Nov. 10, 1953 G. W. PLOSSL ET AL 2,658,738

HOLDING DEVICE FOR BUBBLE CAPS

Filed Jan. 4, 1952

FIG. 1

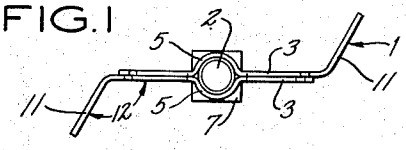


FIG. 2

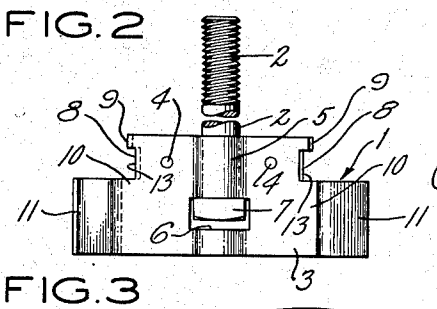


FIG. 5

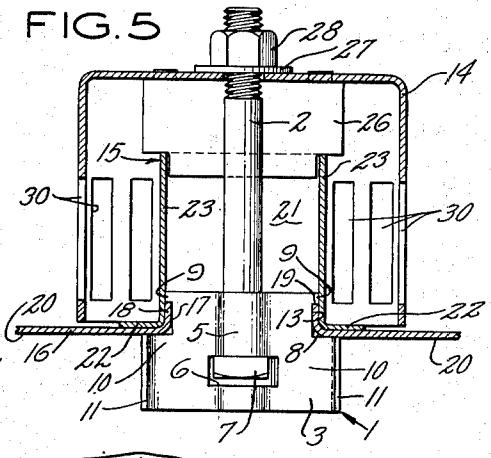


FIG. 3

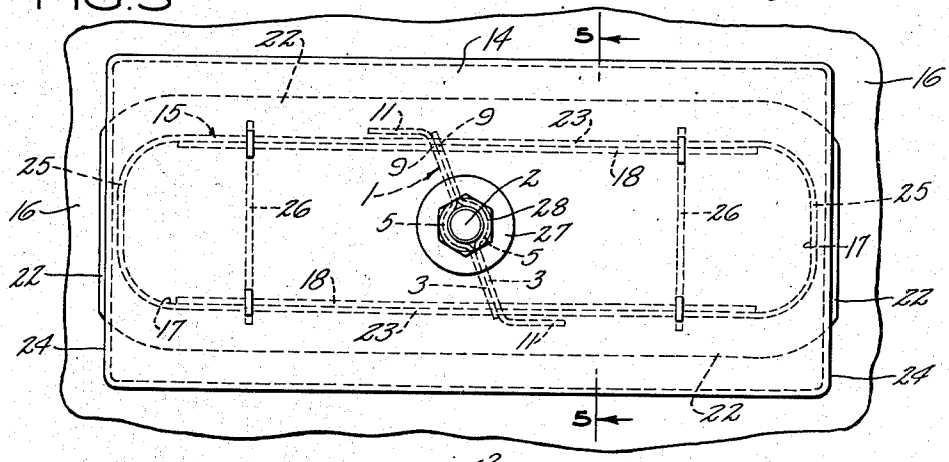


FIG. 4

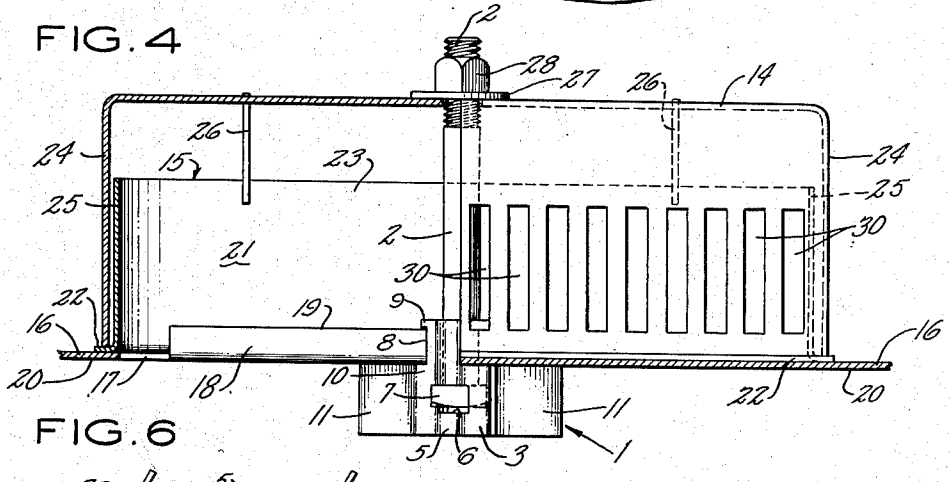
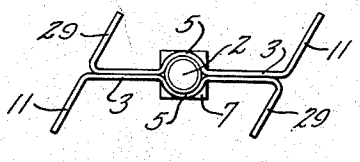


FIG. 6



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HOLDING DEVICE FOR BUBBLE CAPS

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1 Claim. (Cl. 261—114)

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This invention relates to an improved holding device for use in fastening a bubble cap to its chimney and the tray of a fractionating tower in encompassing relation with a gas passage opening in such tray.

The invention has for an object the provision of a device of this character, having a cross bar or so-called "strong back," which may be so engaged with the walls of the tray opening as to be held in place without manual assistance with the hold-down bolt upstanding therefrom, while the chimney is mounted on the tray in encompassing relation with the opening and the cap is placed over the upper end of the hold-down bolt and superposed on the chimney, a nut then being applied to the upper end of the bolt to draw the cap to the chimney and hold it to the floor plate of the tray.

More particularly, the invention has for an object the provision of a holding device of this character for use with an elongated gas passage opening in a bubble tray, the cross bar or strong back having an overall length less than that of the opening and also having notches, one in each end thereof, forming upper and lower projections for engagement with upper and lower surfaces on the tray, adjacent each long side of the opening, the distance between the notches being greater than the width of the opening in order to prevent the cross bar from rotating, when the nut on the upstanding hold-down bolt is tightened.

The invention enables easy assembly of the parts on a bubble tray by a single operator working entirely from above the tray.

The invention will be disclosed with reference to the illustrative embodiment of it in the acompanying drawings, in which,

Figs. 1 and 2 are top plan and elevational views, respectively, of a holding device embodying the invention;

Fig. 3 is a top plan view of a bubble cap and chimney mounted on a tray of a fractionating tower and clamped thereto by the holding device of Figs. 1 and 2;

Fig. 4 is a view partly in front elevation and partly in central longitudinal section of the bubble cap assembly;

Fig. 5 is a cross sectional view thereof taken on the line 5—5 of Fig. 3; and

Fig. 6 is a top plan view, taken similarly to Fig. 1 and showing a modification in the cross bar or strong back of the holding device.

Referring to these drawings and first to Figs. 1 and 2 thereof, the bubble cap holding device includes a cross bar 1, commonly called a "strong back," and a hold-down bolt 2, which is suitably

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fixed to the cross bar at a location intermediate its ends and upstands therefrom at right angles thereto. A desirable way to make the strong back is to use two strips 3 of sheet metal, usually stainless steel, and fasten them together in any suitable way, as for example, by welding at two spots, as indicated at 4. Each strip 3, at a location intermediate its ends, is bent to provide an approximately semi-cylindrical portion 5. The two portions 5 are arranged to encompass the lower end of the hold-down bolt 2, as will be clear from Fig. 1. These two portions 5 have oppositely located slots 6 extending therethrough, to receive the square head 7 of the bolt 2 and to prevent this head from turning in the cross bar. The cross bar 1 has notches 8, one in each end thereof. These notches form upper and lower projections 9 and 10, respectively. One strip 3, at one end of the cross bar, has a portion 11, which forms part of a lower projection 10, extending beyond the lower-projection-forming portion of the other strip. At the other end of the cross bar 1, the other strip 3 has a portion 11, which forms part of a lower projection 10 and extends beyond the lower-projection-forming portion of the other strip. These portions 11 are bent at an obtuse angle 12 to the cross bar 1. The overall length of the cross bar is less than that of the opening in which it is to be mounted. The distance between the ends walls 13 of notches 8 is slightly greater than the width of such opening. The distance between the adjacent horizontal surfaces of each pair of upper and lower projections is substantially equal to the distance between the upper and lower surfaces of the long walls of the opening in the tray.

The holding device described is used as shown in Figs. 3, 4 and 5 to clamp a bubble cap 14 to its chimney 15 and, in the form shown, to also clamp the chimney to the floor plate 16 of a bubble tray of a fractionating tower, although the chimney may be otherwise secured to the floor plate if desired. The plate 16 has an elongated opening 17 extending therethrough. Along the tangent portion of each long side of opening 17, portions of plate 16 are bent upwardly, providing upstanding flanges 18. The distance between the upper surface of each flange 18 and the lower surface of plate 16 is substantially equal to that between the adjacent surfaces of each pair of upper and lower projections 9 and 10. Thus, an operator, supported on the floor plate 16, can insert the strong back in the opening 17 while it is held lengthwise of such opening. Then, the strong back can be turned about the axis of its hold-down bolt 2 to carry it into the position shown in

Fig. 3, or until the vertical walls of the notches 8 bind against the vertical walls of the long sides of opening 17 that are formed by the flanges 18. The upper projections 9 will engage the upper surfaces 19 of these walls or flanges and the lower projections 10 will engage the lower face 20 of plate 16, thus preventing the strong back from upward or downward displacement in opening 17. The chimney 15 is now positioned on the tray with its passage 21 registering with opening 17, the chimney in this case being supported by an outturned base flange 22 which rests on the upper face of plate 16. Proper positioning of the chimney is facilitated because its long side walls 23 are spaced apart so as to engage and closely fit the outer faces of the upstanding flanges 18, whereby the chimney is properly located laterally, also, the tangent portions of these long walls have the same length as the flanges 18, whereby the chimney is properly located longitudinally of opening 17. The cap 14 is then put in place. Its end walls 24 are spaced apart so as to lie closely adjacent the ends walls 25 of the chimney, whereby the cap may be located in proper relation longitudinally with respect to the chimney. The cap is shifted laterally until the central hole in its top wall overlies the upper end of bolt 2, whereupon the cap is pressed downwardly as far as possible. As shown its end walls 24 will rest on the flanges 22 of the chimney and spacers 26, fixed to and depending from the top wall of the cap, one on each side of bolt 2, rest upon the upper end of chimney 15. A washer 27 is then slipped over the upper end of bolt 2 and a nut 28 is screwed onto the threaded upper end thereof and turned down until the cap is clamped to the chimney and the latter to plate 16. The tightening of nut 28 tends to turn the bolt 2 and cross bar 1 in a clockwise direction, as viewed in Fig. 3, thereby tending to increase the binding pressure of the notched ends of the cross bar against the long side walls of opening 17. Since the distance between the notched ends is greater than the width of opening 17, the cross bar is prevented from turning clockwise beyond the illustrated position.

When it is desired to remove the cap, the nut 28 is loosened and this tends to turn bolt 2 and cross bar 1 in a counterclockwise direction, thereby tending to disengage the ends of the cross bar from the tray. If the cross bar does disengage from the tray in this manner the cap, bolt and cross bar may be lifted out of the opening 17 as a unit. If the cross bar 1 does not become disengaged in this manner, then the nut 28 is removed, followed by the washer 27 and cap 14, the bolt 2 remaining in upright position. Then, the cross bar 1 is turned counterclockwise to disengage it from the tray, whereupon it may be lifted through the opening 17.

The extensions 11 of the lower projections of the strong back are made to engage the under side of the tray 16 along a rectangular area that is parallel to the long sides of the opening 17 for the purpose of distributing the clamping pressure longitudinally to some extent. Additional area of engagement of the strong back and tray can be had with the modified form of strong back shown in Fig. 6 and with resulting improvement in the longitudinal distribution of the clamping pressure. The strong back of Fig. 6 differs from that previously described in that both ends of both strips 3 are bent so as to lie substantially parallel with the long sides of the tray opening 17, when the strong back is engaged therewith, which is done in the same manner as heretofore described. Thus, each strip 3 has at one end the extension 11, bent at an obtuse angle, as described, and at the opposite end an extension 29 which is bent in the same direction but at an acute angle. With this construction, the contact area is doubled with a resulting increase in the distribution of the clamping pressure. This strong back construction, however, is more expensive than the one first described because the sharper bend of the projections 29 will necessitate heat treatment of the metal, if the latter is, as is usual, stainless steel.

The tray plate 16, chimney 15, cap 14, spacers 26, nut 28, washer 27, and bolt 2 are also customarily made of stainless steel. The cap 14, as usual, has suitable openings, such as 30 (Fig. 4), to allow the escape of gases, which rise through the chimney 15 and pass downwardly in the space between the cap and chimney, and then upwardly through the liquid, which is maintained on tray 16 to a level above the tops of openings 30.

The invention thus provides an improved device suitable for clamping bubble caps to their associated chimneys and also, if desired, to the floor plate of a tray of a fractionating tower. The strong back is of simple construction, inexpensive to manufacture and readily mounted in place by an operator working from a position above the tray. The strong back, once engaged, in the tray opening, will remain so engaged without manual assistance while the chimney and cap are put in place and the washer and nut are applied to the hold-down bolt.

What is claimed is:

A holding device for a bubble cap, adapted to be mounted in an elongated opening in a bubble tray comprising, a cross-bar and a hold-down bolt fixed centrally to and upstanding therefrom, said cross-bar consisting of two strips of inelastic material fastened together face to face and having in each of its two opposite ends a notch and upper and lower projections respectively above and below the notch, each pair of upper and lower projections being located in the same plane, the adjacent surfaces of each pair of upper and lower projections being straight and parallel and forming the upper and lower walls of the notch, and a straight end wall interconnecting each pair of upper and lower walls at right angles thereto, the upper walls of both notches being located in the same plane and the lower walls of both notches being located in the same plane, said upper and lower walls being spaced apart to respectively engage the upper and lower surfaces of the tray adjacent the opening therein, the distance between said end walls being greater than the width of the opening in the tray, those portions of the strips which form the lower projections being of unequal length with one projection extending beyond the other at each end of the cross-bar, the longer projections each being bent at an obtuse angle to the adjacent shorter projection.

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