Dec. 25, 1951 E. J. WINTERS 2,580,260

BUBBLE CAP HOLD-DOWN DEVICE

Filed June 10, 1950

Fig. 1.

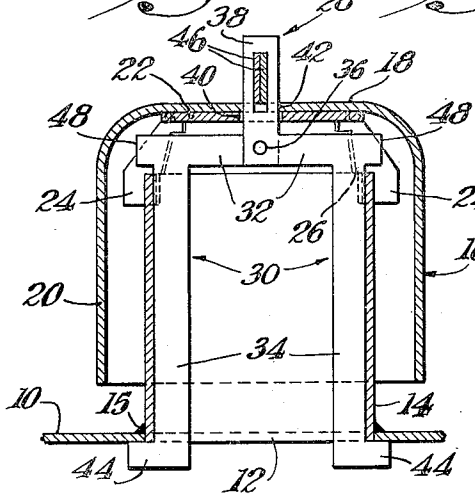


Fig. 2.

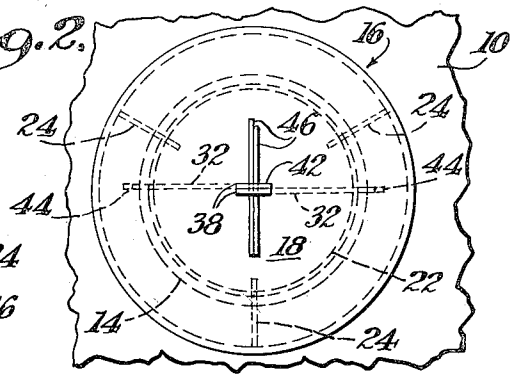


Fig. 4.

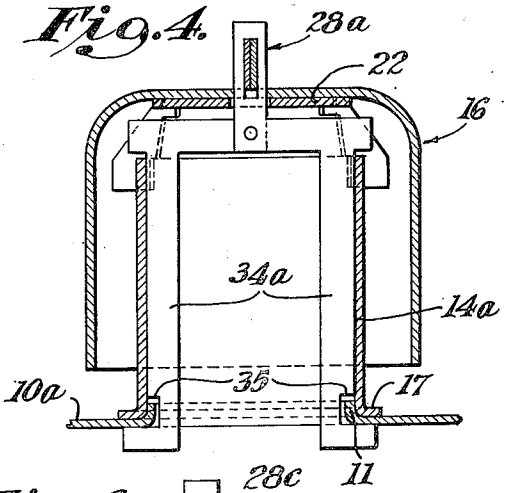


Fig. 3.

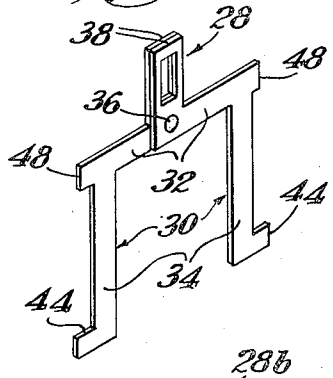


Fig. 6.

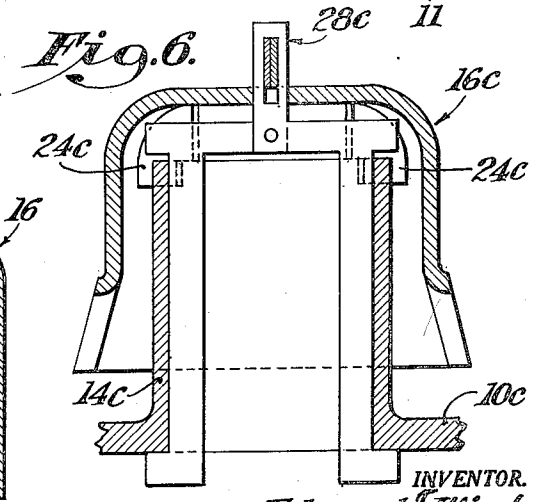
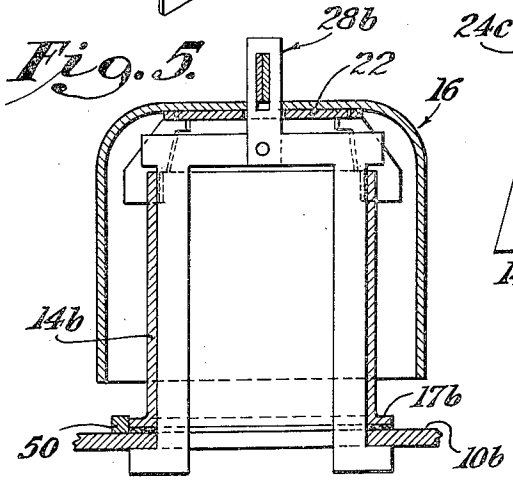


Fig. 5.



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BUBBLE CAP HOLD-DOWN DEVICE

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5 Claims. (Cl. 261—114)

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This invention relates to improvements in bubble cap assemblies such as are used for effecting contact and heat transfer between vapors and liquids in fractionating towers and the like.

A principal object of the invention is to provide a bubble cap assembly of simple and inexpensive construction that can readily be installed by one man from the top of the deck or bubble tray. A related object resides in the provision of simple means for securing a bubble cap over a riser and preventing the securing means from falling through the riser.

It is a further object to provide a bubble cap and bubble cap mounting and securing means of stamped metal construction that offers a minimum obstruction to gas flow.

An additional and important object of the invention is to provide a readily detachable bubble cap mounting and securing means adaptable for use with welded-in risers, removable risers, and cast iron risers.

More specifically, it is an object of this invention to provide a bubble cap assembly embodying a pair of tonglike members pivotally connected and formed to engage the underside of the deck and to extend through a tubular riser and an apertured bubble cap for detachable engagement above the cap with retaining means for urging the cap toward the upper end of the riser and the tonglike members against the underside of the deck.

Another and specific object of the invention resides in the provision of a bubble cap assembly comprising a tubular riser extending above an opening in a deck plate, a bubble cap with means for supporting and centering it over the riser, and a pair of tongs having lower end portions engaging the underside of the deck plate and handle portions projecting outwardly through an aperture in the top of the bubble cap, and wedge means extending through slotted formations in the handle portions to secure the assembly.

These and other objects contributing to economy in manufacture, simplicity of installation, and efficiency in service will be more fully understood from the following detailed description of preferred embodiments, taken with the accompanying drawings in which:

Fig. 1 is a vertical section of a bubble cap assembly embodying the present invention;

Fig. 2 is a top plan view of the assembly of Fig. 1;

Fig. 3 is a perspective view showing the details of the tonglike members for securing the bubble cap;

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Fig. 4 is a vertical section of a modified bubble cap assembly;

Fig. 5 is another vertical section of a further modification of the bubble cap assembly; and

Fig. 6 is a vertical section of a still further bubble cap assembly having a modified bubble cap and bubble cap spacer means.

As shown in Figs. 1 and 2, the improved bubble cap assembly includes a tray or deck plate 10 having a circular opening 12, above which extends a tubular riser 14 connected and sealed to the upper side of the plate 10 by a weld 15. A bubble cap 16 having a flat top 18 with a domed edge portion merging with a cylindrical skirt portion 20 is mounted in centered, spaced relation over the riser 14. The lower edge of cap 16 is spaced over the deck 10 in the usual manner.

One of the novel features of the improved assembly is a disc 22 carrying a plurality of circumferentially spaced lugs 24 secured in depending positions by welding or the like and each having a shoulder portion 26 engaging the upper end of the tubular riser as shown in Fig. 1. As will be apparent, the disc 22 engages the underside of the bubble cap top 18 and the shoulder portions 26 engage the top edge of the riser 14 and the outer surface thereof to center and support the bubble cap 16 in desired relation to the riser 14 and the deck 10.

In Fig. 3 there is shown a pair of tongs 28 intended to be inserted within the tubular riser 14 in the manner shown in Figs. 1 and 2. These tongs 28 preferably comprise tong members 30, 30 of generally right angle shape and formed from striplike or plate material. Each of the identical tong members 30 has a horizontal leg 32 and a vertical leg 34. The horizontal legs 32 are joined in overlapping relation by a pivot pin connection 36 lying beneath slotted vertical handle portions 38, 38 forming continuations of the inner ends of the legs 32.

In assembled relation, the slotted handle portions 38 extend upwardly through a central aperture 40 in disc 22 and outwardly through an aligned aperture 42 in the top of bubble cap 16. When the handle portions 38 are in the aligned coinciding relation shown in Fig. 2, an outturned lower end 44 of each tong 30 will extend over the underside of the deck plate 10. Suitable retaining means, preferably a pair of wedge strips 46, 46 passed through the slots of the handle portions 38 are used to urge the cap 16 toward the upper end of the riser 14 and the lower end portions 44 of the tongs against the deck plate 10. A firm and securely clamped assembly is obtained

through the wedge reaction of the strips 46 against the handle portions 38 and the flat top portion 18 of the bubble cap 16.

While it would be feasible to pass a wire through the slotted handle portions 38 of the tongs 28, and through the aligned apertures 40 and 42 of the disc 22 and cap 16 respectively to prevent dropping through of the tongs during assembly, such an improvision and time consuming operation is avoided by forming an outer end extension 48 on each horizontal leg 32 in order to provide with leg 34, a shoulder engageable with the upper end of the riser 14.

In assembling the bubble cap 16, over the tubular riser 14 extending above a corresponding opening 12 in the deck 10, the tongs 28 will first be manipulated to contract the vertical legs 34 and thus permit the outturned ends 44 to pass downwardly through the riser. When the ends 44 are below the deck plate 10, the slotted handle portions 38 will be brought together, to open the vertical legs 34 against the inside of the riser 14 and move the outturned ends 44 into positions beneath the deck; during and after these manipulations the upper end extensions 48 will be effective to prevent dropping through of the tongs 28. The spacing means including the apertured disc 22 and the depending spacing lugs 24 will next be dropped over the aligned handle portions 38 and the upper end of the riser 14. Following this, or concurrently if desired, the apertured bubble cap will be moved downwardly over the handle portions 38. Then by the simple and relative quick operation of inserting the wedge strips 46 through the slotted handle portions above the bubble cap, the assembly will be made secure. A readily understood reversal of these steps will permit disassembly from the upper side only of the deck 10 for cleaning or replacement.

As the modifications illustrated in Figs. 4 and 5 follow very closely the preferred embodiment that has been described in detail, only the distinguishing features of these modifications will be pointed out.

In Fig. 4 a thin plate 10*a* is formed with an upturned continuous lip 11 defining an opening and serving as a lateral abutment for a tubular riser 14*a* which fits thereover and has a small horizontal flange 17 resting on the top side of the deck. With this removable riser construction, it is necessary only to provide a notch 35 in the lower outer edge portion of each vertical tong leg 34*a* to accommodate the deck opening lip 11. The thus modified pair of tongs are referred to in Fig. 4 by numeral 28*a*.

Fig. 5 illustrates the adaptability of the tong-like means of this invention to another form of removable riser. In this embodiment, a relatively thick deck plate 10*b* has a plurality of circumferentially spaced lugs 50 welded around the deck opening a sufficient distance outward to provide lateral abutments for the ends of an outturned flange 17*b* on the bottom of the riser 14*b*. The greater thickness of the deck plate 10*b* requires a slight increase in length of the pair of tongs 28*b*.

In Fig. 6 there is illustrated a bubble cap assembly embodying a cast iron deck plate 10*c* having an integral tubular riser 14*c*. A cast iron bubble cap 16*c* having a slotted skirt is mounted over the riser 14*c* and secured by a pair of tongs 28*c* modified only to provide the additional length required by this construction. It will also be noted that the bubble cap supporting and spacing means has been modified by elimination of the disc 22 and integral casting of spacing lugs 24*c* on the inside of the bubble cap 16*c*.

While a preferred embodiment and several modifications of the bubble cap assembly of this invention have been described in detail, it is to be understood that various changes can be made in details of construction and arrangement of parts without departing from the principles of the invention and the scope of the appended claims.

Having thus described the invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. A bubble cap assembly comprising a deck plate having an opening therein; a tubular riser extending above said opening; a bubble cap having an aperture through the top; spacer means supporting the bubble cap over the riser; a pair of tongs having pivotally connected legs extending downwardly through the riser, each tong leg having an outturned lower end portion extending over the underside of the deck plate, and a handle portion projecting outwardly through the bubble cap; and retaining means detachably engaging a portion of the projecting handle portions and the top of the bubble cap to hold the bubble cap in operative relation to the riser.

2. A bubble cap assembly comprising a deck plate having an opening therein; a tubular riser extending above said opening; a bubble cap having an aperture through the top; spacer means extending between the inside of the bubble cap and the upper end portion of the riser supporting the bubble cap in spaced relation over the riser; a pair of pivotally connected holddown tongs extending through the riser, each tong having an outturned lower end portion extending over the underside of the deck plate, and a slotted handle portion projecting outwardly through the aperture of the bubble cap; and removable means extending through said slotted handle portions and tightly engaging the top of the bubble cap to urge the cap toward the upper end of the riser and the lower end portions of the tongs against the deck plate.

3. A bubble cap assembly comprising a deck plate having a circular opening therein; a tubular riser extending above said opening; a centrally apertured bubble cap; spacer means extending between the inside of the bubble cap and the upper end portion of the riser suporting the bubble cap in centered spaced relation over the riser; a pair of pivotally connected holddown tongs extending through the riser, each tong having an outturned lower end portion engaging the underside of the deck plate, and a slotted handle portion projecting outwardly through the aperture of the bubble cap; and wedge means extending through said slotted handle portions and tightly engaging the top of the bubble cap to urge the cap toward the upper end of the riser and the lower end portions of the tongs against the deck plate.

4. A bubble cap assembly comprising a deck plate having a circular opening therein; a tubular riser extending above said opening; a centrally apertured bubble cap for the riser; a centrally apertured disc engaging the inside of the top of the bubble cap and having a plurality of spacing lugs depending therefrom, said lugs each having a shouldered portion resting on the upper end of the riser and engaging the outside thereof to support the bubble cap in centered spaced relation over the riser; a pair of pivotally connected holddown tongs extending through the

riser, each tong having an outturned lower end portion engaging the underside of the deck plate, and a slotted handle portion projecting outwardly through the apertures of the disc and the bubble cap; and wedge means extending through said slotted handle portions and tightly engaging the top of the bubble cap to urge the cap toward the upper end of the riser and the lower end portions of the tongs against the deck plate.

5. The combination of claim 4 in which each tong is provided with a lateral extension projecting over the upper end of the riser to prevent the tongs from dropping therethrough.

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