reinforcing rods or wires, and these networks may, for example, be welded directly to the elongated uninterrupted sheet portions 4. Then these networks are embedded in the concrete slabs 19 and 20 illustrated in FIGS. 13 and 14, so that an exceedingly strong and at the same time light-weight structural unit is provided, with these concrete slabs capable of forming floors for a static building structure. As is apparent from FIG. 14, the expanded metal sheet of the invention has free end portions 22 extending beyond the concrete slabs 19 and 20. The ends of the expanded metal sheet may be provided with the flanges 21 shown in FIG. 13, so that adjoining structural units of the invention can have these flanges embedded in concrete for the purpose of integrally uniting a series of structural units to form a complete floor assembly. The free end portions 22 enable the structural unit of the invention to be joined with a supporting means. Thus, FIG. 15 diagrammat-

ically illustrates how the free end portions 22 are embedded in an elongated concrete beam 23 which forms part of a building structure. In this case the beam 23 serves to support the structural units of the invention. At the places where the successive structural units are joined at the end flanges 21, there wo;; be spaces 24, illustrated in FIG. 15, and these spaces will be filled with concrete so that in this way it is possible to form a continuous floor. Moreover, because of the large open spaces which are freely available between the slabs 19 and 20, it is possible very easily to situate between these slabs 19 and 20 any conduits, whether for gas, electric conductors, water, or the like, and it is is equally possible to situate very readily in the space between the slabs 19 and 20 suitable insulation, sound or vibration-deadening materials, etc.

FIG. 16 shows a wall 25 which is formed with an opening through which the expanded metal structure extends. In this case the expanded metal sheet of the invention is first placed through the opening of the wall 25, and then the reinforced concrete slabs are joined with the parts of the expanded metal sheet which extend beyond the wall 25. The opening in the wall 25 is first filled with concrete 26, so that in this way the expanded metal sheet structure is rigidly fixed with the wall 25. It is to be noted that with such a construction the structural unit of the invention has sufficient strength so that it can extend freely from the wall 25 forming a cantilever structure which is capable of supporting large loads and forming, for example, a balcony.

FIG. 17 illustrates an arrangement where the metal sheets have the configuration shown in FIG. 5. Thus, these expanded metal sheets may be joined to each other in the manner shown in any one of FIGS. 10–12, and the reinforced concrete slabs 19 and 20 are joined to the expanded metal sheets in the manner shown in FIG. 17, so that with this structure also it is possible to provide large units of any desired area. In the particular example shown in FIG. 17, the weld 14 is used to join the successive expanded metal sheets to each other.

In the arrangement shown in FIG. 18, the structure of FIGS. 13 and 14 is joined with an elongated metal beam 27 which has the hollow C-shaped configuration shown in FIG. 18. Thus the free end portions 22 will become situated within the supporting beam 27 next to the upper and lower flanges thereof, and suitable lines of welding 28 are used in this case for welding the projecting ends 22 of the expanded metal sheet directly to the supporting beam 27.

It is to be noted that according to the method of the invention it is possible to form the expanded metal sheet either by stretching the latter and drawing the narrow portions 7 while they are cold or while they are hot, or the operation can be one which is partly cold and partly hot. The elongated cutouts 2 can have many different forms and can simply take the form of removed material from the body of the sheet 1, either in the form of punched openings, as pointed out above, or by engraving or thinning of the sheet along predetermined areas or lines, so as to provide the sheet with weakened portions which will form the openings when the sheet is stretched transversely of these weakened portions. It is possible to drill openings through the sheet with these openings located close to each other and along lines which will form the weakened portions which during the transvere stretching will provide the openings which are required. As was pointed out above, according to the method of the invention the stretching of the sheet transversely of the cutouts can take place either simultaneously at all of the cutouts or successively at the successive pairs of rows of adjoining cutouts, the stretching preferably being carried out in such a way that the elongated uninterrupted portions 4 cannot contract longitudinally. In all cases the stretching operation is terminated conveniently before the area at predetermined locations of the sheet becomes too small.

A structure as shown in FIG. 5 can also be used without the structural means joined to the opposed elongated portions 4 at the crests of the waves. Thus a structure as shown in FIG. 5 can directly form a structural load-bearing element utilized directly as a reticulated three-dimensional roof-supporting structure, or some part of a static building structure, although for this purpose it is also convenient to join to the expanded metal sheet the beams 12 and 13 as shown in FIGS. 8 and 9.

It is also to be noted that the thickness of the structural assembly an be doubled by placing the expanded metal sheets as shown in FIG. 5 one on top of the other with the lower elongated uninterrupted portions 4 of the upper sheet joined, as by welding, for example, to the upper elongated uninterrupted portions for the lower sheet. Thus the thickness of the entire assembly can be regulated as desired. As was pointed out above it is a simple matter to join successive expanded metal sheets of the invention to each other so as to increase the area of the entire final structure, as described above in connection with FIGS. 10–12 as well as FIGS. 15 and 17.

What is claimed is:

1. In a method of treating a metal sheet formed with pairs of parallel rows of elongated cutouts arranged with each pair of rows of said cutouts separated from the next pair of rows by an elongated uninterrupted sheet portion and with one of each pair of rows of cutouts being symmetrically staggered with respect to the other of each pair of rows of cutouts and with the distance between the successive cutouts of each row being shorter than the length of each cutout so that the cutouts of each one of parallel row of cutouts overlap the cutouts of the other of each pair of rows of cutouts, the steps of clamping the sheet at the elongated uninterrupted portions thereof and spreading the clamped sheet portions apart from each other while preventing the clamped sheet portions from contracting longitudinally so as to transversely enlarge said cutouts and to form therefrom triangular openings having bases defined by those edges of said cutouts which adjoin said elongated uninterrupted sheet portions and inclined sides formed by the inner edges of each row of parallel cutouts which are directed toward each other, so that between each successive pair of elongated uninterrupted sheet portions there is a row of triangular openings oppositely oriented one with respect to the next and separated one from the next by elongated narrow sheet portions.

2. In a method as recited in claim 1 and including during spreading of the clamped portions of the sheet apart from each other, the step of longitudinally drawing the elongated narrow sheet portions which separate the successuve, oppositely oriented triangular openings formed from each pair of rows of cutouts from each

other and forming them into elongated channels of substantially U-shaped cross section.

3. In a method as recited in claim 2 and including the step of oppositely inclining subsequent to the drawing of said elongated narrow sheet portions, the elongated sheet portions which are formed with said rows of oppositely oriented triangular openings toward each other at alternate elongated uninterrupted sheet portions situated between the rows of oppositely oriented triangular openings and locating the elongated uninterrupted sheet portions successively in a pair of mutually spaced planes between which said sheet portions with said triangular openings extend with one of the latter sheet portions being inclined oppositely to the next, and providing the metal sheet with a substantially wave-shaped configuration having the elongated uninterrupted sheet portions between said rows of oppositely oriented triangular openings located at the crests of the waves.

4. In a method as recited in claim 3 and including the step of fixing a structural means to said elongated uninterrupted sheet portions at the crests of said waves for forming with the metal sheet portion a structural unit which may be used in a static building structure.

5. For use in a static building structure, a structural unit comprising an expanded metal sheet of substantially wave-shaped configuration having a first set of elongated uninterrupted sheet portions forming crests situated along their entire lengths at one plane and a second set of elongated uninterrupted sheet portions parallel to and alternating with said first set and forming crests situated along their entire lengths at another plane spaced from and substantially parallel to said one plane, and between the latter sheet portions elongated apertured substantially flat sheet portions which connect said elongated uninterrupted sheet portions to each other and which are oppositely inclined one with respect to the next and sequentially situated respectively in oppositely inclined planes, and each of which is formed with a row of triangular openings which are located in one of said inclined planes and which are oppositely oriented one with respect to the next and separated by inclined relatively narrow, longitudinally drawn sheet portions which are of substantially U-shaped cross section and which are situated in the same plane as the triangular openings which they separate.

6. The structural unit of claim 5 including a plurality of the expanded metal sheets which are located one next to the other and which are fixed to each other.

7. The unit of claim 5 and wherein a structural means is fixed to said elongated uninterrupted sheet portions, said structural means including elongated beams extending transversely of said elongated uninterrupted sheet portions and fixed thereto.

8. The unit of claim 5 and wherein a structural means is fixed to said elongated uninterrupted sheet portions, said structural means including reinforcing networks engaging the elongated uninterrupted sheet portions and concrete slabs in which said networks are embedded.

9. The unit of claim 8 and wherein said expanded metal sheet has a peripheral portion extending beyond the concrete slabs, and a supporting beam receiving and supporting said peripheral portion of the expanded metal sheet.

10. The unit of claim 9 and wherein said supporting beam is a concrete beam.

11. The unit of claim 9 and wherein said supporting beam is an elongated channel receiving said peripheral portion of said expanded sheet and welded to the latter.

12. The unit of claim 9 and wherein a wall is formed with an opening through which the expanded metal sheet extends, and the latter wall opening being filled with concrete in which the part of the expanded metal sheet is said opening is embedded.

* * * * *