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A. BORGES

3,089,281

BUILDING ROOFING STRUCTURE

Filed Dec. 1, 1959

FIG. 1

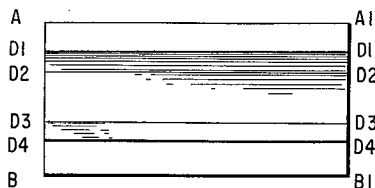


FIG. 2

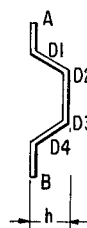


FIG. 3



FIG. 4

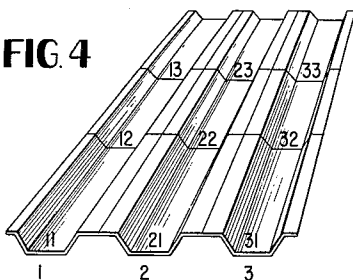


FIG. 5

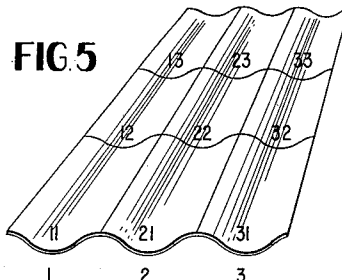
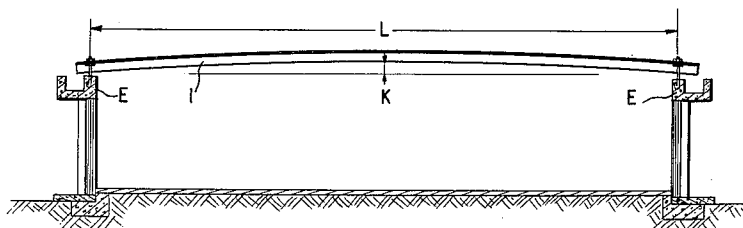


FIG. 6

FIG. 7

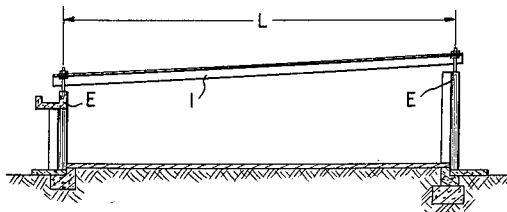
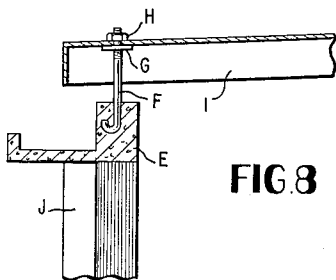
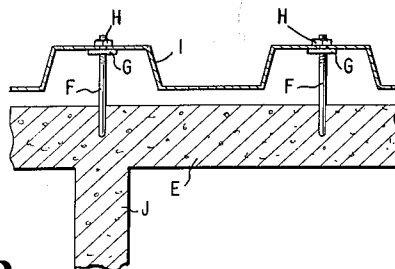


FIG. 8

FIG. 9



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BUILDING ROOFING STRUCTURE
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My invention relates to improvements in structures for the roofing of buildings, in which the structure comprises the roof as well as the frame.

The primary object of my invention is to provide a roof structure made up of a multiplicity of steel sheets in such a way as to provide a roof structure of large inertia or stiffness.

In general, the improved structure according to my invention comprises an assembly of a multiplicity of similar preformed steel sheets in which each sheet includes a trough extending from one end to the other and is provided with laterally-projecting side edges offset with respect to the bottom of the trough. In the roof structure the preformed sheets are arranged in rows and joined together end to end in one direction of the roof, with the troughs of the sheets in the rows providing long troughs extending in that direction across the roof. The side edges of the sheets in one row are joined edge to edge respectively to the side edges of the sheets in adjacent rows. The roof structure assembled in this manner has an undulating surface and a mean thickness equal to the depth of the troughs provided in the sheets.

The attached drawings illustrate the invention.

FIG. 1 shows a steel sheet of convenient thickness AA1, BB1 wherein are provided bends D1, D2, D3 and D4 which make the cross section of the sheet assume the shape illustrated in FIG. 2. As shown in perspective view in FIG. 4, the various sheets, after being bent, are associated, transversely, by means of soldering, thus forming a kind of trough comprising sheets numbered 11, 12, 13 . . . which form trough 1 and sheets 21, 22, 23 . . . which form trough 2 and so on; the various troughs 1, 2, 3 . . . are further laterally associated by longitudinal soldering, thus forming a large roof surface with, in cross section, polygonal U-shaped troughs therein.

The steel sheets used for this purpose should have dimensions of 1 x 2 ms. or 1 x 3 ms., commonly found on the market; their thickness should be comprised between 2 and 3 mm. The bend indicated in FIG. 2 may be done away, the sheet being then calendered or molded as shown in FIG. 3. In this case, the association of the sheets should be as shown in FIG. 5.

Because of the surface undulations, said surface will have a mean thickness equal to the depth of the bend or calendering of the sheet, as shown in FIGS. 2 and 3; therefore, said surface will have a large inertia in the direction of the troughs.

In FIGS. 6 and 7, there is shown cross sections of buildings equipped with the roof structure of the present invention; upon the two beams E, generally made of concrete, rest the various associated troughs I, the total width of the building being shown by the letter L; FIG. 6 illustrates a building, provided with two beams E situated at the same level; in this case, the associated troughs I are slightly curved so as to provide a slight arch K, more or less equivalent to 1:200 of the width L. In FIG. 7, the two beams are not at the same level and this difference in level is about 1:100 of the width L; this difference in level and said arch K are meant to facilitate the disposal of rain water.

Said structure, besides being truly a structure or frame, also forms the roofing. Protection of the steel sheets against oxidation is provided by a coating of asphalt paint or similar substance; labor for the application of

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this protection is rendered cheaper because of the fact that the roofing lies practically on a level.

FIGS. 8 and 9 shows the manner of resting trough I on the beam E (supported by columns J) by means of an inverted J-shaped bar F comprising a round steel bar of J-shape embedded in the concrete of the beam. Trough I is attached at its crest to the steel bar F by means of a distribution plate G and of a nut H. The function of the J-shaped steel bar F is to allow for free expansion and contraction of the roof in all directions.

In actual practice the mean thicknesses h will be around $\frac{1}{60}$ of the width of the building L , and the slope of the roof should be about $\frac{1}{100}$, which ensures very low eaves or gables.

Attention should be called to the perfect water-tightness of the roofing herein described and to its durability, especially since these properties cannot be obtained with common clay, asbestos-cement, aluminium or zinc tiles.

Another important advantage is that the inner aspect of the structure presents a very pleasing appearance, thus rendering unnecessary any ceiling.

I claim:

1. A building structure including two spaced generally parallel roof supports lying generally in the same horizontal plane, a self-supporting generally horizontal roof spanning the space between said supports and having edge portions respectively overlying and supported only by said roof supports, said roof comprising an assembly of a multiplicity of preformed sheet metal sections both lengthwise and widthwise of the roof, said sections being of generally rectangular shape in outline and each including a trough extending therethrough from one edge to the opposite edge, the other edge portions of each sheet section being offset upwardly and extending respectively laterally of the trough and generally in a plane parallel to the bottom of the trough, the sheet sections of the roof being arranged with the edges abutting and with the troughs all extending in a direction spanning the roof supports, a continuous solder joint joining all adjacent edges of the sheet sections to provide a water-tight roof, the end portions of the roof containing said edges between which extend the troughs constituting the edge portions of the roof overlying and supported by said spaced roof supports, a plurality of spaced upright bars carried by both of said roof supports, the upper portion of each bar being secured to the overlying edge portion of the roof supported by said support, said bars supporting said edge portions of the roof spaced from the supports to allow free expansion and contraction of the roof in all directions, said roof being so formed and attached to said supports as to have a slight arch between said supports, whereby a unitary water-tight roof is provided having an undulating surface with a large inertia and a mean thickness equal to the depth of the troughs provided in the sheet sections.

2. A building structure as set forth in claim 1 in which said other edge portions of each sheet section are offset upwardly to the same extent with respect to the bottom of the trough, said troughs in the sheet sections being of polygonal U-shape in cross section, said adjacent soldered off-set edge portions of the sheet sections forming a trough of similar shape facing opposite to said troughs in the sheet sections.

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