April 13, 1926. 1,580,413

L. E. COVER

HEAT INSULATION FOR CONTAINERS

Filed Oct. 9, 1924 5 Sheets-Sheet 1

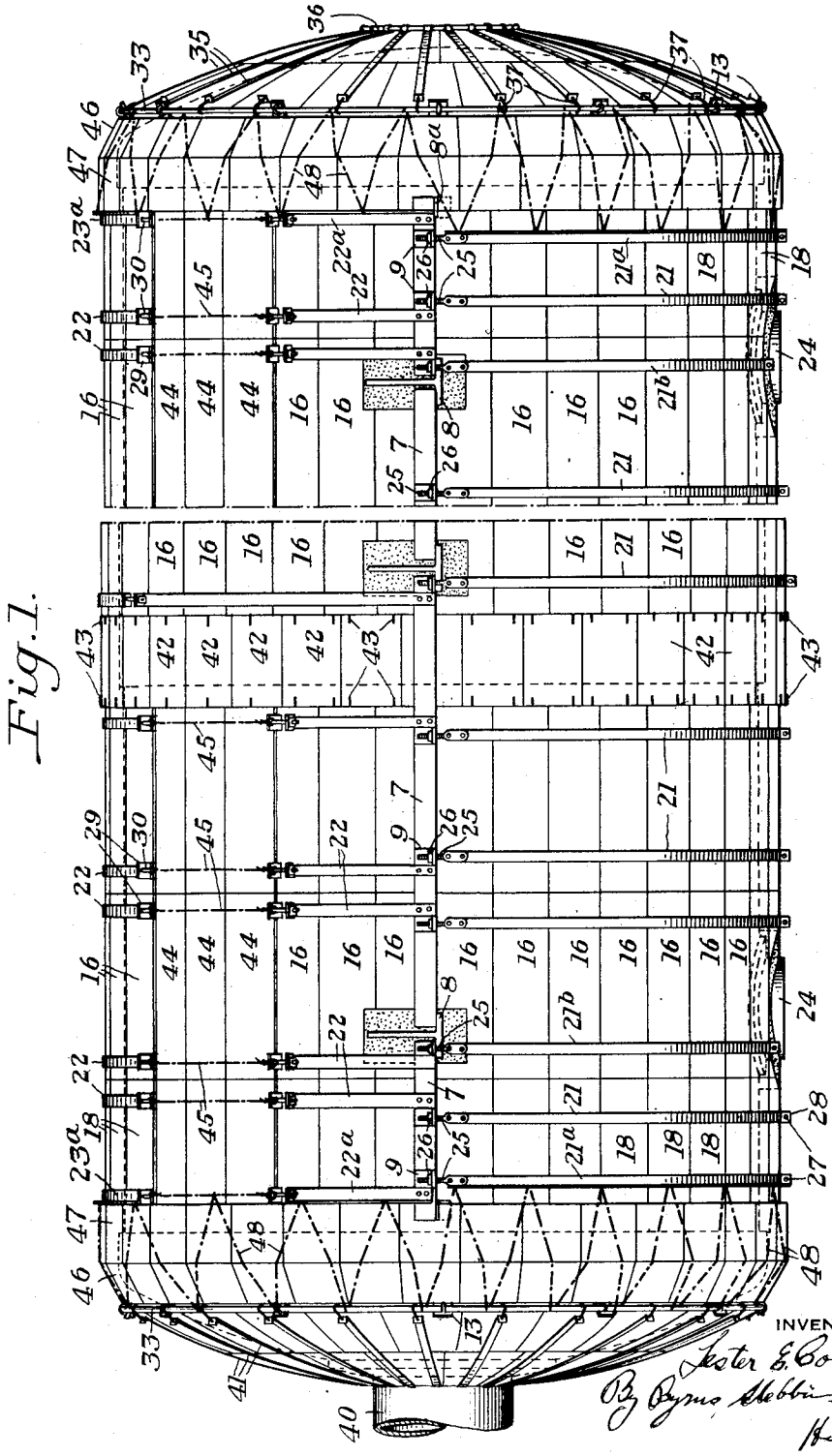


Fig. 1.

INVENTOR
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By Byrne Stebbins & Bennett
His Attys.

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L. E. COVER

HEAT INSULATION FOR CONTAINERS

Filed Oct. 9, 1924 5 Sheets-Sheet 2

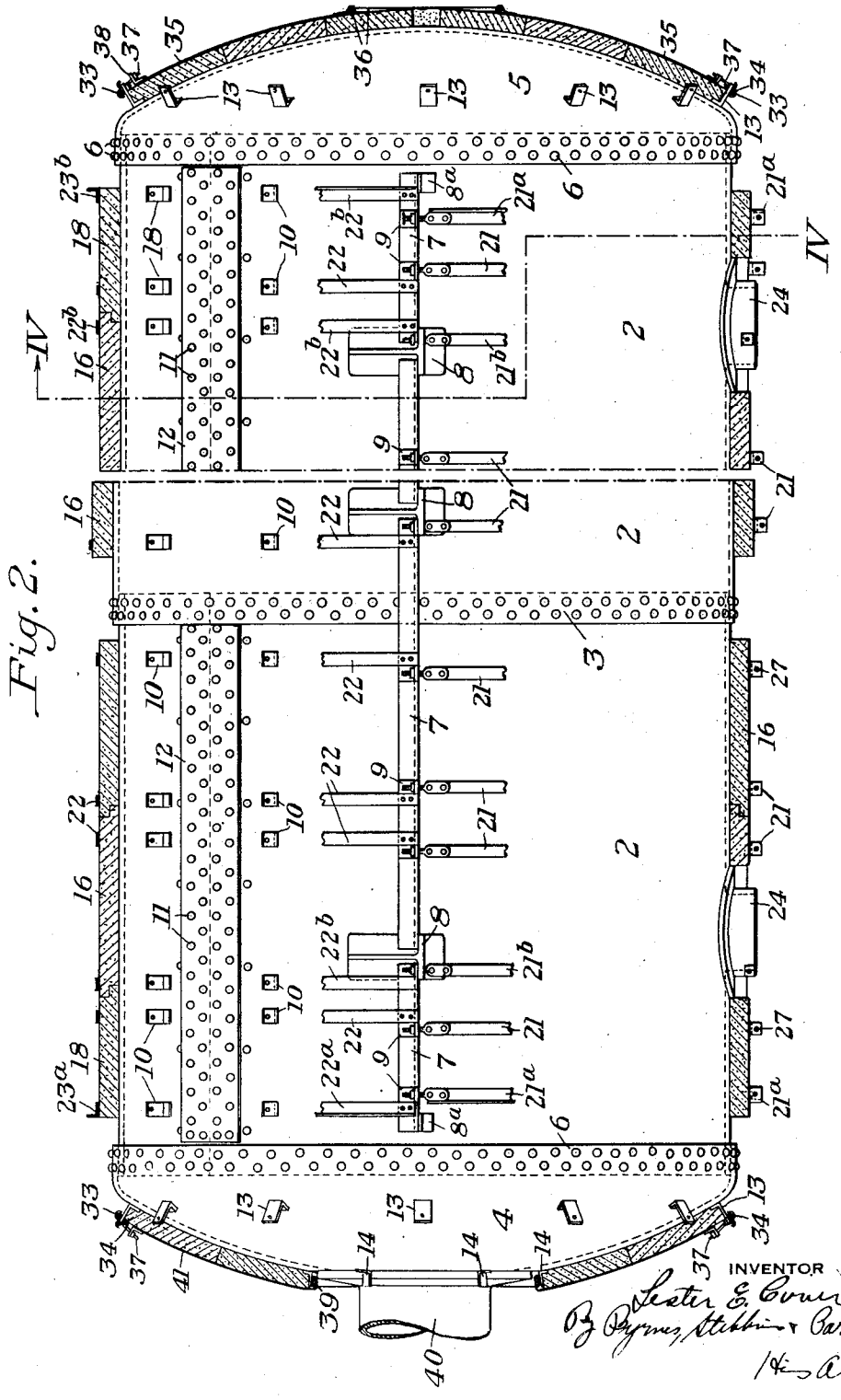


Fig. 2.

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April 13 , 1926. 1,580,413

L. E. COVER

HEAT INSULATION FOR CONTAINERS

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Fig. 3.

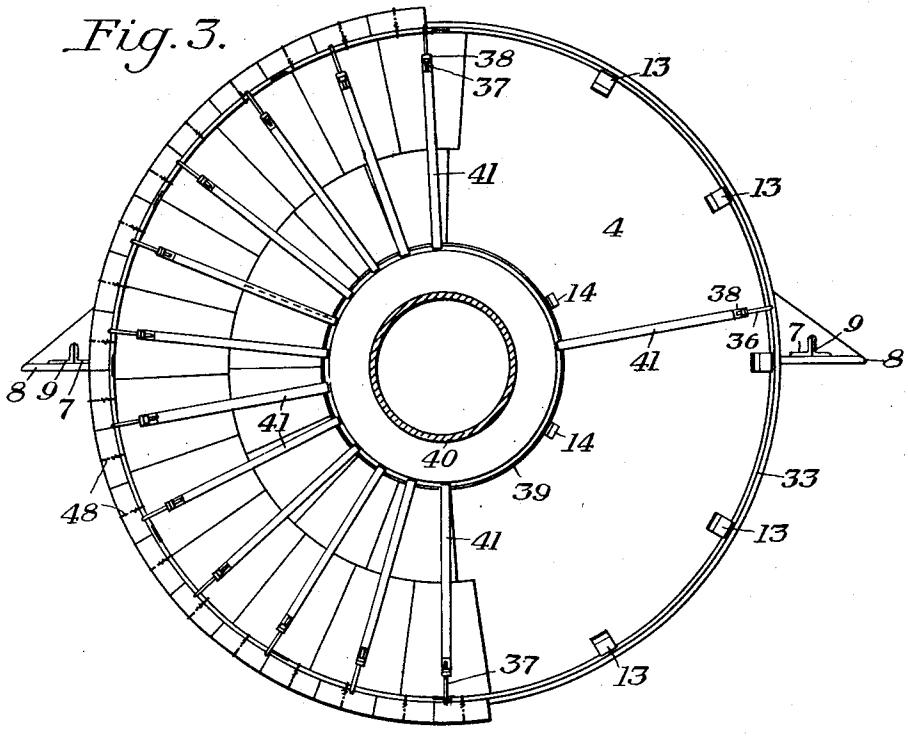
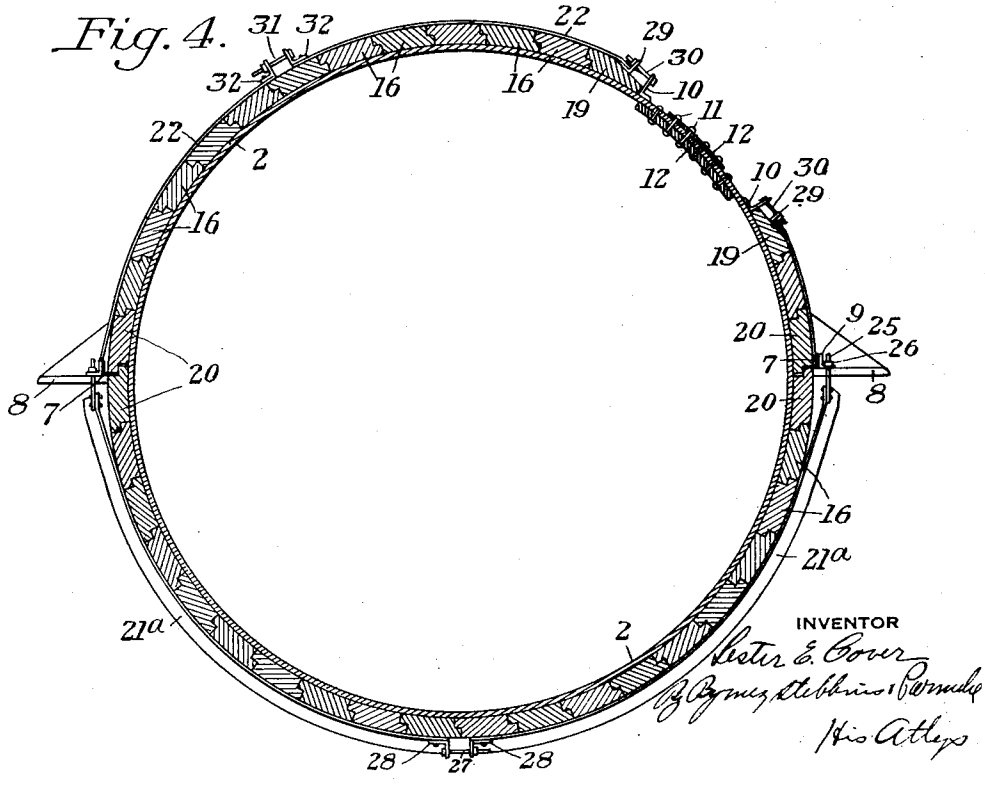


Fig. 4.



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April 13 , 1926. 1,580,413

L. E. COVER

HEAT INSULATION FOR CONTAINERS

Filed Oct. 9, 1924 5 Sheets-Sheet 4

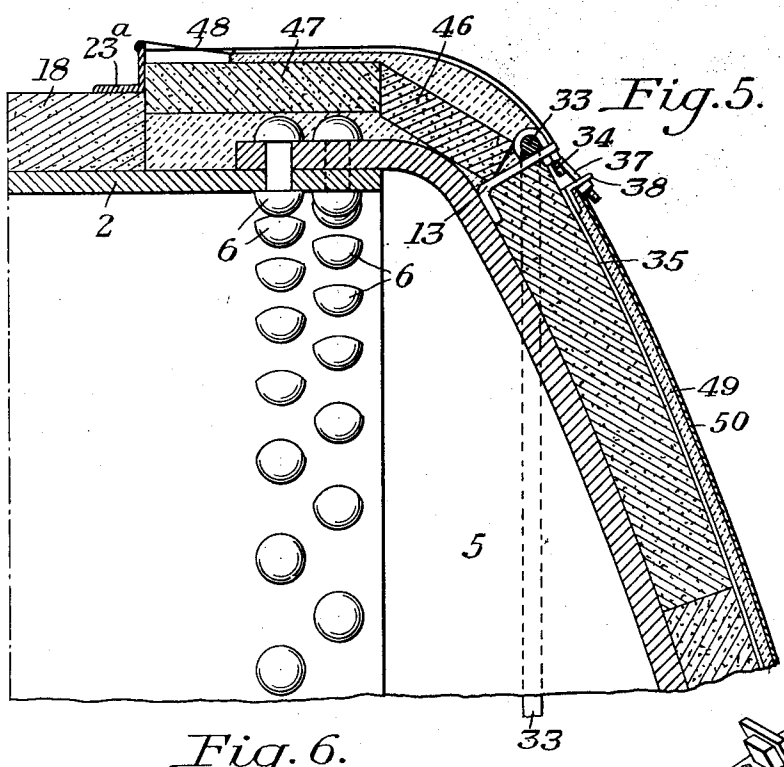


Fig. 5.

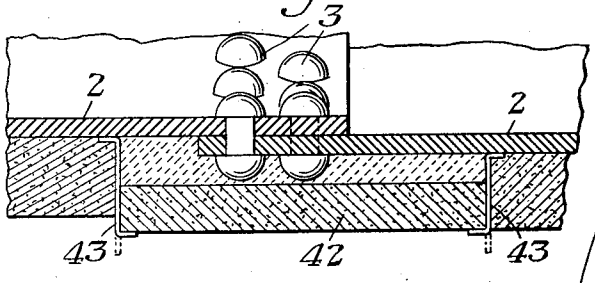


Fig. 6.

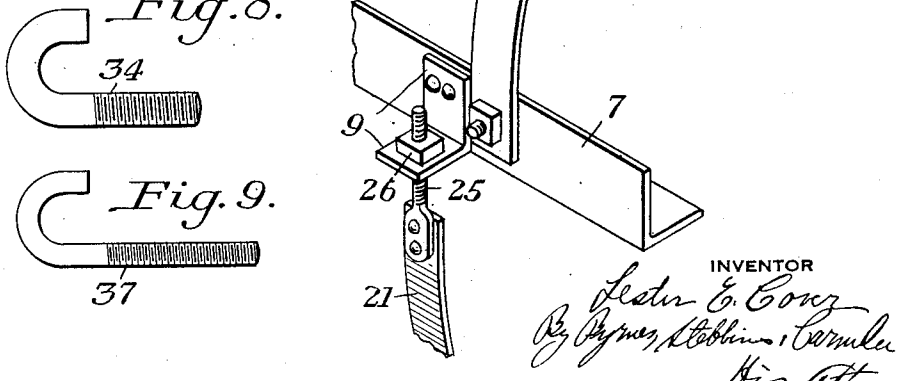


Fig. 7.

Fig. 8.

Fig. 9.

INVENTOR

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His Attys

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L. E. COVER

HEAT INSULATION FOR CONTAINERS

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Fig. 10.

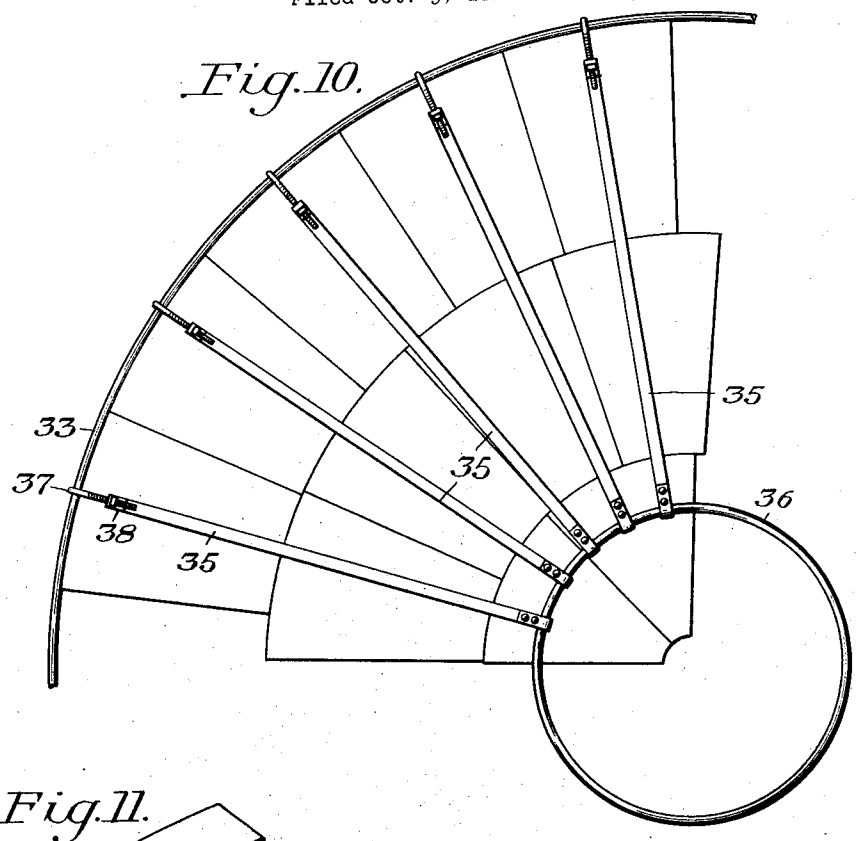


Fig. 11.

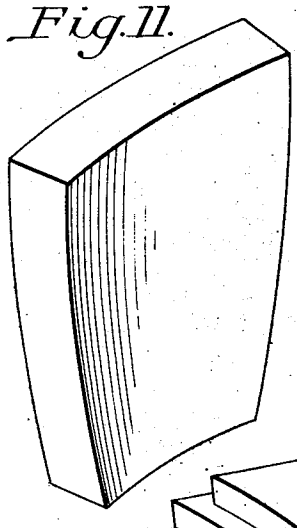


Fig. 13.

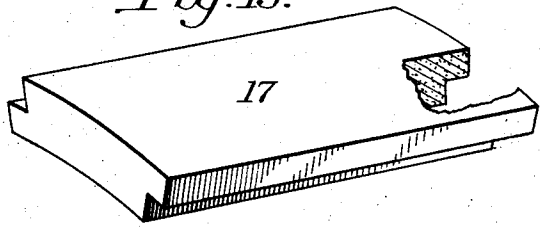
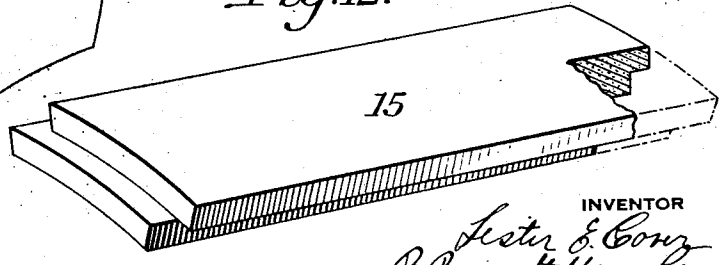


Fig. 12.



INVENTOR

Lester E. Cover

By Bymes, Stebbins & Cornish

His Attys

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Patented Apr. 13, 1926. 1,580,413

UNITED STATES PATENT OFFICE.

LESTER E. COVER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO ARMSTRONG CORK COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

HEAT INSULATION FOR CONTAINERS.

Application filed October 9, 1924. Serial No. 742,601.

To all whom it may concern:

Be it known that I, LESTER E. COVER, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Heat Insulation for Containers, of which the following is a full, clear, and exact description.

The present invention relates to the insulation of containers for the purpose of protecting them against loss of heat, and particularly to the insulation of pressure stills, soaking drums and bubble towers employed in oil refineries.

The purpose of the invention is to provide an insulation construction, particularly adapted for containers of the character mentioned, that fits structurally; stands up under high temperatures, vibration and exposure; that is applied in a single layer; that allows ready access to rivet courses and that can be re-used with practically no loss.

The usual practice in insulating pressure stills and similar containers is to cover the body and heads of the still drum, including rivet courses, with a double layer of insulating material held in place by a system of wiring which permits the insulating material to sag down as the wires stretch, due to the weight of the insulating material and the expansion caused by heat. The inner layer is formed of a material having good heat resisting qualities but poor insulating qualities and serves as a protection for the outer layer which is formed of material which has good insulating qualities but poor heating resisting qualities. This method is cumbersome, laborious and expensive and necessitates cutting into and more or less damaging the main body of the insulation whenever it is desired to get at the rivets for caulking or repairs. Moreover, the insulation applied by this and other known methods cannot be taken off except when broken up and used as a cement. Usually it is a total loss.

By the method of the present invention, the insulation is applied in a single layer and is formed of blocks molded to fit the contour of the drum. Each block has its place in some one course on front or rear head, on body rings or over a rivet space. These blocks are constructed from a material which combines high heat insulating characteristics with ability to withstand high temperatures without deterioration. The blocks are not bent or broken in order to conform them to the shape of the container to which they are applied but are molded to permit perfect contact with the metal.

An important feature of the invention is that the rivet spaces and welded joints are not insulated with the main portions of the heads and body of the container but are left open until leaks have had a chance to show and to be caulked. Cement is then put in flush with the tops of the rivets and courses of blocks are fitted between the main blocks on both sides and held in place by simple means which permits individual blocks to be readily removed at any time without disturbing the main body of the insulation.

The main courses of blocks over the heads and body of the container are held in place by means of metal bands having take-up bolts secured to their ends for cooperation with angle clips welded to the body and heads. In applying these main courses, the bands are secured to the angle clips so as to permit the blocks to be easily slipped into place under them and then the loose bands are tightened up, thereby drawing the insulation as a unit firmly into place. The blocks in the main courses over the body of the container have rabbeted edges providing overlapped joints both longitudinally and circumferentially of the container, so that no possible amount of circumferential or longitudinal expansion of the container can open up the joints. The longer circumferential bands are formed in two parts connected by take-up bolts and angle clips which, in case of expansion of the bands due to heat, serve to automatically tighten up the bands so as to always keep the insulation firmly held against the body of the container.

With this method of insulation, when a still drum or other container is no longer fit for service, the insulation can be easily removed from the same by first removing the outside weatherproofing and cement finish covering the insulation, slacking off the take-up bolts to loosen the bands and then slipping out the blocks from under the bands. With reasonable care in handling, practically the entire insulation will be undamaged and can be used again for insulating a similar container.

In the accompanying drawings, wherein I

have illustrated my invention as applied to the insulation of a horizontal pressure still:

Figure 1 is a side elevation of the still, shown broken away intermediate its ends, protected with a layer of insulating material in accordance with a preferred embodiment of the invention;

Figure 2 is a view similar to Figure 1, but showing the insulation in section over the main portions of the heads any body of the container, some of the metal bands being shown broken away and the rivet courses being left uncovered;

Figure 3 is a view looking at the front head of the still drum and showing a portion of the insulation in place on the head;

Figure 4 is a transverse section on the line IV—IV of Figure 2;

Figure 5 is a detail sectional view on a larger scale through a head of the drum, illustrating the method of insulating the circumferential rows of rivets which secure the head to the body of the drum;

Figure 6 is a detail sectional view, illustrating the method of insulating the circumferential rows of rivets which secure two of the body rings together;

Figure 7 is a detail view, on a larger scale, illustrating the construction of the metal bands;

Figure 8 is a detail view of one of the hook bolts employed for holding the main head rings to the angle clips;

Figure 9 is a detail view of one of the hook bolts used for securing to the main head rings the metal bands which hold the head insulating blocks in position;

Figure 10 is a detail view illustrating the construction for holding the insulating blocks on the rear head;

Figure 11 is a perspective view of one of the head insulating blocks;

Figure 12 is a perspective view, partly broken away, showing the type of block used in the intermediate courses over the body of the container; and

Figure 13 is a view similar to Figure 12, showing the type of block used in the end courses over the body of the container.

Referring to Figure 2, the reference numeral 2 designates the rings which form the body of the container and are secured together by circumferential rows of rivets 3. The front and rear heads 4 and 5 of the drum are secured to the body thereof by the end circumferential rows of rivets 6. As is usual in stills of this character, the body of the drum is provided with longitudinally extending angles 7 at diametrically opposite sides of the drum which are fastened to the brackets 8 by which the drum is supported (Figures 1, 2, 3 and 4) and to bracket 8[a] adjacent the end of the body. Welded to these longitudinally extending angles are angle clips 9. Other angle clips 10 are welded to the body of the drum adjacent to and on opposite sides of the longitudinally extending rows of rivets 11 which extend through the butt straps 12. Still other angle clips 13 are welded to each head of the drum for holding the main head rings and angle clips 14 are welded to the front head for holding the inner head ring.

Figure 12 illustrates the type of insulating block 15 which is used in the intermediate circumferential courses 16 over the body of the drum. These blocks are formed straight longitudinally and curved transversely so as to make an accurate fit with the metal of the body of the drum. The blocks have rabbeted longitudinal and end edges whereby the longitudinal joints between the individual blocks in a circumferential course and the circumferential joints between circumferential courses are overlapped, as will be apparent by reference to Figures 2 and 4. Figure 13 illustrates the type of block 17 which is employed for the end courses 18 over the body of the drum. These blocks differ from the blocks 15 in that they may be formed somewhat shorter and are not rabbeted at the end which lies adjacent the end of the body of the drum. It will be seen by reference to Figure 4 that the blocks 19 of the circumferential courses 16 and 18 which lie adjacent the angle clips 10 are not rabbeted at the longitudinal edges thereof which lie adjacent said angle clips. Furthermore, the blocks 20 of said courses which come adjacent the longitudinal angles 7 may or may not have their longitudinal edges adjacent said angles rabbeted. In the construction shown, such edges are rabbetted to provide an overlapping joint at this point.

The courses of blocks 16 and 18 are held to the body of the drum by flat metal bands 21, 22 and 23 and by angle bands 21[a], 22[a] and 23[a] at the ends of the body of the drum. In the construction shown, the longitudinal rows of rivets 11 and butt straps 12 are at the upper side of the drum so that the lower half of the body of the drum is not interrupted by a longitudinal seam. However, the nipples 24 to which the circulation pipes are connected come at the lower side of the drum and the bands 21[b] which come adjacent these rings may be fastened to said rings or may pass on opposite sides of the same. The bands 21, 21[a] and 21[b] are provided at their ends with take-up bolts 25 which pass through openings in the angle clips 9 and have nuts 26 associated therewith for adjustably securing the bands to the angle clips. In applying the insulation to the lower half of the body of the drum, the bands 21, 21[a] and 21[b] are bolted to the angle clips 9 so as to hang lower than when in final position. The blocks are inserted under the bands at the bottom of the drum

and are built up around the drum until the angles 7 are reached. The bands are then tightened up by means of the take-up bolts 25 and nuts 26, thereby drawing the insulation firmly into place against the body of the drum. The bands 21 and 21ª are made in two parts connected by take-up bolts 27 which cooperate with angle clips 28 welded or otherwise secured to the ends of the parts of the bands. These angle clips and take-up bolts form a yielding connection between the parts of the bands whereby when the bands tend to expand under heat and pressure these connections serve to automatically contract the bands and hold the insulation firmly in place. These take-up bolts 27 also afford means whereby the bands may be readily adjusted independently of the main take-up bolts 25 and nuts 26. The bands 22, 22ª, 23 and 23ª are riveted or bolted, or otherwise secured, at one end to the longitudinal angles 7 and have angle clips 29 secured to the other end thereof. Take-up bolts 30 extend through the angle clips 29 and the angle clips 10. The insulation for the upper half of the drum is applied under the bands 22, 22ª, 23 and 23ª in substantially the same manner as the insulation for the lower half of the drum. The bands 22 and 22ª are also made in two parts connected by take-up bolts 31 and angle clips 32. It will be noted that in applying the insulation to the body of the drum as described, the circumferential rows of rivets 3 and 6 and the longitudinal rows of rivets 11 are left uncovered. These rows of rivets remain uncovered a sufficient length of time, which may be a month or more, for leaks at the rivets to develop and be caulked. Then these rows of rivets will be insulated, as will be hereinafter explained.

Secured to the angle clips 13 of each head is a main head ring 33. These head rings are securely fastened to the angle clips 13 by means of hook bolts 34 of the character illustrated in Figure 8. The heads are insulated by blocks of the type illustrated in Figure 11 and which are formed as segments of a hollow sphere in case the drum heads have spherical outer surfaces as shown. In any case, the blocks are moulded to accurately fit the surfaces of the heads. The blocks which cover the rear head 5 are held in position by means of metal bands 35 (Figure 10), which are secured at one end to an inner ring 36, which is a floating ring, and at the other end to the main head ring 33. The bands are secured to the main head ring by hook bolts 37 of the character shown in detail in Figure 9. The hook bolts are hooked over the band and extend through angle clips 38 secured to one end of the bands 35. In applying the blocks to the rear head, several of the bands are connected to the floating ring 36 and to the main ring 33, and then the innermost blocks are applied under the bands and then the blocks built around these inner blocks and the bands applied until the head is completely covered. The bands 35 are then tightened up by means of the hook bolts 37 to firmly bind the insulation against the head.

The front head 4 has an inner fixed ring 39 secured to the angle clips 14 (Figure 3). This ring extends around the manhole pipe 40. Bands 41 are connected at one end to the ring 38 and at the other end to the main head ring 33 by means of the hook bolts 37. The blocks are applied to the front head in a similar manner as to the rear head.

After the circumferential and longitudinal rows of rivets have been caulked, cement is applied to the rivet spaces to cover the heads of the rivets, as illustrated in Figures 5 and 6. The circumferential rivet spaces intermediate the ends of the drum are insulated by blocks 42 bedded in the cement and held in position by removable fasteners. As illustrated in Figure 6, these fasteners may be in the from of round wire clips 43 bent at their inner ends to hook under the ends of the blocks of the adjacent courses 16 and bent at their outer ends in the opposite direction to engage over the blocks 42. With this construction any individual block 41 can be readily removed by simply straightening out the outer ends of the clips 43. Any other suitable fastening means may be employed for securing these blocks in place.

Over the longitudinal rows of rivets 11 and butt straps 12 are placed blocks 44 similar to the blocks of the courses 16 and 18 but of less thickness than such blocks and having straight edges. The blocks 44 may be held in place by means of wires 45 extending across the same and fastened at their ends to the angle clips 10. The blocks 44 are bedded in the cement which covers the rows of rivets 11 and outer butt straps 12 and they may be individually removed by simply cutting the wires 45 which hold them in place.

The circumferential rows of rivets 6 which secure the heads to the body of the drum may be insulated by means of special blocks 26 and 27 which are bedded in the cement covering the rivets and which are held in place by wires 48 which may be laced around the main head rings 33 and through openings in the angle bands 21ª, 22ª and 23ª.

It will be understood that all of the insulating blocks will be covered with an outer layer of cement and a layer of waterproofing material. This outer coating is shown in Figure 5, in which reference numeral 49 indicates the layer of cement and the reference numeral 50 the outer waterproofing layer.

While I have illustrated the invention as applied to a horizontal pressure still, it will be understood that the method described is

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applicable to any other container. It will also be understood that the invention is not limited to providing a container with a single layer of insulating blocks, although a single layer will usually suffice, nor is the invention limited to the details of construction illustrated and described, as changes therein may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. The method of insulating a container having a rivet space, comprising covering a portion of the container adjacent said rivet space with a single layer of insulation consisting of preformed blocks, covering said rivet space with insulating blocks, and holding said last mentioned blocks in place by means permitting ready removal thereof without disturbing said insulating layer, substantially as described.

2. The method of insulating a container having a rivet space, comprising covering a portion of the container adjacent said rivet space with a single layer of insulation consisting of preformed blocks, leaving the rivet space open for leaks to develop, caulking such leaks as may appear, covering said rivet space with insulating blocks, and holding said last mentioned blocks in place by means permitting ready removal thereof without disturbing said insulating layer, substantially as described.

3. The method of insulating a container having a rivet space, comprising covering a portion of the container adjacent said rivet space with a single layer of insulation consisting of preformed blocks, leaving the rivet space open for leaks to develop, caulking such leaks as may appear, placing a layer of cement in said space, covering said space with insulating blocks bedded in said cement, and holding said last mentioned blocks in place by means permitting ready removal thereof without disturbing said insulating layer, substantially as described.

4. A container provided with a single layer of insulating material consisting of preformed blocks, and individual bands holding said blocks in place and provided each with take-up means, substantially as described.

5. A container provided with a single layer of insulating material consisting of preformed blocks, angles welded to the body of the container, and individual bands holding said blocks in place and secured at at least one end to said angles by take-up bolts, substantially as described.

6. A container provided with a single layer of insulating material consisting of preformed blocks, angles welded to the body of the container, and individual bands holding said blocks in place and secured at at least one end to said angles by take-up bolts, certain of said bands being formed in a plurality of parts having their adjacent ends connected by take-up means, substantially as described.

7. A container provided with a single layer of insulating material consisting of preformed blocks, angles welded to the body of the container, and individual bands holding said blocks in place and secured at at least one end to said angles by take-up bolts, certain of said bands being formed in a plurality of parts having their adjacent ends provided with angles connected by take-up bolts, substantially as described.

8. In a container having a rivet space, a single layer of insulating material covering a portion of said container adjacent said space and consisting of preformed blocks, means holding said blocks in place, insulating blocks covering said rivet space, and means holding said last mentioned blocks in place and permitting ready removal thereof without disturbing said first mentioned blocks, substantially as described.

9. In a container having a rivet space, a single layer of insulating material covering a portion of said container adjacent said space and consisting of preformed blocks, individual bands holding said blocks in place and provided each with take-up means, insulating blocks covering said rivet space, and means holding said last mentioned blocks in place and permitting ready removal thereof without disturbing said first mentioned blocks, substantially as described.

10. In a contaner comprising a body and a head secured thereto by rivets, a single layer of insulating material over said head consisting of preformed blocks, means holding said blocks in place, a single layer of insulating material over said body adjacent said rivets and consisting of preformed blocks, means holding said body blocks in place, insulating blocks covering said rivets, and means holding said last mentioned blocks in place and permitting ready removal thereof without disturbing the blocks on said head or body, substantially as described.

11. In a container comprising a body and a head having overlapped edge portions and secured together by fastening elements extending through said overlapped portions, a single layer of insulating material over said head consisting of preformed blocks molded to fit said head, means holding said layer in place on said head and comprising a plurality of individual spaced radial bands provided each with take-up means, a single layer of insulating means on said body consisting of preformed blocks molded to fit said body, a plurality of individual bands holding said last mentioned layer in place and provided each with take-up means, insulating blocks covering said

fastening elements, and means holding said blocks in place and permitting ready removal thereof without disturbing the blocks of either of said layers, substantially as described.

12. In a container comprising a cylindrical body and a head having overlapping edge portions, said head having a spherical outer surface and said body and head being secured together by a circumferential row of rivets extending through said overlapping edge portions, a single layer of insulating material over said head and consisting of preformed blocks molded to fit said spherical surface, means holding said blocks in place and comprising a ring secured to said head adjacent said circumferential row of rivets and a plurality of individual bands connected at one end to said ring and extending radially towards the center of said head and provided each with take-up means, a single layer of insulating material on said body consisting of preformed blocks molded to fit the cylindrical surface of said body, a plurality of individual circumferentially extending bands holding said blocks in place and provided each with take-up means, insulating blocks covering said circumferential row of rivets, and means holding said last mentioned blocks in place and permitting ready removal thereof without disturbing the blocks on the body or head, substantially as described.

13. In a container having a rivet space, a covering of insulating material over a portion of said container adjacent said rivet space, said covering consisting of preformed blocks, insulating blocks covering said rivet space, and means holding said last mentioned blocks in place and permitting ready removal thereof without disturbing said first mentioned blocks, substantially as described.

14. A container having rivet spaces and protected over the body of the container and over the rivet spaces by insulation consisting of preformed blocks held in place by means permitting ready removal of the blocks over the rivet spaces without disturbing the blocks over the body of the container, substantially as described.

15. The method of insulating a container having a rivet space, comprising covering a portion of the container adjacent said rivet space with insulation consisting of preformed blocks, leaving the rivet space open for leaks to develop, caulking such leaks as may appear, covering said rivet space with insulating blocks, and holding said last mentioned blocks in place by means permitting ready removal thereof without disturbing such first mentioned blocks, substantially as described.

In testimony whereof I have hereunto set my hand.

LESTER E. COVER.

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