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BUBBLE TRAY SUPPORT MEANS

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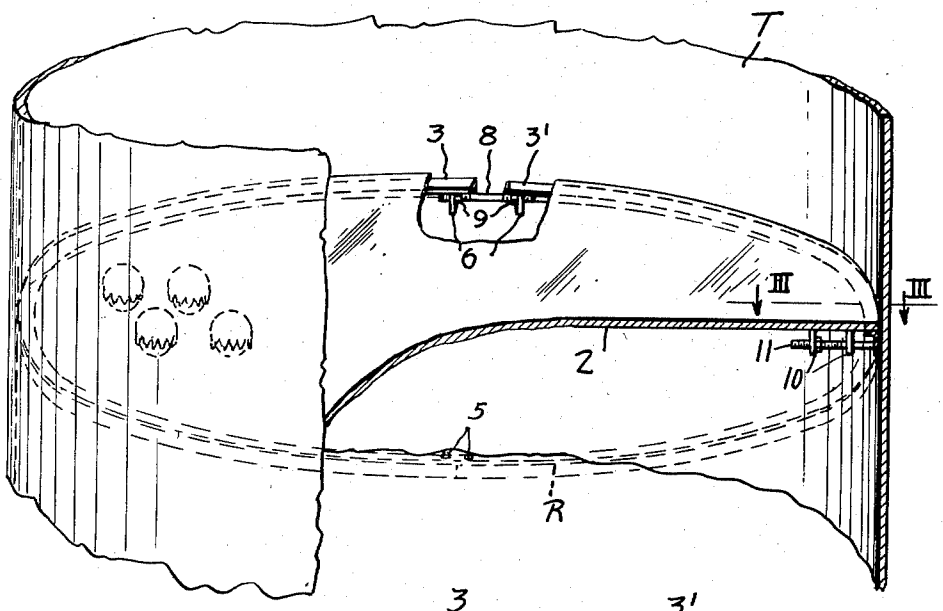


Fig. 1

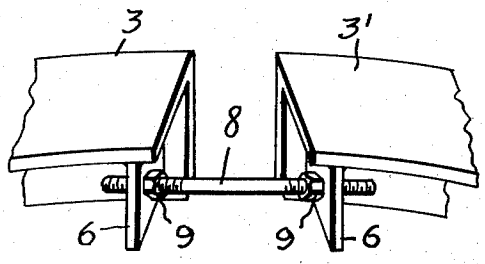


Fig. 2

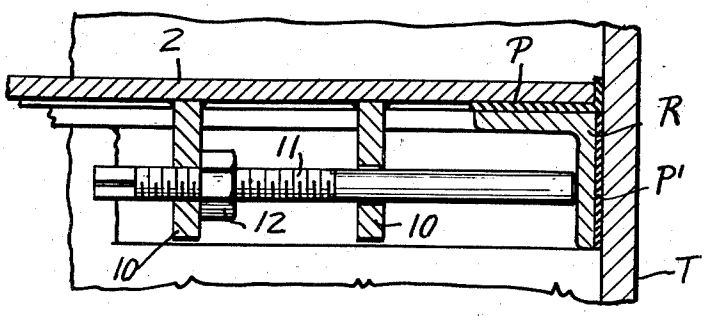


Fig. 3

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BUBBLE TRAY SUPPORT MEANS

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In distillation columns or towers of bubble cap type, it is customary to secure the trays or tray supports in the tower by welding. This necessitates working under adverse conditions for making the weld joints; and it is not always easy to attain leak-tight joints. Also, such means for supporting the trays involves considerable cost, and in the event of necessity of repair or replacement of a tray, a removal and replacement is particularly costly. I have in the present invention provided support means for such trays, which affords a highly advantageous short-cut in installation, and which furthermore permits demounting and changing as may be desired in any particular instance. Withal, the support means here provided can effect material savings in costs. Other objects and advantages will appear from the following description.

To the accomplishment of the foregoing and related ends, said invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a fragmentary partly vertical sectional and partly elevational view of a distillation tower, the bubble cap tray showing in perspective;

Fig. 2 is an enlarged showing of a detail thereof; and

Fig. 3 is a further enlarged vertical section of another detail.

The trays or plates, carrying bubble caps are of the conventional form, but instead of requiring welding in place against the inner wall of the tower, they are supported in place tight against the tower wall by thrust expansion means. In general, this involves a split-ring support under the edge of the tray or plate, and including means for expanding the split-ring into tight holding engagement against the tower wall. Depending upon size and concomitant relations, the split-ring structure where the size requirement is not too large may be of a single ring, but for larger units it is in two or more pieces, with expanding means between.

Thus, as shown in the illustrative embodiment in Fig. 1, the tray **2** is supported on a split ring R which is in two approximately semi-circular pieces, the split being located between the ends **3**, **3'**, the opposite ends of the ring pieces being secured to the tray, as shown at **5**, **5**, Fig. 1, this being by a weld or bolting of the tray or plate to the ring-pieces near such ends. Elsewhere, the ring-pieces are free from the tray; however, associated with the ends **3**, **3'** are means for forcing the ring-pieces against the inner wall of the distillation column or tower T. These means comprise lugs **6** on radial lines, and between these lugs a thrust-expanding means forcing the ring-ends apart and with corresponding thrust-pressure engagement against the distillation tower wall. The thrust expanding means here comprises a screw-threaded rod **8** having its ends loosely fitted through holes in the lugs **6** and

carrying nuts **9** which bear respectively against the opposed faces of the lugs, whereby the ring is expanded into holding contact with the tower wall by appropriately turning one or both of such nuts. The split ring or ring-pieces are preferably of angle cross-section, as this provides a particularly ample shelving upon which the tray or plate with its bubble caps may adequately be supported. In large sizes, additional thrusting means may also be provided such preferably taking a form as illustrated in Figs. 1 and 3, wherein lugs **10** are secured to the under surface of the bubble cap tray or plate **2**, these lugs being near the periphery of the tray and oriented generally parallel with the adjacent ring and tower wall. Through the lugs a thrust-rod **11** is directed against the inside of the expansion ring, and by screw-threaded means exerts thrust-pressure between lug and ring, thereby providing further holding-thrust pressure for the ring against the distillation tower wall and at the same time importantly holding the bubble tray or plate in assembly. A convenient form of thrust means here, is illustrated as a nut **12** on the threaded portion of the thrust-rod **11** and bearing against the lug face, the thrust-rod being free in the openings through the lugs.

To further insure liquid-tightness, packing or gasketing P is preliminarily positioned between the upper support-ring surface and the bubble cap tray and it may have a flange between the tray edge and the tower wall; and desirably also gasketing P' between the ring R and the tower wall so that any unevenness is adequately filled.

In installation, the expansion ring or associated ring pieces, with the bubble tray or plate held thereto at the weld points **5** and with the thrust means **8** suitably relaxed or contracted, is positioned at the desired level in the tower, with the gasketing for the expansion ring, and the thrust expanding means is turned up to tightly drive the ring into its engagement with the distillation tower wall. With gasketing of particularly suitable form, such as gasket P with a slight up-turned flange between the edge of the tray and the inner wall of the distillation tower, liquid-tightness is assured. The thrust nut **12** is turned up to add the additional thrust pressure of the rod against the expansion ring. One or more of such expansion rods as in lugs **10** on the bubble tray may be employed.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a distillation tower, a bubble tray, and means for mounting the tray in the tower, comprising an expansion ring in half-ring pieces of angle-section, adjacent ends of the half-rings being secured to the under-surface of the tray near an edge and the free ends of the half-rings having radially-aligned lugs, means between the lugs for thrust-expanding the half-rings against the inside wall of the tower, lugs on the under-side of the tray near an edge, a thrust rod through said lugs with its end contacting the inner surface of the expansion ring, and screw-threaded means associated with said rod for thrusting against the expansion ring which is in contact with the inner wall of the tower.

2. In a distillation tower, a bubble tray, and means for mounting the tray in the tower, comprising an expansion ring in pieces of angle-section, adjacent ends being secured to the under-surface of the tray near an edge and the free ends of the ring pieces having radially-aligned lugs, means between the lugs for thrust-expanding the ring pieces against the inside wall of the tower, lugs on the

under-side of the tray near an edge, a thrust rod through said lugs with its end contacting the inner surface of the expansion ring, and screw-threaded means associated with said rod for thrusting against the expansion ring which is in contact with the inner wall of the tower.

3. In a distillation tower, a bubble tray, and means for mounting the tray in the tower, comprising an expandable split ring of angle-section, the free ends of the split ring having radially-aligned lugs, means between said lugs for thrust-expanding the ring into tight holding engagement with the inside wall of the tower, a lug on the under-side of the bubble tray near an edge, and means between said lug and the expansion ring for thrusting against the ring.

4. In a distillation tower, a bubble tray, and means for mounting the tray in the distillation tower, comprising an expansible split ring, means for expanding said ring into tight holding engagement with the inside wall of the tower, a lug on the under-side of the bubble tray near an edge, and thrust-means between said lug and the expansion ring for forcing the latter toward the inner wall of the tower and anchoring the bubble tray in place.

5. In a distillation tower, an expansible split ring in contact with the inner wall of the tower, means for expanding said ring into tight holding engagement with such wall, a bubble tray supported on the thus held ring, and thrust means acting substantially radially between the tray and a section of the ring to force the latter tightly against the tower wall.

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