

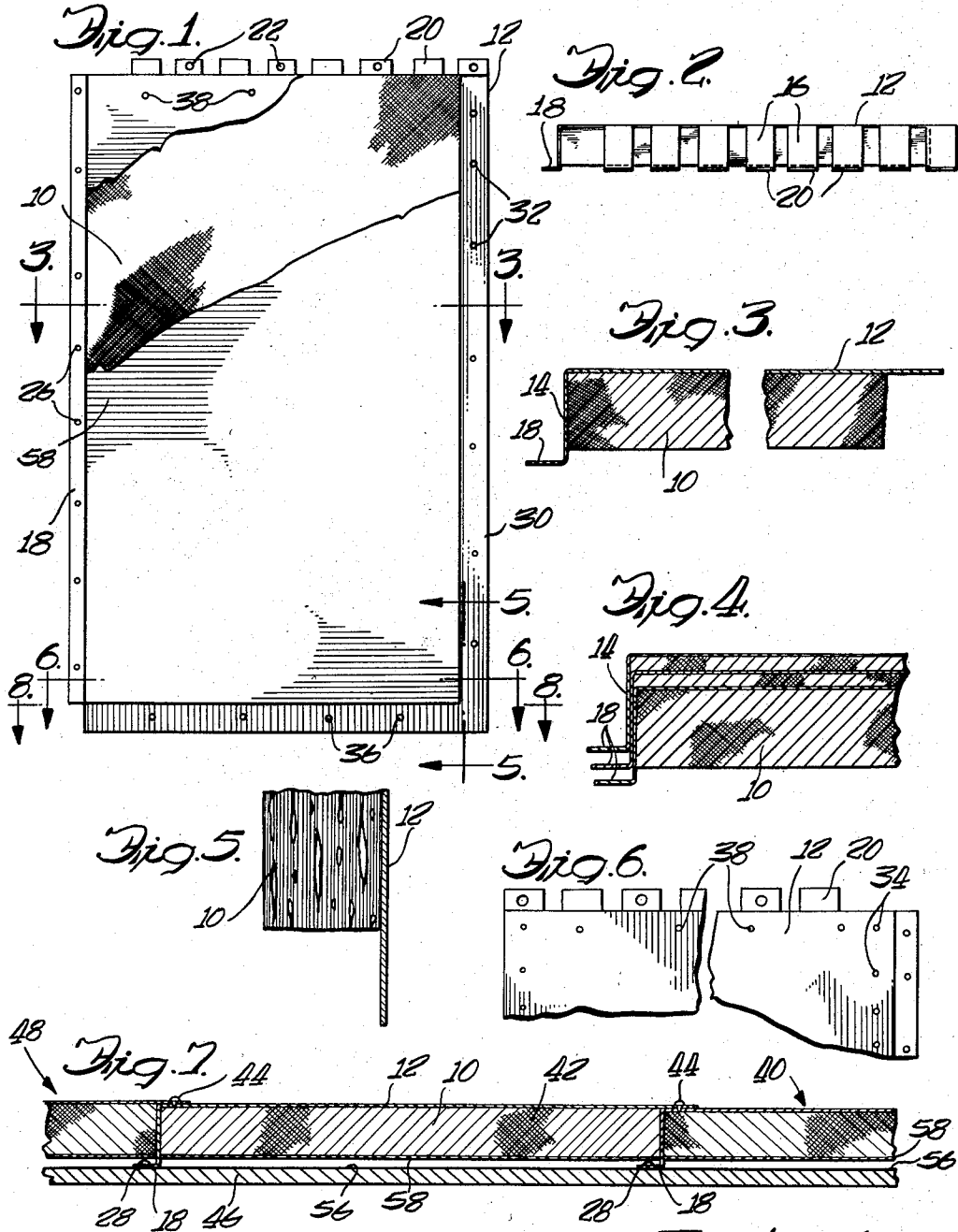
June 16, 1959

E. F. CUTLER
INSULATION

2,890,499

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3 Sheets-Sheet 1



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Fig. 8.

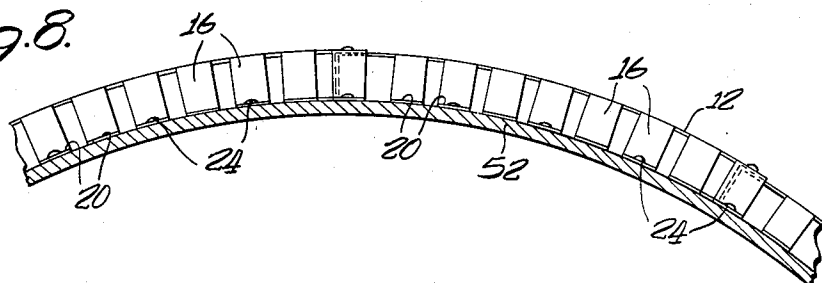


Fig. 10.

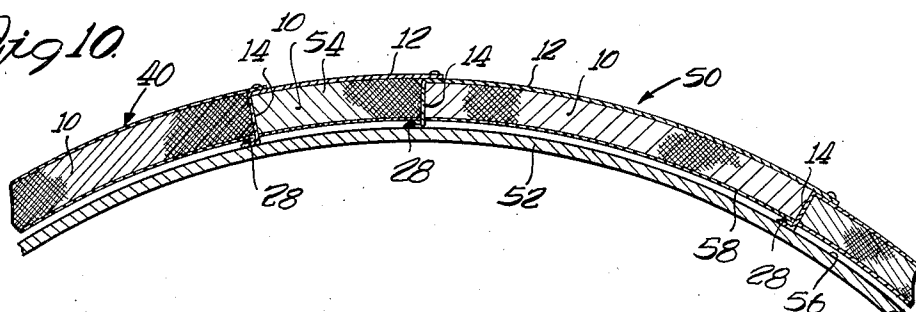
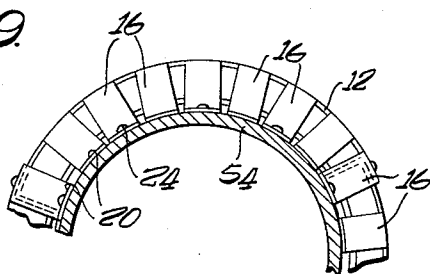


Fig. 9.



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Fig. 11.

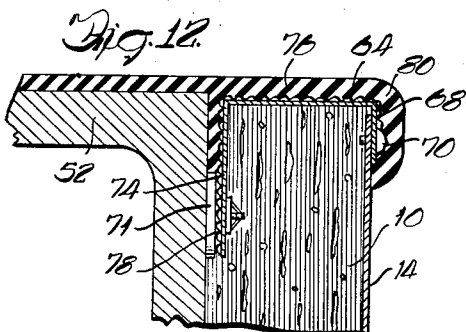
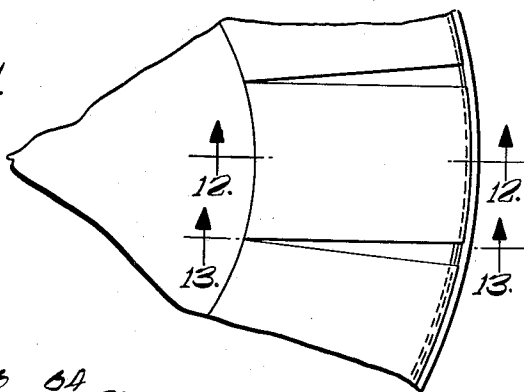


Fig. 13.

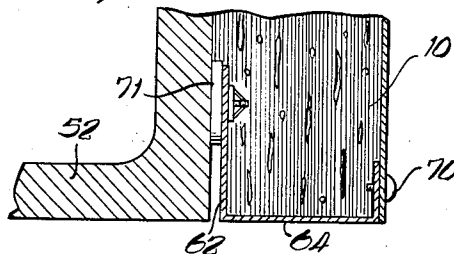


Fig. 15.

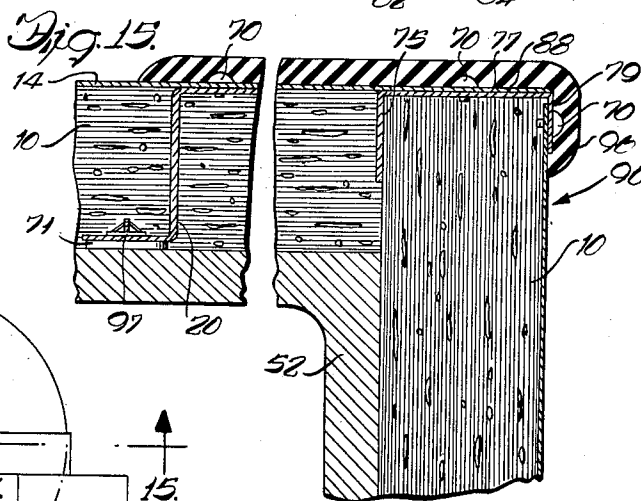
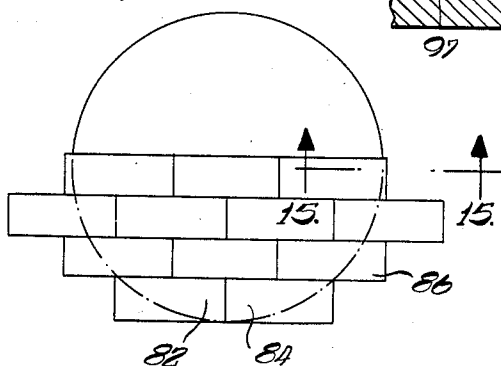


Fig. 14.



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INSULATION

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3 Claims. (Cl. 20—4)

My invention relates to insulation and includes among its objects and advantages an extension of the use of pre-fabricated units. More specifically, the extension is into the field of large storage receptacles such as cylindrical metal tanks and tank cars. In this field many large storage tanks for melted asphalt or other heated materials stand out doors, or at least partly exposed to the weather, without any effective insulation. The cost of the British thermal units thus wasted in a year's time is a serious item of operating expense. Insulation according to the invention represents an expenditure of only a minor fraction of this annual waste.

In the accompanying drawings:

Figure 1 is an elevation of a pre-fabricated panel according to the invention.

Figure 2 is an edge view of the same panel looking down from above. Figure 3 is a section on line 3—3 of Figure 1;

Figure 4 is a similar section of 3 panels nested for packaging;

Figure 5 is a detail section on line 5—5 of Figure 1 showing the edge of the batt in elevation;

Figure 6 is a fragmentary elevation of the reverse side of the panel of Figure 1;

Figure 7 is a section indicating the application of an insulating covering to a flat container wall, with the section line as on line 3—3 of Figure 1;

Figure 8 is a similar section of a curved container wall with the section line as on line 8—8 of Figure 1;

Figure 9 is a section of a container of much smaller radius, also as on line 8—8 of Figure 1; and

Figure 10 is a section as on line 3—3 of Figure 1 indicating the use of part of a panel to complete a circular course.

Figure 11 is a fragmentary top view of an installation, complete except for the final conventional roof covering;

Figure 12 is a radial section on line 12—12 of Figure 11;

Figure 13 is a similar radial section at the bottom, as on line 13—13 of Figure 11;

Figure 14 is a fragmentary plan view of the top of a cylindrical container having a vertical axis, indicating the application of insulation according to the invention to the container top; and

Figure 15 is a section on line 15—15 of Figure 14.

In the embodiment selected to illustrate the invention the batt 10 is of glass wool with the felted fibers lying substantially in the plane of the batt. To secure mechanical strength sufficient to enable the batt to hold its shape, a minor percent of a phenolic resin is incorporated at the time of manufacture. The batt illustrated is 3" thick, 24" wide and 42" long and weighs about one half pound per cubic foot. It contains more than 99% of air spaces. Without serious injury it can be compressed by simple pressure to about one-eighth its normal thickness and when the pressure is removed it will expand to substantially its initial thickness.

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The batt 10 is affixed to a sheet metal backing 12 of aluminum or galvanized sheet steel, as by applying dabs of adhesive on the sheet metal and putting the batt in place and pressing it gently so that its proximate surface is lightly glued to the sheet metal. The backing 12 has an integral flange 14 (see Figures 3 and 4) running longitudinally and normal to the plane of the panel, and one longitudinal edge of batt 10 abuts the flange 14. There is also an interrupted end flange, illustrated as 8 fingers 16, 2" wide with 1" spaces between them. Each finger extends 3" normal to the plane of the panel and one end edge of the batt abuts these fingers.

The flange 14 is stiffened by a narrow flange 18 turned outwardly into the plane of the batt, and this flange constitutes an abutment for positioning the panel on the structure to be insulated and for affixing the panel thereto. The fingers 16 also have end flanges, or ears, 20 turned outwardly into the plane of the panel. When assembled, about every second or third finger 16 is also affixed to the structure to be insulated. In Figure 1 I have illustrated alternate ears 20 perforated at 22 for convenience in affixing them to the structure to be insulated. One desirable mounting is by inserting through the aperture a stud resembling a short nail with both ends pointed, and welding the inner end of the stud to the container wall. Then a spring steelspeed clip is slipped down over the stud to bear against the flange, 18 or 20, and hold it firmly against the container wall. The longitudinal stiffening flange 18 is also apertured at 26 for fastening in the same way, as indicated at 28 in Figures 7 and 10, and each aperture receives a stud for fastening the parts together.

No difficulty is experienced in installation, because the parts to be affixed are quite flexible and, therefore, permit variations in the spotting of the points of attachment.

A panel with one edge already fastened can be fastened along the opposite edge by working through the holes in the sheet metal. Alternatively, the location of the holes can be marked with a tool and the panel flexed back for access to the container wall. This is preferable when the wall is painted or scaly. Another quick and convenient method of attachment is with a template for spotting the parts of attachment.

Along the longitudinal edge opposite the flange 14, the main panel 12 extends about 2" beyond the edge of the batt to define an overlap strip 30 which may be provided with spaced apertures 32. Finally, spaced apertures 34 are provided in the body of panel 12 and positioned to register with the apertures 32 when the panels are juxtaposed as in Figures 7—10.

The body 12 is also provided with fastening apertures 36, and the fastening apertures 38 along the upper edge of the body 12 are spaced to register with the apertures 36.

In applying such panels application may be from the bottom up, one tier, or course, after another. The first panel may be set in position and anchored by affixing the flange 18 only. For purposes of discussion consider this to be the panel 40 at right side of Figure 7. A companion panel 42 is placed beside it at the same level and affixed to the panel 40 at 44, and to the structure 46 to be insulated by means of its own flange 18. A third panel 48 is then juxtaposed to the panel 42 and similarly fastened in place. In this way the bottom tier of paneling proceeds. In the case of a container with flat walls it can terminate along the edge of each flat wall. In a cylindrical container the belt will continue and come back to itself, as indicated in Figure 10, where the last full sized panel is indicated at 50. It will be obvious that in applying such prefabricated panels to build up a

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continuous peripheral belt, the width of an individual panel will rarely, if ever, be an aliquot portion of the periphery of the container. Thus panels 40 and 50 in Figure 10 happen to end with their proximate edges separated by a trifle less than one half panel. To complete the course it is only necessary to cut the batt 54 in Figure 10 longitudinally, which can be done in a jiffy with an ordinary jackknife or the like, and then shear the backing 12 longitudinally with a pair of tin snips. This produces a fractional panel that will exactly fit the opening between panels 50 and 40 and complete the encirclement.

Applying the second and successive courses it is desirable that the vertical joints in the second course should be in the center of the exposed panel below.

It will also be apparent that when the top, or longitudinal end, of the container is reached, the axial length to be covered by the last tier may be less than the length of an individual panel, in which case the panels of the last tier can have their lower ends cut off transversely in the same way that the fractional panel 54 was cut longitudinally.

Because there is no structural stiffening means to hinder flexure of the panel into the curvature indicated in Figures 8, 9, and 10, cylindrical containers down to a very small diameter can be quickly wrapped with tier after tier of such paneling. In Figure 9, the curvature is such that the fingers 16 do not quite touch at their inner ends, but if an even shorter radius is needed, alternate fingers 16 can be snipped off and discarded to provide additional clearance without overlap. It will be obvious that the batt can be flexed in either direction, and needs no alteration to be affixed to the outside of a convex surface or the inside of a concave surface.

For insulating containers that are heated to very high temperature, the batt 10 should be built up with heat resisting resin.

However, decomposition of the resins does not impair the effectiveness of the insulation because the glass wool itself has ample mechanical strength by means of its interlaced fibers to carry its own weight after the resin has become ineffective.

A batt which is installed in slightly compressed condition where it is subjected to vibration may even increase its dimensions under the influence of the vibration after the resin has decomposed. In other words, the presence of the resin is desirable only as a means of effecting the installation conveniently, with a formed batt. After installation its presence is immaterial.

Referring now more specifically to Figure 4 it will be apparent that an indefinite number of identical panels can be nested as indicated in the drawing. A convenient package for shipment calls for about 10 or 12 such panels, nested as in Figure 4, tied and wrapped. When such a package is opened, even after long storage, the batts extend back to substantially full thickness.

The total insulating power can be stepped up materially by painting the container wall with a layer of aluminum paint 56, and affixing to the batt a thin sheet of aluminum foil 58. Because this locates a radiation barrier at the high temperature end of the temperature gradient, much higher working temperatures for the container can be dealt with without decomposing the resin.

The use of such aluminum foil gets greater insulating power with the same batt thickness or identical insulating power with materially less batt thickness. Whether the aluminum foil will replace $\frac{1}{2}$ ", 1" or more than 1" of fiberglass depends on the total temperature drops involved in the particular installation.

Referring to Figures 11-13, the bottom starting strip is a simple sheet metal band 62. It carries fingers 64 and the outer ends of the fingers are turned back up at 68 and affixed to the backing 14 by self-tapping screws 70. Wherever the working temperature permits it, the total insulating effect may be enhanced by interposing

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neoprene washers 71 between the container wall and the sheet metal affixed to it.

At the top, the same identical starting strip is merely turned over to become a finishing strip at 74. Because the top needs weather protection, a strip of flexible roofing felt or burlap 76 is positioned with its inner edge at 78 pinched between the washer 71 and the strip 74. The felt 76 is wide enough to extend out over the fingers 64 and down a little beyond the finger ends 68. Finally, a conventional or suitable covering, indicated as a mastic asphalt cover 80, is put over the container and its lateral insulation, and run down over the edge of the burlap 76 to complete a weather tight seal.

Where such a mastic coating as the covering 80 does not provide a sufficient thermal barrier for the top of a container, it will be obvious that panels according to the invention can be laid on the top also. When the container has the shape of a vertical cylinder this will involve trimming off the edges of the top paneling to fit the contour of the panel. I have indicated starter panels 82 and 84 about half trimmed away and panel 86 in the next row about one-third trimmed away.

At the corner joints, as illustrated in Figure 15, the top batt 10 is cut away three inches shorter than the backing 14 to leave an overhang 88. Then the adjacent side panel 90 is simply laid in place. The corner joint may be completed by a strip 75 duplicating the strip 62 but turned upside down. The fingers 77 and turned-down ends 79 are attached to the adjacent panel backing by sheet metal screws 70. Before and after the top batt is moved into position, the fingers 77 and the loosened end of the batt are embedded with mastic 96, so that after the parts are put together there will be a weather-tight joint all along the corner. Finally, the standard fingers 20 at the inner end of the top batt are affixed to the container itself at 97.

Others may readily adapt the invention for use under various conditions of service by employing one or more of the novel features disclosed, or equivalents thereof.

As at present advised with respect to the apparent scope of my invention, I desire to claim the following subject matter:

1. An insulating unit comprising a sheet metal support consisting of a rectangular sheet metal panel having a stiffening flange along one edge only; a fibrous flexible waterproof insulating batt nested into the angle between said panel and flange, substantially in abutment with said flange; and adhesive means affixing said batt to said panel; said stiffening flange and batt remaining unattached to each other for free relative movement parallel to the plane of said flange; said batt being compressible without injury to a minor fraction of its thickness when not distorted; whereby a plurality of units can be prefabricated and stacked and pressed into small bulk for shipment without injury.

2. A unit according to claim 1 in which said panel has a second flange means along one other second edge only; said second edge being adjacent the edge carrying said stiffening flange.

3. A unit according to claim 2 in which said second flange means is discontinuous and consists of a plurality of narrow spaced fingers; said fingers projecting normal to the plane of the adjacent panel, a distance not less than the thickness of said batt and across the edge of said batt; whereby said spaced fingers are adapted for attachment to a structure supporting the entire unit, but said panel remains flexible into a variety of cylindrical forms having their geometrical elements parallel to said stiffening flange

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