# United States Patent [19]

**Carlson**

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[54] **JACKET FLASHING**


[75] Inventor: **Edwin S. Carlson,** Hammond, Ind.

[73] Assignee: **Union Tank Car Company,** Chicago, Ill.



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[52] **U.S. Cl.** ..... **105/358,** 220/14, 280/5 G, 296/31 P

[51] **Int. Cl.** ..... **B61d 5/00**

[58] **Field of Search** ..... 296/31 P; 220/14; 105/377, 358–360; 280/5 G



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*Primary Examiner*—Gerald M. Forlenza
*Assistant Examiner*—Richard A. Bertsch
*Attorney*—Charles M. Kaplan and Joel E. Siegel



[57] **ABSTRACT**

A jacket flashing assembly to close openings which are required in the outer jacket of an insulated tank car to permit fittings to protrude through the jacket. The jacket flashing assembly includes a resilient disc having an opening in the central area thereof, of somewhat lesser dimension than the outside dimension of the fitting associated therewith, such that distortion of the opening during installation of the assembly about the fitting causes the central area of the disc to elliptically engage the fitting, forming a watershedding joint therebetween. The central area of the disc is bonded to the fitting and the outer periphery of the disc is bonded to the outer jacket.

A similar type flashing is disclosed for use to close the opening in the jacket which receives the bolster pipe and bolster web.


**4 Claims, 5 Drawing Figures**

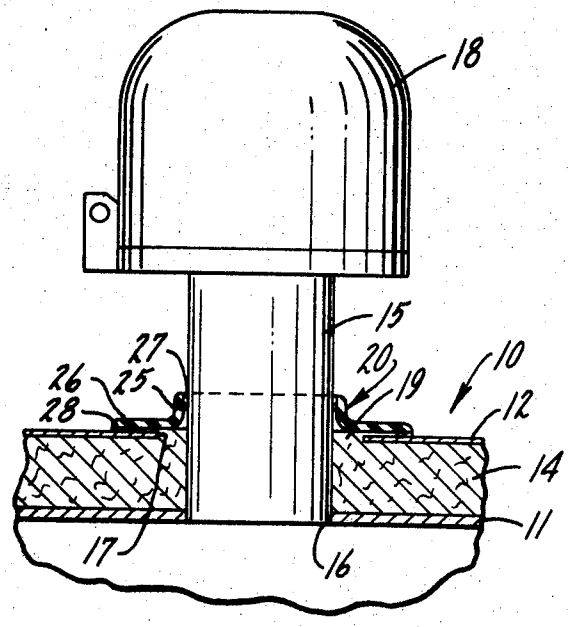


Fig. 1.

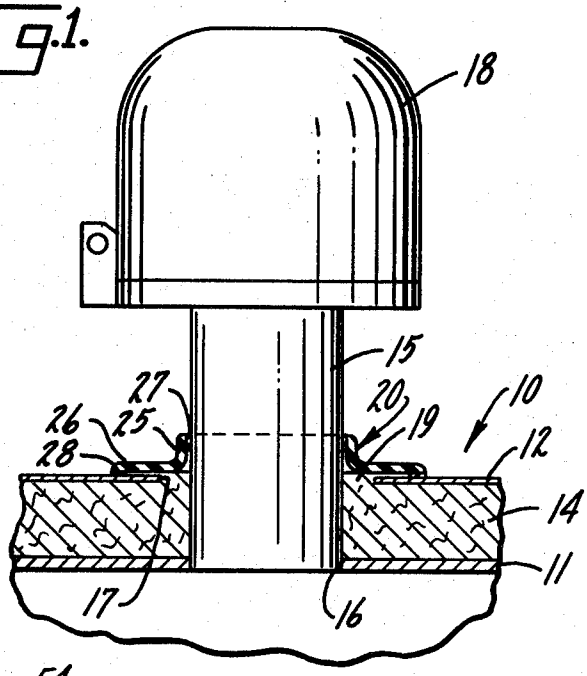
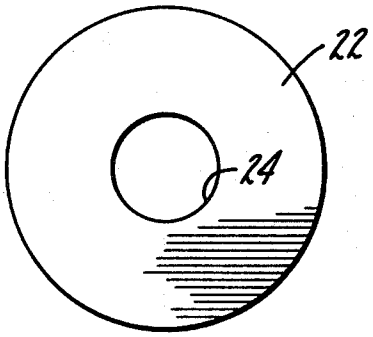



Fig. 2.



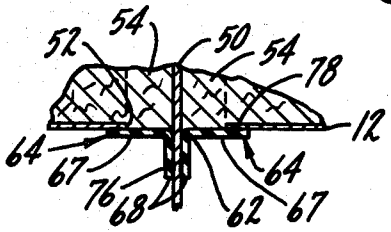
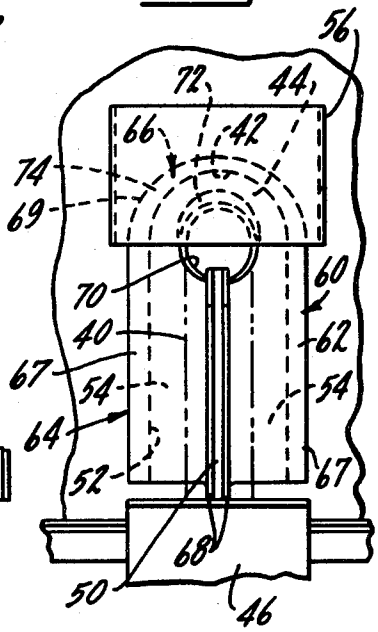




Fig. 5.




Fig. 3.

Fig. 4.




INVENTOR.
Edwin S. Carlson
BY Joel E. Siegel
Attorney.

# JACKET FLASHING

## BACKGROUND OF THE INVENTION

This invention relates to an insulated tank car and more particularly to jacket flashings to close openings which are required in the outer jacket to permit fittings to protrude through the jacket.

The invention is directed to improvements in insulated tank cars that are designed to effect the handling and transportation of commodities which are to be maintained in the tank cars under other than ambient temperature conditions (e.g., under either high or low temperature conditions). Such insulated tank cars generally include an elongated and fully enclosed commodity confining tank shell that is an integral and structurally stable assembly. A pair of railroad car body bolster and stub sill assemblies are joined to the oppositely disposed ends of the tank shell so as to effect the necessary support therefor. The tank shell is preferably confined within an outer jacket or housing that forms an enclosure for and effects the confinement of an insulating layer that substantially entirely surrounds the tank shell except at those few locations whereat the tank is joined to portions of the body bolster and stub sill assemblies. Typically, such a tank car includes fittings such as a manway nozzle, a top unloading nozzle, a safety vent or valve located on the top surface of the car, and a bottom outlet.

These fittings provide communication between the interior of the tank shell and the exterior of the car. They are structurally attached to the tank shell and extend upwardly through openings in the outer jacket. Jacket flashings are provided to close these openings in the jacket. Because of extreme temperature differentials between the tank shell and outer jacket and because the light weight jacket is not rigid and immobile the flashing design must permit relative movement between the tank shell and the outer jacket. Heretofore, a steel flashing, having an opening therein dimensioned slightly larger than the dimensions of the fitting, was affixed to the outer periphery of the fitting by a costly fillet weld while the outer edges were free to slide on the jacket surface. The fit of these free edges usually deteriorates so that air and water frequently enters into the area between the jacket and tank shell causing reduce thermal performance of the insulation and corrosion of the jacket.

The body bolsters include a bolster pipe and a bolster web which extend through openings in the outer jacket and are secured to the tank shell. Similar type jacket flashings, as described above, have heretofore likewise been provided, resulting in the same performance problems.

## SUMMARY OF THE INVENTION

The present invention provides a weather tight jacket flashing assembly to close openings in the outer jacket of an insulated tank car.

The primary object of the present invention is to provide an improved jacket flashing to close openings in the outer jacket of an insulated tank car that is weather tight and minimizes the reduction in thermal performance of the insulation.

Another object is to provide a jacket flashing of the aforedescribed type which is flexible and thus is effective even when an extreme temperature differential exists between the temperature of the tank shell and the temperature of the outer jacket.



A further object is to provide a flexible jacket flashing of the aforedescribed type which is permanently bonded to the outer jacket and the protruding fitting to prevent air and water from entering through the openings in the outer jacket.

A still further object is to provide a flexible jacket flashing of the aforedescribed type which is inexpensive to fabricate and install.

The jacket flashing assembly of the present invention includes a resilient disc having an opening in the central area thereof, of somewhat lesser dimension than the outside dimension of the fitting associated therewith, such that distortion of the opening during installation of the assembly about the fitting causes the central area of the disc to elliptically engage the fitting forming a watershedding joint therebetween. The central area of the disc is bonded to the fitting and the outer periphery of the disc is bonded to the outer jacket. A similar type flashing is disclosed for use to close the opening in the outer jacket which receives the bolster pipe and bolster web.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawings, in which:

FIG. 1 is a cross-sectional view of a portion of a tank car illustrating the jacket flashing assembly of the present invention in conjunction with a top unloading nozzle;

FIG. 2 is a plan view of the jacket flashing prior to installation;

FIG. 3 is a front elevational view of one-half of a tank car bolster construction illustrating a second jacket flashing embodiment associated therewith;

FIG. 4 is a side elevational view of the bolster and jacket flashing of FIG. 3 with certain lines removed for clarity; and

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3.

## DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to the drawing, and particularly FIG. 1, a portion of a broadly conventional insulated railway tank car is illustrated generally at 10. Tank car 10 includes an elongated commodity confining tank shell 11, which is an integral, structurally stable and fully enclosed cylindrical unit that is supported at the opposite ends thereof by conventional body bolster and stub sill assemblies. Tank shell 11 is, in a conventional manner, surrounded by an outer housing or jacket 12 so as to define an insulation receiving and confining region 14 substantially entirely around the external surface of the tank shell. As with previous insulated tank car constructions, the characteristics of the insulation used to fill region 14 are dictated by the nature of the commodity confined within the tank 11 and the temperature conditions that are sought to be maintained in the interval of time between the loading and unloading of the commodity.

Suitable openings are formed in shell 11 and jacket 12 to receive fittings such as a manway nozzle, a bottom outlet, a top unloading nozzle, and a safety vent or

valve. As seen in FIG. 1, a top unloading nozzle 15, having a nozzle cover 18 associated therewith, is received through openings 16 and 17, in shell 11 and jacket 12 respectively. Opening 16 has a diameter substantially equal to the diameter of the outer periphery of nozzle 15 and opening 17 has a diameter greater than the diameter of the outer periphery of nozzle 15 resulting in an annular space 19 between the side surface of nozzle 15 and the periphery of opening 17. Nozzle 15 is rigidly attached to shell 11 at opening 16 in a suitable manner as by welding. Because of extreme temperature differentials between shell 11 and jacket 12 relative movement between shell 11 and jacket 12 results preventing nozzle 15 from being rigidly attached to jacket 12. The jacket flashing assembly 20 of the present invention is directed to this problem.

Jacket flashing assembly 20 includes a disc shape member 22, as seen in FIG. 2, of thin resilient material having an outer diameter greater than the diameter of opening 17. Disc 22 has a round opening 24 therein, which is of less diameter that the outside diameter of nozzle 15 on which the disc is adapted to be positioned. Disc 22 is installed in place closing off annular space 19, by initially positioning disc 22 above nozzle 15 such that opening 24 is in vertical alignment with the periphery of nozzle 15. Disc 22 is than forced downward towards jacket 12 such that distortion of central portion 25 of disc 22 results, causing central portion 25 to elliptically engage the surface of nozzle 15. Disc 22 is forced downward until outer portion 26 is in contact with the upper surface of jacket 12. Central portion 25 is secured to the surface of nozzle 15 engaged thereby in a suitable manner, such as by contact cement 27, and outer portion 26 is secured to the outer surface of jacket 12 in contact therewith, in a suitable manner, such as by contact cement 28.

Jacket flashing assembly 20 results in a watershedding joint between nozzle 15 and jacket 12 preventing water and air from entering region 14 through annular space 19 and thus minimizes the reduction in thermal performance of the insulation adjacent nozzle 15. Disc 22, being of a flexible material, compensates for the differential thermal expansion between shell 11 and jacket 12 without effecting the sealing performance of flashing assembly 20. It will be understood that the present invention contemplates the construction of disc 22 out of various flexible materials known in the art, such as elastomers. Further, other conventional securing means may be substituted for contact cement joints 27 and 28.

FIGS. 3–5 illustrate a section of a body bolster construction 30 of the type disclosed in U.S. Pat. No. 3,467,027, assigned to the same assignee as the present invention. Each body bolster section 30 includes a bolster saddle plate 32 contoured to the radius of curvature of shell 11. Extending along the bottom of shell 11, and also contoured to its radius, is a bottom plate 34. Bottom plate 34 is welded to the bottom of shell 11 along its axis and also to the lower end of the bolster saddle plate 32. Extending from bottom plate 34 is a heavy steel draft sill member 36 having a flange 38 which defines the lower-inner extremity of each bolster section 30.

Extending downwardly from adjacent the upper end of bolster plate 32, and inclined slightly outwardly, is a bolster pipe 40. Bolster pipe 40 extends through an opening 42 in jacket 12 having a dimension greater that the outer dimension of pipe 40 thus resulting in an annular space 44 between pipe 40 and jacket 12. Pipe 40 extends from bolster plate 32 through opening 42 to a bolster base plate 46 which spans the distance between flange 38 and the lower end of pipe 40. Base plate 46 is connected to flange 38 by a weld plate 48. A stiffener plate 49 is welded along its lower edge to base plate 46 and along its upper edge to bolster plate 32. The area between the stiffener plate 49, the bolster pipe 40, and the bolster saddle plate 32, as well as the base plate 46 in each bolster section is occupied by a single thickness steel web 50. Web 50 extends through an elongated opening 52 in jacket 12 which is of a greater dimension that the thickness of web 50 resulting in a pair of elongated slots 54, one on each side of web 50, extending between the stiffener plate 49 and the bolster pipe 40. A bolster flashing 56, secured to jacket 12, is provided as shown in FIGS. 3 and 4.

A second embodiment of the jacket flashing assembly of the present invention, illustrated at 60 in FIGS. 3–5 is provided to close off slots 54 and annular space 44 in jacket 12. Flashing assembly 60 comprises a flashing member 62, of thin resilient material, having a first sealing section 64 to close off slots 54 and a second sealing section 66 to close off annular space 44. Section 64 includes a pair of flat horizontal portions 67 spaced lengthwise from each other by a distance approximately equal to the thickness of web 50. The width of portions 67 is greater than the width of slots 54 and the length of portions 67 is approximately equal to the length of slots 54. A pair of vertical flange portions 68 are formed integral with the adjacent inner edges of portions 67 and extend downward therefrom, as seen in FIG. 5. Section 66 includes a horizontal semicircular disc portion 69 integral with the outer edges of portions 67 of section 64 to form a horse-shoe shaped member therewith. An opening 70, of slightly less diameter than bolster pipe 40, is formed through sections 64 and 66. The dimensions between the periphery of opening 70 and the outer edges of sections 64 and 66 are greater than the dimensions between the outer periphery of pipe 40 and the periphery of opening 42.

Flashing member 62 is installed in place closing off slots 54 and annular space 44 in jacket 12, by positioning member 62 adjacent jacket 12, contoured to its radius, such that portions 67 close off slots 54 and bolster pipe 40 passes through opening 70. Flange portions 68 sandwich web 50 therebetween and since opening 70 is dimensioned less than pipe 40 a portion 72 adjacent the periphery of opening 70 elliptically engages the surface of pipe 40. An outer portion 74 of disc portion 69 and portions 67 close off annular space 44. Flange portions 68 and portion 72 are secured to web 50 and pipe 40 respectively in a suitable manner, such as by contact cement 76, and portions 67 and 74 are secured to the outer surface of jacket 12 in contact therewith, in a suitable manner, such as by contact cement 78. Although member 62 is illustrated and disclosed as being of one piece construction, it is contemplated that member 62 may be divided into a plurality of pieces to facilitate installation.

Jacket flashing assembly 60 results in a watershedding joint between web 50 and bolster pipe 40, of bolster construction 30 and jacket 12 preventing water and air from entering region 14 through slots 54 and annular space 44, and thus minimizes the reduction in thermal performance of the insulation adjacent bolster

construction **30.** Member **62,** being of flexible material, compensates for the differential thermal expansion between shell **11** and jacket **12** without effecting the sealing performance of flashing assembly **60.** It will be understood that the present invention contemplates the construction of member **62** out of various flexible materials known in the art, such as elastomers. Further, other conventional securing means may be substituted for contact cement joints.

While the embodiments described herein are at present considered to be preferred, it will be understood that various modifications and improvements may be made therein and it is intended to cover in the appended claims all such modifications and improvements as fall within the true spirit and scope of the invention.

What is claimed is:

**1.** In an insulated railroad tank car for handling and transporting materials under other than ambient temperature conditions and wherein the tank car includes an elongated and enclosed commodity confining tank shell, an outer jacket that forms an enclosure for and effects the confinement of an insulating layer that substantially surrounds said tank shell, and a pair of railroad car body bolsters and stub sill assemblies for supporting the oppositely disposed ends of said tank shell; an improved weather tight jacket flashing assembly to close openings in said jacket which are required to permit a substantially vertical bolster pipe and a substantially transverse bolster web to protrude through said jacket, comprising:

a. a flashing member of resilient material;

b. said flashing member having a first sealing section and a second sealing section;

c. said first sealing section having a pair of substantially horizontal portions and a pair of substantially vertical portions, said horizontal portions being secured to said outer jacket adjacent the periphery of the opening in said jacket to receive said bolster web, said vertical portions being secured to opposite sides of said bolster web so as to effectively close off said bolster web receiving opening; and

d. said second sealing section having an opening in the central area thereof of somewhat lesser dimension that the outside dimension of said bolster pipe such that distortion of said opening during installation of said second sealing section about said bolster pipe causes said central portion of said second sealing section to elliptically engage said bolster pipe forming a watershedding joint therebetween, said central area being secured to said bolster pipe and the outer periphery of said second section being secured to said outer jacket adjacent the periphery of the opening receiving said bolster pipe.

**2.** The invention of claim **1** wherein said horizontal portions being secured to said outer jacket and said vertical positions being secured to said bolster web by contact cement.

**3.** The invention of claim **1** wherein said central area being secured to said bolster pipe and the outer periphery of said second section being secured to said outer jacket by contact cement.

**4.** The invention of claim **1** wherein said flashing member includes a plurality of separate pieces to facilitate installation.

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