

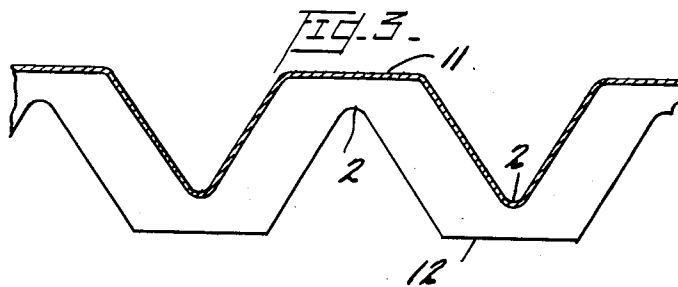
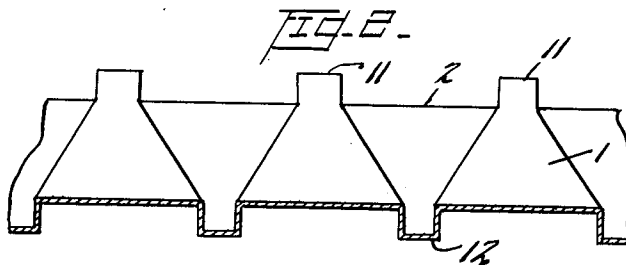
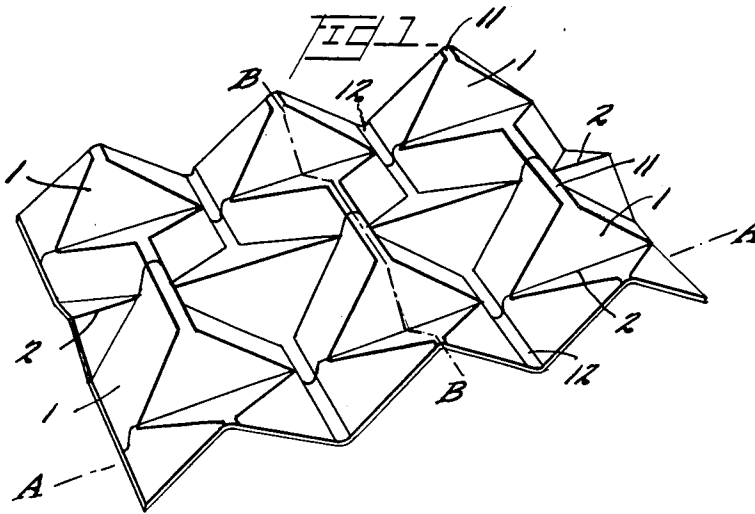
Aug. 10, 1965

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3,199,963

CORRUGATED SHEET FORMED MATERIAL

Filed Nov. 21, 1962



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3,199,963

CORRUGATED SHEET FORMED MATERIAL

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Filed Nov. 21, 1962, Ser. No. 239,197

Claims priority, application Norway, Nov. 23, 1961, 142,285

3 Claims. (Cl. 29—183)

In the transport and storing of great quantities of liquid substances at a temperature substantially departing from the ambient temperature, it is of the greatest importance to be able to utilize the mechanical strength and volume of the structure, such as a ship's hull, wherein the tank or tanks containing the liquid substance are arranged, the shape of the tank or tanks being as far as possible adapted to the shape of the structure, and they are so arranged as to be supported by the strengthening elements of the structure. In this connection it has been considered if it is possible to provide the structure, such as a container or a ship, with internal insulation and line the insulation with a sealing shell, so that the insulation is not in contact with the liquid. Such proposition has, however, not been successful, due to the difficulties encountered from the thermal tensions appearing in a sealing shell at varying charges of liquid at a temperature which is strongly departing from the temperature at the outer face of the insulation. The possibility has been indicated of the use for this purpose of a corrugated foil, a shell, but it has been found to be difficult to prepare such a shell in such a manner that the marginal tensions arising will be of a sufficiently restricted value to be absorbed by the insulation at important temperature variations and also absorb the relatively big tensions simultaneously appearing in the shell proper due to thermal and/or hydrodynamic load.

The purpose of the present invention is to provide a corrugated sheet made of metal or other deformable but shape rigid material which i.a. is adapted for use in a shell as referred to above and wherein the folds or waves are arranged in such a manner that when the sheet is in the form a generally flat condition or in a curved condition having a radius of curvature which is very great as compared with the amplitude value of the corrugations, no essential tensile stress is developed in the sheet along the plane so formed. When a sheet according to the invention is secured relatively to its environments and at the same time subjected to great variations in temperature relatively to the ambient temperature, the forces required for the purpose of securing the sheet are to be small and in all essentials dependent upon the bending strength of the folds or waves.

According to the invention this is achieved by so forming the corrugations that they consist of substantially straight wave crests departing in opposite directions from the mean plane of the sheet, the individual wave crests being so arranged relatively to each other that the crests departing in one direction are broken by crests extending at an angle, preferably right angles, to the first mentioned crest and that the length of the curve measured along the surface of the sheet between any two parallel planes extending at a right angle to the said mean plane, is always essentially the same when measured along two sectional lines in two further parallel planes extending at right angles to the mean plane and at right angles to the first mentioned two planes.

Hereby, the individual corrugations may be formed in the most varying manners. Thus, the wave crests may be flattened at the top and this top may be of a very short length along the crest, to such a degree that the wave crest may even present itself in approximately nipple form. Further, the wave crests extending at right

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angles relatively to each other may be positioned at different distances from the mean plane of the sheet, and they may be of different width at the top and/or they may have different side slope angles. Further the "half wave length," i.e. the distance between the wave crest tops in a direction at right angles to the direction of length of the crests may differ. All such various features will be of influence to the properties which are characteristic to each individual sheet, and the choice of this or that particular feature will depend upon the material used as well as upon the intended use of the sheet.

When preparing such a corrugated sheet from a plane or slightly curved sheet, no portion of the sheet is subjected to any particular tensile stress along the plane proper to such portion, but the bending or folding operation leads to local bending stresses (effort de flexion) in the material in a direction transverse to the thickness of the sheet. If such a sheet is subjected to tensile or compression forces along the mean plane of the sheet, such forces will result in that the folds or bends, i.e. the corrugations are slightly straightened or made more acute, to the effect that no substantial membrane tensions are produced, and consequently no marginal tensions.

It is, however, obvious that in the preparation of a sheet according to the invention, it is not essential to start with a plane or slightly curved sheet. It is also possible to prepare the sheet directly with the desired corrugations by casting, pressing, welding or any other suitable method, dependent, i.a. of the material used.

With reference to the accompanying drawing, one practical embodiment of a corrugated sheet according to the invention is to be described, wherein the wave crests are extending at approximately right angles to each other. The drawing illustrates a portion of such a sheet.

FIGURE 1 is a perspective view of the sheet.

FIGURE 2 is a sectional view taken along the line A—A of FIGURE 1.

FIGURE 3 is a sectional view taken along the line B—B of FIGURE 1.

As shown in the drawing, a sheet formed material is formed with a plurality of mutually parallel wave crests 1 of short length and transversely to the same a plurality of series of crests 2 of short length and lesser height than the former. As shown, the sheet of the example is formed with a slightly S formed profile of the "hill sides" of the crests 1, so as to give marked wave tops 11 and "valley bottoms" 12, whereas the "hill sides" of the crests 2 are approximately rectilinear, in sectional view.

Such a double corrugated sheet is capable of absorbing tensile and compressive forces along the mean plane of the sheet, independently of the direction of such forces relatively to the direction of length of the individual wave crests, without thereby giving rise to any noticeable marginal tensions or tensions in the sheet as a whole.

Of the possible fields of use of such a sheet, reference may be made to walls of tanks for the transport or storing of liquified gas, such as methane or propane at temperatures which are substantially lower than the ambient temperature.

I claim:

1. A corrugated sheet made from a flattened sheet of deformable material having three sets of corrugations therein, the corrugations of each set being substantially parallel, the corrugations of the first set extending alternately in opposite directions from the mean plane of said material with wave crests equi-distant from the mean plane of said material, said second and third sets of corrugations being parallel to each other and at an angle with respect to said first set of corrugations, the corrugations of said second and third sets being spaced from each other and extending alternately inwardly from

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said wave crests in said first set of corrugations on opposite sides of said mean plane respectively, the distance of the wave crests of said second and third sets of corrugations from said mean plane being less than the distance of the wave crests of said first set of corrugations from the mean plane, all of said corrugations being formed without elongation of said material, whereby when said sheet is subjected to tensile and compression forces along its mean plane the angles of said corrugations will vary without altering the peripheral dimensions of said corrugated sheet.

2. A corrugated sheet as claimed in claim 1 wherein the wave crests of said first set of corrugations are flattened.

3. A corrugated sheet as claimed in claim 1 wherein

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said second and third sets of corrugations are at right angles to said first set of corrugations.

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