July 13, 1965 J. M. GALLOWAY 3,193,971

CONCRETE FORMS

Filed April 20, 1961

Fig. 1

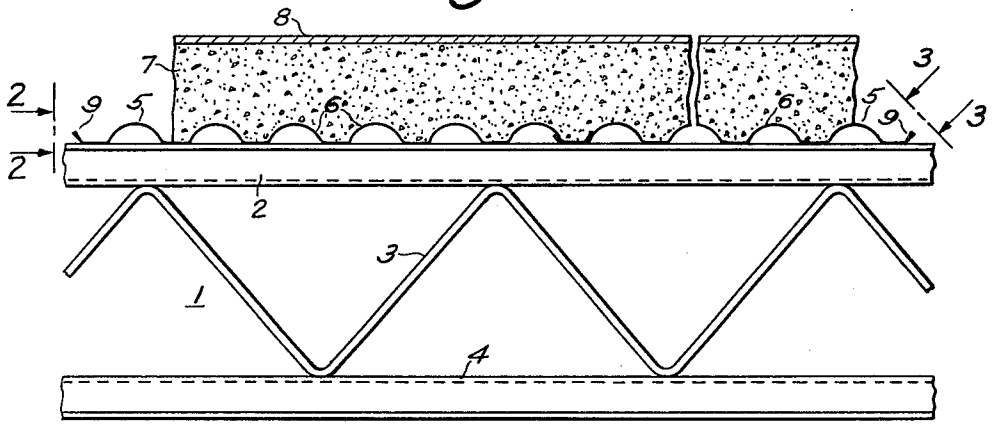


Fig. 2

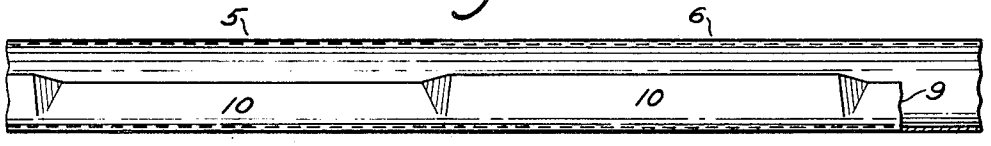


Fig. 3

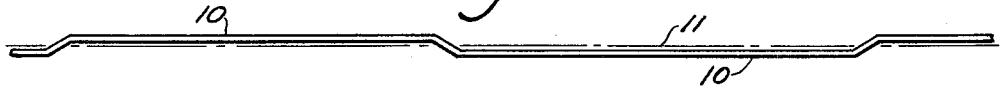
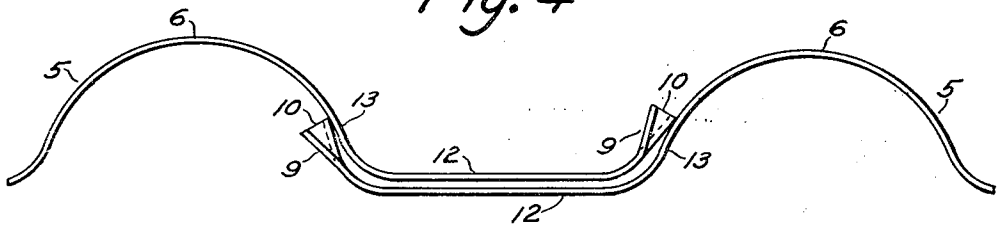


Fig. 4



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2 Claims. (Cl. 50—233)

This invention relates to metal concrete forms and more particularly to corrugated metal backing sheets for constructing lightweight concrete roof slabs.

A roof for a commercial or industrial building is commonly constructed by fastening overlapping corrugated high tensile strength metal backing sheets permanently to the top of supporting girders such as open web joists or purlins. Several inches of concrete are then poured on top of the backing sheets and left to harden to form an integral metal and concrete slab. The concrete used is usually one of the "lightweight" varieties that uses a low density aggregate. This type of concrete not only has the advantage of being light in weight but also possesses excellent insulation properties. After the concrete has set, a waterproof outer wearing surface such as the well known "built-up" type of roofing comprising layers of felt and hot asphalt is applied to the top of the slab.

The lightweight concrete still retains a certain amount of construction moisture even after it has hardened. On warm summer days this moisture will vaporize and the vapor pressure tends to build up under the intense heat of the sun. The waterproof wearing surface prevents this vapor from escaping to the outside and an impervious metal backing sheet prevents it from escaping into the building. The build up of this trapped vapor soon causes the wearing surface to blister and fail prematurely.

For this reason it has been found desirable to provide venting or spacing means between the side laps of the backing sheets when using this lightweight concrete in order to release this excess vapor pressure on warm sunny days.

Prior to my invention, separate clips or similar spacing devices were inserted in the side laps of the sheets to act as vents. Although these were successful in releasing the vapor pressure, they were an added expense to the builder and required additional labor to install them. Furthermore, these separate clips or other devices were often lost and left out due to carelessness.

It is therefore an object of my invention to provide a corrugated metal backing sheet for concrete that has a "built-in" venting feature.

It is a further object of my invention to provide a corrugated metal backing sheet for receiving, supporting and strengthening low density concretes.

It is a still further object of my invention to provide a concrete form that is easily and quickly installed with a minimum of expense.

The foregoing objects and the means whereby they are attained will be more fully understood from the following description and claims together with the drawings in which:

FIGURE 1 is a partial elevation view illustrating a typical roof section.

FIGURE 2 is a view taken along line 2—2 of FIGURE 1 and shows the venting means formed in the side edges of the corrugated backing sheet.

FIGURE 3 is a view taken along the line 3—3 of FIGURE 1 and shows the side edge deformation.

FIGURE 4 is a detail of a typical side lap joint according to my invention with the transverse edge corrugations slightly exaggerated.

Referring to FIGURE 1, girder 1 consists of top chord

member 2, rod shaped diagonal web member 3 and bottom chord member 4. The corrugated high tensile strength metal backing sheets 5 rest upon and are fastened to the top chord member 2 with suitable fastening means such as self-tapping screws, clips, or by welding. These sheets are usually galvanized for longer life since they remain as a permanent part of the roof structure. Adjacent sheets overlap one another slightly at the ends and at the sides. The corrugated backing sheets 5 are usually placed so the longitudinal corrugations 6 are perpendicular to the girders 1 and overlap each other at the ends directly over a supporting girder. The side lap joints will be discussed in more detail later. After the backing sheets 5 are in place a layer of low density concrete 7 is poured on top of the sheets 5. This concrete uses a low density material such as Perlite or Vermiculite as the aggregate. The layer is thick enough to provide an insulating cover above the crests of the corrugated sheets and averages from 2 to 4 inches in depth. The top surface of the concrete is screeded to form a smooth surface and when it has hardened a waterproof wearing surface 8 such as a "built-up" roof of layers of roofing felt and hot asphalt is applied.

FIGURE 4 illustrates a detail of a typical side lap joint. The rectangular metal sheets 5 have longitudinal corrugations 6 formed in the sheets parallel to the opposite side edges of the sheet. The outermost corrugation along each of the side edges defines the terminal side portion of the sheet. Each outermost corrugation has an upwardly and outwardly inclined outer side wall 9 terminating at one of the side edges, a bottom wall 12 extending transversely of the side edge as a continuation of the lower portion of the outer side wall 9 to define a base of the respective outermost corrugation, and an upwardly and inwardly inclined inner side wall 13 extending as a continuation of the bottom wall 12 and to a position at least above a plane that would contain both side edges of the sheet.

According to my invention, the upturned outer side walls 9 are deformed to form a series of short shallow contiguous corrugations 10 along the length of each edge. These corrugations 10 are transverse to the main longitudinal corrugations 6, and are formed only in the upturned outer side walls 9. These short shallow corrugations 10 bear against the undeformed inclined inner side wall 13 of the adjacent sheet when in an overlapped position and thus keep the lapped flat bottom walls 12 of the sheets in spaced relation and provide a plurality of elongated vents. The vents permit escape of the excess vapor pressure that may build up in the concrete slab on warm sunny days. These vents also permit the escape of excess moisture while the concrete is setting during construction.

As shown in FIGURE 4, the transverse cross section of each of the outermost corrugations from below the deformed terminal portion of the outer side wall 9 continuing to include the bottom wall 12 and inner side wall 13 is substantially constant along the extent of respective side edge of the sheet. It can also be seen from FIGURE 4 that the distance between the outermost surface of each of the outermost corrugations of the sheet along the plane that includes both side edges of the sheet, is at least as large as the distance between the innermost surfaces of the other outermost corrugation of the sheet along the same plane.

FIGURES 2 and 3 illustrate further how the terminal portions of the outer side walls 9 are deformed to provide the venting corrugations 10. These corrugations are formed by slightly displacing the metal in the terminal portion of each outer side wall 9 alternately along the extent of the side edge of the sheet and transversely in-

wardly and outwardly beyond the centerline 11 of the projected continuations of the faces defining the portion of the outer side wall 9 immediately below the deformed terminal portion. The deforming can easily be accomplished during the rolling operation that forms the longitudinal corrugations 6. The amount of the displacement required is very small and usually amounts to no more than about 1/64 to 1/32 of an inch on either side of the centerline 11 as shown in FIGURE 3. However, different conditions may require somewhat different displacements and these dimensions are merely illustrative.

A suitable shape for these transverse corrugations 10 is a channel shape about two inches wide in the form of a trapezium such as shown by FIGURE 2. However, this invention is by no means intended to be limited to that shape. The channel shape is easily formed and presents a broad bearing surface where the lapped sheet edges touch while at the same time providing very satisfactory vents. This shape and small size makes these corrugations practically invisible if the backing sheets are left exposed as a ceiling underneath. The channel shape type of edge corrugation also lends itself to efficient stacking of the sheets for shipping. Because of the small amount of displacement of the metal at the edge and of the fact that the edges end in an upturn, leakage of fresh concrete through the side lap joints is not a problem with this type of backing sheet.

Although these vented backing sheets are primarily intended for use in constructing lightweight concrete roof slabs, they are also suitable for other backing purposes such as in the construction of floor slabs using conventional concrete.

Although the longitudinal corrugations 6 shown in the drawings are of the variety having rounded crests, my invention can also be used with any of the other well known shapes of longitudinal corrugations for backing sheets such as the "channel shaped" or "dove-tailed" varieties.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A rectangular metal sheet having longitudinal corrugations parallel to a pair of opposite side edges, the outermost corrugation along each of said pair of side edges defining the terminal side portion of the sheet, each outermost corrugation having an upwardly and outwardly inclined outer side wall terminating as one of said side edges, a bottom wall extending transversely of said side edge as a continuation of the lower portion of the outer side wall to define the base of said respective outermost corrugation and an upwardly and inwardly inclined inner side wall extending as a continuation of said respective bottom wall and to a position at least above a plane containing said side edges, the terminal portion of each outer side wall defining said side edge being deformed alternately along the extent of said side edge and transversely inwardly and outwardly beyond projected continuations of the faces defining the portion of the respective outer side wall immediately below said deformed terminal portion for providing contiguous transverse venting and spacing corrugations, the transverse cross section of each of the outermost corrugations at that portion of said inner side wall in the vicinity of said plane being substantially constant along a straight path for substantially the length of the respective outermost corrugation and defining a surface of said inner side wall free of transverse corrugations, and the distance between the outermost surfaces of each of said outermost corrugations intersected by said plane being at least as large as the distance between the innermost surfaces of the other of said outermost corrugations intersected by said plane for providing venting space between the outer, inner and bottom walls when the outermost corrugations of adjacent sheets are nested.

2. A concrete form comprising a plurality of adjacent metal sheets, each sheet having longitudinal corrugations parallel to a pair of opposite side edges, the outermost corrugation along each of said pair of side edges defining the terminal side portion of the sheet and overlapping and nesting in the outermost corrugation of the adjacent sheet, each outermost corrugation having an upwardly and outwardly inclined outer side wall terminating as one of said side edges, a bottom wall extending transversely of said side edge as a continuation of the lower portion of the outer side wall to define the base of said respective outermost corrugation and an upwardly and inwardly inclined inner side wall extending as a continuation of said respective bottom wall and to a position at least above a plane containing said side edges, the terminal portion of each outer side wall defining said side edge being deformed alternately along the extent of said side edge and transversely inwardly and outwardly beyond projected continuations of the faces defining the portion of the respective outer side wall immediately below said deformed terminal portion for providing contiguous transverse venting and spacing corrugations, the transverse cross section of each of the outermost corrugations at that portion of said inner side wall in the vicinity of said plane being substantially constant along a straight path for substantially the length of the respective outermost corrugation and defining a surface of said inner side wall free of transverse corrugations, and the distance between the outermost surfaces of each of said outermost corrugations intersected by said plane being at least as large as the distance between the innermost surfaces of the other of said outermost corrugations intersected by said plane for providing venting space between the outer, inner and bottom walls of the nested outermost corrugations of adjacent sheets.

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