HEAT INSULATING BOLTED TANKS

[Diagrams of heat insulating bolted tanks with various labeled parts, including Figs. 5, 6, 7, 8, 9, 10, and 11.

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This invention relates to improvements in heat insulating bolted tanks.

A large number of bolted steel tanks are now in use which it is desirable to cover or protect with heat insulating material. These bolted tanks are usually constructed of overlapped sections of thin steel plate between which sections a gasket is disposed. Usually on the inside of the bolted tank at each joint there is a vertically arranged channel within which the heads of the bolts are disposed. The shanks of the bolts extend through aligned apertures in the steel plate sections and through the gasket, and nuts are applied to the projecting ends of the shanks of the bolts which are disposed on the exterior of the tank. The bolts are consequently arranged in vertical rows at suitably spaced intervals around a tank. It has been customary to apply sections of heat insulating material to the exteriors of the tanks between these vertical rows of bolts and to apply battens of heat insulating material over the vertical rows of bolts which battens overlap the vertical side edges of the sections of heat insulating material. It is desirable to be able to hold the battens, and consequently the sections, of heat insulating material on the tank by means of the bolts so that whenever occasion requires that ingress be afforded into the tank it is merely necessary to detach adjacent battens and the intervening section of heat insulating material to provide a means of ingress.

An object of the present invention is to provide an improved and highly simplified and economical means for attaching the battens of heat insulating material to the tank by means of the bolts. With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claim, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a partial view in side elevation of a bolted tank, illustrating the heat insulating material held in applied position thereon by one form of construction that may be advantageously utilized to hold the battens in place;

Fig. 2 is a horizontal section taken substantially upon the line 2—2 upon Fig. 1;

Fig. 3 is a horizontal section taken substantially upon the line 3—3 upon Fig. 1;

Fig. 4 is a perspective view of the type of nut utilized in that form of construction illustrated in Fig. 3;

Fig. 5 is a view similar to Fig. 3, but illustrating an alternative form of construction that may be employed;

Fig. 6 is a perspective view of a portion of the construction illustrated in Fig. 5;

Fig. 7 is a horizontal section, illustrating still another form of construction that may be employed;

Fig. 8 is a perspective view illustrating a portion of the construction shown in Fig. 7;

Fig. 9 is a perspective view similar to Fig. 8, but illustrating still another alternative form of construction;

Fig. 10 is a horizontal section illustrating still another form of construction that may be advantageously employed;

Fig. 11 is a perspective view illustrating a portion of the construction shown in Fig. 10; and

Fig. 12 is a view showing still another form of the construction.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the conventional bolted tank has its side walls made up of sections of thin steel plate. Two of such adjoining sections are illustrated at 10 and 11 which have overlapping side edges between which there is interposed a gasket 12. Registering holes are formed in the sections 10 and 11 and in the gasket 12 for the reception of bolts 13. These bolts preferably have square heads which are disposed within vertically extending channels 14 that are arranged on the inside of the tank and which hold the heads of the bolts against turning when nuts 15 are tightened on the ends of the bolts which project on the exterior of the tank.

There is a large number of bolted tanks having this general construction that are now in general use. However, in many instances it is highly desirable to cover the exterior of such tanks with a heat insulating material. In so doing, in accordance with the present invention sections of heat insulating material indicated at 16 and 17 are applied to the exteriors of the plates 10 and 11. These sections have vertical side edges that are disposed adjacent, but are slightly spaced from, the vertical rows of bolts 13. Battens 18 of heat insulating material are disposed over the vertical rows of bolts and have their side edges in overlapping relationship to the sections 16 and 17.

The present invention concerns itself with a simple and economical means for attaching the battens 18 in place and consequently holding the sections 16 and 17 in applied position. To this end, the form of construction illustrated in Figs. 3 and 4 consists of applying to certain of the nuts 19 bendable steel straps 20 and 21. Certain of the nuts 15 on the bolted tank are removed and replaced by the nuts 19 and when the battens 18 are applied, holes 22 are punched or are otherwise formed in the battens. The bendable steel straps 20 and 21 are to be extended through the battens and after having been thus extended, as indicated by dotted lines on Fig. 3, the projecting portions of the straps are bent laterally. These portions consequently hold the battens in applied position and hold them pressed against the sections 16 and 17 so that the sections are also held in applied position. Whenever it is desired to remove a section of insulating material, such as for example the section 17, in order to provide ingress into the tank, the laterally bent portions of the bendable straps 20 and 21 on the nuts 19 which hold two adjacent battens in place may be straightened thus permitting removal of the batten and consequently the intervening section 17. It will thus be appreciated that in order to apply heat insulating material to a conventional bolted tank it is merely necessary to replace certain of the nuts 15 with nuts 19 and their attached straps 20 and 21. The straps 20 and 21 may be attached to the nuts in any preferred manner, such as for example by welding indicated at 23.

In the construction illustrated in Figs. 5 and 6, instead of attaching straps to the sides of a nut a bendable U-shaped steel strap is provided having parallel arms 24 and 25 that are connected together by an aperture portion 26. In this form of construction certain of the nuts 15 can be removed from their respective bolts.
and the apertured portion 26 can be applied over the shanks of such bolts. The nuts 15 can then be reapplied and the batten 18 can be applied over the arms 24 and 25, as is illustrated in dotted lines on Fig. 3. The projecting portions of the arms 24 and 25 can then be bent laterally to hold the batten 18 in place.

In the construction shown in Figs. 7 and 8, the attaching means consists of an angular section 27 formed of bendable strap metal. One arm of this angular section is apertured as at 28 so that it may be slipped over certain of the bolts 13 and the nut 15 re-applied. The other or long arm is longitudinally split as indicated at 29. When the batten 18 is applied only a single aperture 30 need be formed therein to accommodate each long arm of each angular member. When the batten has been applied the two sections 31 and 32 on opposite sides of the split 29 can be bent laterally in opposite directions to hold the batten in place.

The form of construction illustrated in Fig. 9 differs from the form of construction shown in Figs. 7 and 8 by having the arm 33 welded or otherwise secured to the side of a replacing nut 34 such as by welds 35. This arm is longitudinally split as indicated at 36 to provide two bendable arms 37 and 38. In the use of this construction certain of the nuts 15 are replaced by the nut 34, and when the batten 18 is applied the two arms 37 and 38 are bent laterally in opposite directions.

In the form of construction illustrated in Figs. 10 and 11, certain of the nuts 15 are replaced by nuts 39 which have studs 40 welded or otherwise secured to the side thereof. In using this form of construction, when the batten 18 is applied apertures 41 are punched or are otherwise formed therein to receive the studs 40. Apertured plates 42 having apertures 43 which receive the studs are applied against the outer sides of the battens 18 and nuts 44 which are applicable to the studs are tightened against the outer sides of the plates.

In the construction shown in Fig. 12 the attaching means is in the form of an eye-bolt, the head of which is bent laterally so that the eye is receivable over the bolt of the tank and is capable of being retained thereon by the nut. The threaded shank of the eye-bolt may have a nut, such as the nut 44, applied thereto and will function in the same manner as the construction shown in Fig. 10. In this form of construction substantially the only difference between the construction and that shown in Fig. 10 is that the stud or shank, instead of being welded directly to the nut 39, is equipped with a laterally bent eye which can be retained on the bolt of the tank by the nut 39.

In the constructions shown in Figs. 3, 5 and 7, it is usually desirable to interpose between the insulation and the laterally bent portions of the retaining means suitable washers as illustrated.

In all of the above described constructions it will be appreciated that a relative simple and economical construction is provided which enables the balance of insulating material to be attached to the tank by constructions which are held in place by the bolts of the tank. In some instances, certain nuts of the bolts of the tank must be removed and replaced. In other instances such nuts are merely removed to permit of the application of the attaching structure, after which the same nuts are again applied to their respective bolts. In all forms of construction, although the battens are firmly held in positions, it is possible to remove the battens whenever occasion requires the removal of one or more sections of heat insulating material to provide ingress to the tank.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

1 claim:  
In a tank, plates forming the body of the tank and connected by lap joints, bolts extending through lapping portions of the plates at the joints, sheets of insulation overlying the exterior of said plates and having parallel edges extending along opposite sides of the joints but terminating short thereof, battens of insulation bridging the gaps between said edges, angular eye bolts, each eye-bolt having a single eye loosely positioned over a bolt and having a threaded shank extended outwardly along the side of the bolt and through the batten in spaced relation to but approximately parallel to the axis of the bolt, a nut on each bolt for tightening the eye of the eye-bolt against the joint and tightening the joint, and nuts on the threaded shanks for tightening the battens in place.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>438,522</td>
<td>Brennan</td>
<td>Oct. 14, 1890</td>
</tr>
<tr>
<td>1,076,382</td>
<td>Maloney</td>
<td>Oct. 21, 1913</td>
</tr>
<tr>
<td>1,508,462</td>
<td>Mayer</td>
<td>Sept. 16, 1924</td>
</tr>
<tr>
<td>1,674,842</td>
<td>Sparks</td>
<td>June 26, 1928</td>
</tr>
<tr>
<td>2,112,594</td>
<td>Double</td>
<td>Mar. 29, 1938</td>
</tr>
<tr>
<td>2,263,943</td>
<td>Barnes</td>
<td>Nov. 25, 1941</td>
</tr>
<tr>
<td>2,691,458</td>
<td>Elswitde</td>
<td>Oct. 12, 1954</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>19,404</td>
<td>Great Britain</td>
<td>of 1899</td>
</tr>
<tr>
<td>490,095</td>
<td>Germany</td>
<td>Jan. 25, 1930</td>
</tr>
</tbody>
</table>