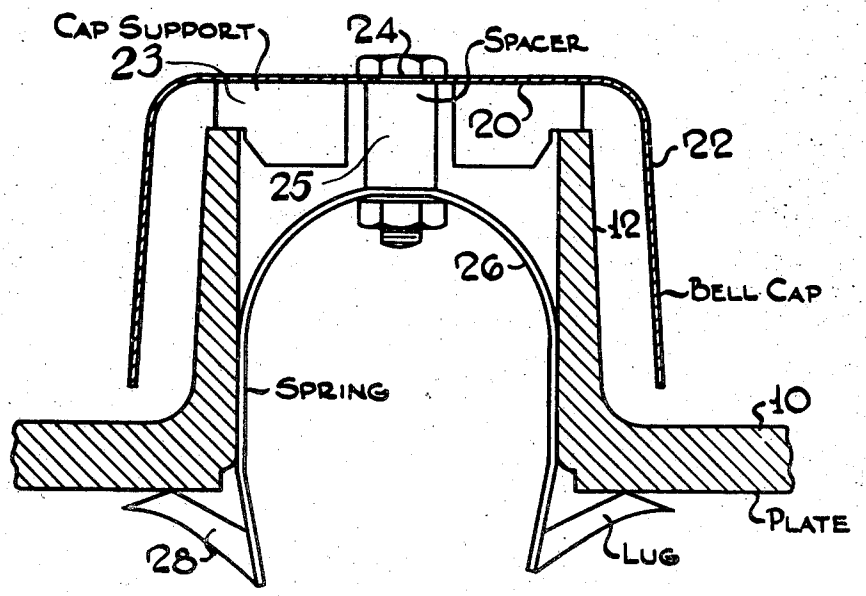
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BUBBLE CAP

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BUBBLE CAP

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This invention relates to bubble caps in fractionation equipment, and in particular to a new method of attaching bubble caps to the bubble cap tray.

In the distillation of many types of crude liquors and particularly in the fractionation of petroleum fractions, bubble caps have been extensively used for effecting good fractionation conditions. The use of such bubble caps on trays in elongated towers with liquids which have a tendency to foul or plug the bubble caps and trays due to polymerizing of the liquids or due to solid matter contained in the liquid, requires that the plates and the caps be removed from time to time for cleaning. The removal of the caps in the past has presented considerable difficulty because of the manner of the attachment of the caps to the plates. The present invention is concerned with an improvement in the method of attaching the bubble caps to the trays.

In the prior art one method of attachment of the caps to the plate has been by individually bolting the caps to the plate. Some improvement was made by attaching a number of caps to the plate by means of bars. Such means, however, of attaching many caps to the plate involved impedance to the flow of the liquid and hindered uniformity of treating conditions. Moreover, considerable labor was involved in any of these cases when the caps had to be removed from the plates due to the necessity for unscrewing the bolt and then detaching the cap from the plate. The present invention minimizes the labor factor by the use of a spring clip for maintaining the cap in position over the riser portion of the plate. Thus the cap of this invention can easily be removed by compressing the spring from below the plate and then pushing the cap upwards.

The design of the cap attachment of this invention can be more fully understood by reference to the attached drawing and the following descriptive matter. It is not intended to confine this invention to the particular design shown on the drawing.

In the drawing, a section of a bubble cap plate for the treatment of petroleum distillates is represented by the reference numeral 10. A bubble cap, indicated by the reference numeral 20, is fitted over the riser portion 12 of the plate. The cap 20 consists of the bell portion 22 on cap support 23 attached by nut and bolt connection 24 through the collar or space element 25 to the spring element 26. The spring element 26 is of U-shaped construction, the lower open ends of which terminate in lugs 28 which, when the cap

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is placed in position over the riser 12, make spring contact with the lower surface of the plate 10 as shown in the drawing. Moreover, the upper portion of the U of the spring has spring fitting with the lower riser portion 12 of the plate 10. In the particular illustration of the invention shown in the drawing, the spring 26 consists of ½" strap spring steel. The material of which the spring element 26 is made consists of an essentially corrosion-resistant composition having spring characteristics at both atmospheric and operating temperatures, in this case chrome steel.

In attaching the bell cap to the plate, the two open ends of the U are brought together and forced downwards within the interior of the riser 12. When the lugs 28 are freed from the sides of the riser and reach the under side of the plate, the spring releases itself so as to bring the lugs in a spring fitting with the lower part of the plate and the sides of the spring in spring fitting with the inside of the riser as shown in the drawing. To remove the cap from the plate, the lugs 28 are brought together by a pinching action from below the plate and then the cap is forced upwards. In this manner the caps can be easily detached from the plate by labor working wholly from below the plate.

Thus, the invention consists of rigidly attaching bubble caps to trays over the risers in fractionation equipment by having spring elements, preferably U-shaped, in compression against the inner surfaces of the risers and terminal lugs on the spring elements or preformed ends of the spring element holding the caps down by having the terminal lug or preformed spring ends protruding under the plate. The spring is constructed of corrosion-resistant materials in cases in which corrosion may be likely to interfere with its efficiency but otherwise may be made of any composition having the desired spring characteristics at both atmospheric and operating temperatures. At the present, to install or remove bubble caps from the trays using any of the methods of attachment referred to as above as now in use, requires considerable labor within the tower itself. When installing caps using a T bolt, it requires two men, one working below the plate holding the T bolt in position while the other working above the plate bolts the cap in position. Even when using the less desirable hold-down bar, there is considerable bolting or unbolting to install or remove the bubble caps. By using the spring clip, no bolting or unbolting is required while working inside the tower. One

man working alone can easily install or remove the caps with a minimum amount of effort while working in the cramped quarters of a fractionating tower.

What is claimed is:

1. In combination with a bubble tray riser element, and a cap member therefor, bubble cap retainer means, comprising a rigid spacer bolt element dependent concentrically from the inner surface of said cap, and an inverted U-shaped spring member, insertable in said riser, rigidly secured to and dependent from said bolt element, each leg portion of said spring member extending downwardly beyond the lower end of the riser, and frictionally engaging the inner wall surface of said riser for a major portion of their length, and an outwardly extended spring lug at the lower end of each leg portion to engage the lower surface of the bubble tray when the spring member is fully inserted in said riser.

2. A combination according to claim 1, in which the spring lug at the lower end of each spring member leg portion extends angularly upward and outwardly.

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