Sept. 18, 1962 J. W. CASTEN 3,054,524

JACKETED VESSEL AND METHOD OF PRODUCING SAME

Filed Jan. 28, 1958

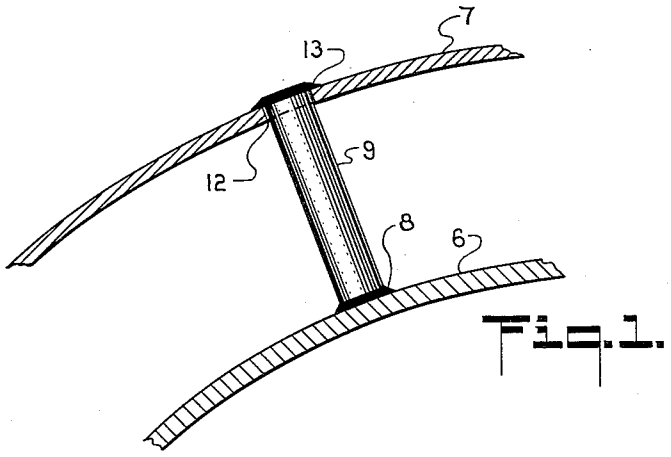



Fig. 1.

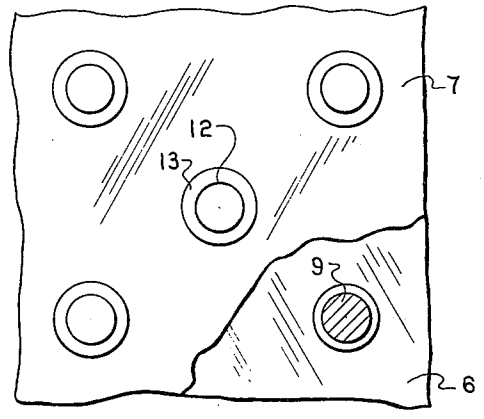



Fig. 2.

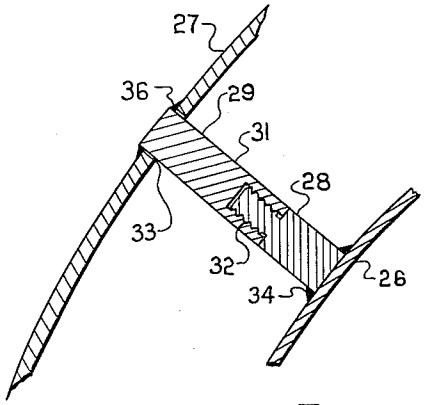



Fig. 3.

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United States Patent Office 3,054,524 Patented Sept. 18, 1962



# 3,054,524
# JACKETED VESSEL AND METHOD OF PRODUCING SAME

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Filed Jan. 28, 1958, Ser. No. 711,730
2 Claims. (Cl. 220—15)

This invention generally relates to the art of construction of tanks or similar vessels, and is more particularly directed towards a jacketed vessel construction and an improved method of securing the jacket to the vessel.

In many instances, tanks or other receptacles are provided with an outer jacket spaced from the wall of the tank in which a product may be contained. In most of these cases, steam or other fluid may be introduced into such space for the purpose of heating the tank contents. Obviously, if steam under pressure is introduced into the space, there must be a proper seal between the tank and jacket so as to prevent any leakage of the pressure fluid therefrom.

Accordingly, it is an object of the present invention to provide a method of properly securing an outer jacket to a tank or like receptacle so as to preclude the possibility of leakage therebetween, particularly at the points of connection, and in which the securing means permits the use of thinner materials for the tank and jacket walls.

A further object of the invention is to provide a tank construction of the above character in which the tank and outer jacket are held together by means of staybolts, and in which such staybolts may be operatively secured to the respective parts after the jacket has been positioned over the tank, thereby providing a great saving of time and avoidance of difficulties in assembling the parts.

Another object of this invention is to provide a method and apparatus of the character described in which a stud is electrically fused to the tank wall and likewise fused to the outer jacket, thereby providing a staybolt between the jacket and tank wall portions.

Still another object of this invention is to provide a method and apparatus of the above character in which the stud may be so constructed that it may be properly welded to the jacket and tank notwithstanding the fact that the jacket and tank may be formed of incompatible materials thereby normally precluding the welding of any single conventional stud element thereto.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

FIGURE 1 is a cross-sectional view of a portion of a jacketed vessel, with a stud shown operatively secured to the walls of the respective members.

FIGURE 2 is an exterior plan view of the structure shown in FIGURE 1.

FIGURE 3 is a cross-sectional view similar to FIGURE 1 but illustrating a modified form of the invention.

As hereinabove explained, in the construction of jacketed tanks, it is frequently difficult to properly secure the tank or receptacle wall to the outer jacket wall, and heretofore a variety of securing means have been utilized. However, most of these prior art types of construction required relatively thick walls in either the gasket, tank, or both so as to insure sufficient rigidity when pressure was introduced between the walls, and considerable difficulty was encountered in assembling the parts.

In accordance with the teachings of the present invention and as illustrated in the drawing, a construction is provided including a receptacle or tank wall **6** in generally parallel spaced relationship to a wall **7** of an outer jacket. As will be hereinafter explained in more detail, the metals of the tank and jacket walls may be of the same or different materials, but for the initial explanation, it may be considered that both of the metals are the same, or at least compatible from a welding standpoint.



Secured to the outer surface of the wall **6**, such as by welding **8**, are a plurality of studs **9** disposed generally normal to the wall and extending through apertures **12** provided in the jacket. In order to secure such studs to the jacket the exposed end of the studs are welded to the outer surface of the jacket as indicated at **13**. It will thus be clear, that by providing a sufficient number of studs along the surface of the wall **6** and properly welding or otherwise securing the same to the jacket wall **7**, the receptacle and jacket are properly and securely affixed together with no danger of leakage, such as when steam under pressure might be introduced in the space between the respective walls.

From an examination of FIGURES 1 and 2 of the drawings, it will be appreciated that a difficult problem arises if the studs **9** were secured to the wall **6** prior to the proper positioning of the shell **7**. Similarly, it would likewise appear that after the jacket was placed over the tank, it would not be possible to mount the studs on the tank wall. Consequently, as an important feature of the invention there is provided a novel method of securing the stud to the wall **6** as well as to the jacket **7**, after the latter has been properly oriented and positioned relative to the tank. Briefly, this method comprises first placing the jacket **7** in its proper spaced position relative to the tank and either then drilling the apertures **12** therethrough or, if desired, the jacket may have such apertures already drilled or punched therein before the jacket is so positioned. Then, a stud **9** is inserted through an aperture **12** and caused to be positioned against the wall **6** and may be secured thereto by utilizing a stud welding process which constitutes no independent part of the instant invention since the same is known to those skilled in the art. However, it might be explained that stud welding utilizes a welding gun which supports and passes an electrical current through the stud, and likewise has a portion engaging the work, in this case the wall **6**. The stud is pulled away a slight distance from the work piece thereby creating an arc between the stud and the work piece and the adjacent portions of the stud and the work piece are melted. After completion of the arcing period, the stud is forced back into the molten pool on the work piece to complete the weld. This form of resistance welding provides a positive and perfect weld. Thus, the stud is electrically fused to the wall **6** by access through the hole in the outer jacket, leaving the distal end of the stud extending through the aperture in the jacket. Then, it is a simple matter to provide a conventional weld **13** so as to secure the stud to the jacket and thereby properly staybolt the jacket to the tank.

The foregoing description defines an adequate process so long as the jacket, tank and stud are of compatible materials, that is, materials or metals that may be welded to each other. However, in many instances the parts may be formed of incompatible materials, such as a zirconium tank, kettle or vessel and a jacket of stainless steel. Since a stainless steel stud could be properly welded to the jacket but not to the zirconium kettle or vessel, it is obvious that the process above described would not be adequate to fulfil the securing or staybolting requirements. Accordingly, as shown in FIGURE 3 of the drawing, the vessel or tank **26** is formed of one metal which is not compatible with the jacket **27**. Consequently, instead of the conventional stud **9**, I provide a two-piece

stud having one section **28** formed of the same or a compatible metal to that of the tank **26** and a second section **29** formed of the same or a compatible metal to that of the jacket **27**. The stud sections may be secured together by means of a threaded extension **31** on one of the sections engageable with a threaded bore **32** on the other section. Then, after the sections have been threadedly secured together, the stud may be introduced through the aperture **33** of the jacket and resistance welded or electrically fused to the liner **26** as indicated at **34** and the outer end of the stud subsequently welded as shown at **36** to the jacket.

From the foregoing description it will be appreciated that the method of staybolting the jacket to the tank or other receptacle may be accomplished in an extremely rapid and efficient manner and will produce a tank construction in which the jacket is uniformly spaced from the vessel at all portions and which likewise insures adequate sealing and strength requirements.

What is claimed is:

1. A tank construction including an inner metal receptacle and an outer metal jacket disposed in spaced parallel relationship to said receptacle, said jacket and said receptacle being formed of incompatible welding metals, said jacket having a plurality of apertures therethrough, a plurality of studs, each of said studs being formed of a pair of sections with the respective sections being formed entirely of compatible metals with the receptacle and jacket respectively, means securing end portions of said sections together in axial alignment, one stud extending through each of said apertures with the other end portion of one section engaging and externally welded to said receptacle and the other end portion of the other section extending through said aperture to adjacent the outer surface of said jacket and being welded thereto.



2. A method of staybolting a jacket of one metal to a vessel formed of an incompatible metal, which comprises forming a stud of two separate sections of different metals with the respective metals of the stud being compatible with the metals of the vessel and jacket, mechanically securing said stud sections together, placing said jacket in parallel spaced relationship to said vessel and providing a plurality of apertures through the jacket, placing said studs through said apertures whereby the respective compatible metals of the stud and vessel will be placed in juxtaposition, electric resistance welding said stud to said vessel, and then welding one section of the other section of said stud to said jacket.

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