March 29, 1955 H. C. GLITSCH 2,705,136

BUBBLE CAP RISER

Filed July 9, 1951

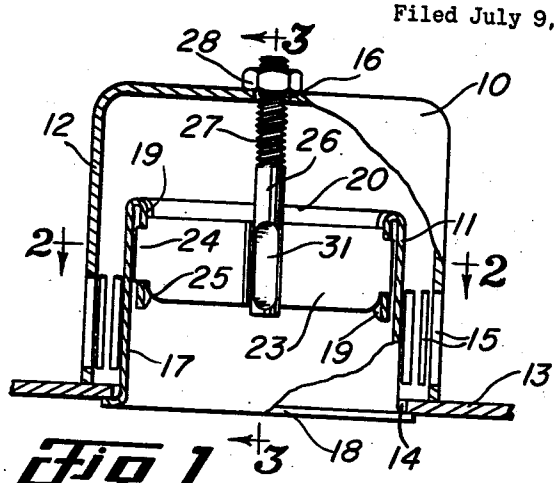


Fig. 1

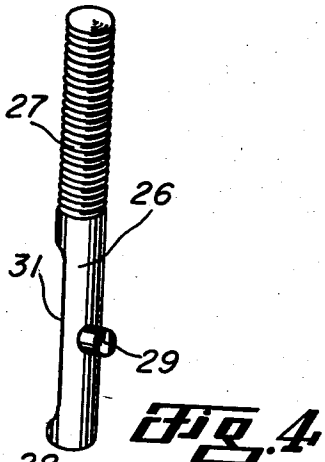


Fig. 4

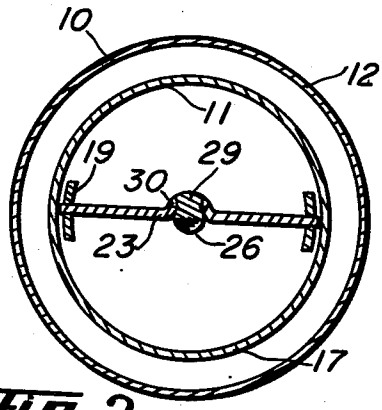


Fig. 2

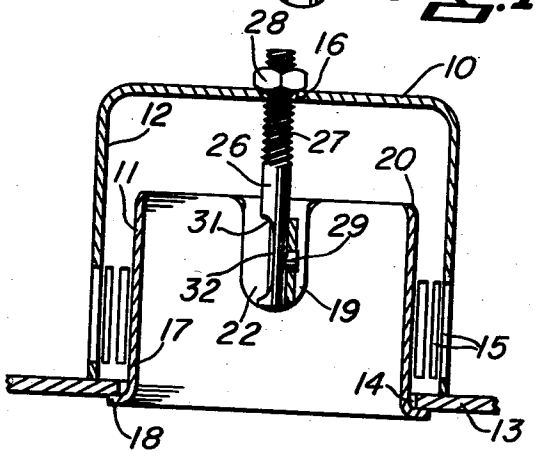


Fig. 3

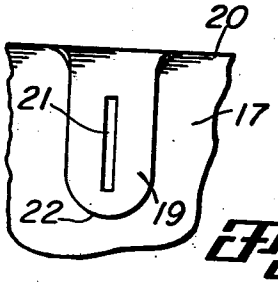


Fig. 6

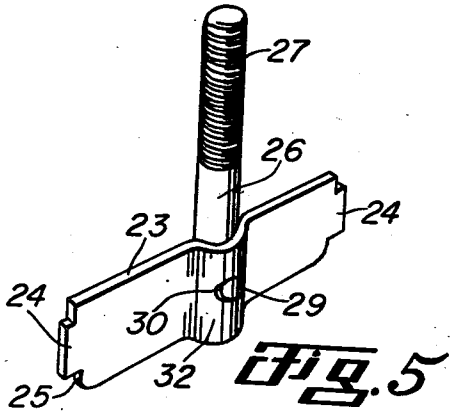


Fig. 5

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BUBBLE CAP RISER

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6 Claims. (Cl. 261—114)

This invention relates to new and useful improvements in bubble cap risers for use in refining vessels.

One object of the invention is to provide an improved riser for a bubble cap which is of economical construction and which is adapted to be supported and secured in one of the riser openings of a bubble tray or deck by coaction with the bubble cap.

Another object of the invention is to provide an improved bubble cap riser having a collar and a bubble cap holddown at its upper end which is attached thereto by engagement with arms made integral with the collar so as to eliminate the necessity of fastening the arms to said collar and so as to utilize material which ordinarily is scrapped.

A further object of the invention is to provide an improved bubble cap riser, of the character described, wherein the arms are bent inwardly and downwardly so as to be disposed within the upper end of the riser collar and have openings for engagement by the bubble cap holddown, said arms being urged or flexed inwardly into more positive engagement with said support by the upward pull of the latter.

Still another object of the invention is to provide an improved bubble cap riser, of the character described, wherein the bubble cap holddown includes a cross bar for connection with the collar arms and a stud for connection with the bubble cap, the cross bar having an opening for receiving a projection formed on the stud whereby said support may be economically assembled and installed in the riser collar.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, wherein an example of the invention is shown, and wherein:

Fig. 1 is a transverse, vertical, sectional view of a bubble cap assembly mounted in a riser opening and having a riser construction in accordance with the invention,

Fig. 2 is a horizontal, cross-sectional view, taken on the line 2—2 of Fig. 1,

Fig. 3 is a transverse, vertical, sectional view, taken on the line 3—3 of Fig. 1,

Fig. 4 is a perspective view of the stud prior to attachment to the cross bar of the bubble cap holddown.

Fig. 5 is a perspective view of the assembled bubble cap holddown, and

Fig. 6 is an enlarged, detailed view of one of the arms of the riser collar.

In the drawing, the numeral **10** designates a bubble cap assembly which includes a riser **11** and a bubble cap **12** mounted upon a tray floor or deck **13** of a refining vessel (not shown) above and in alinement with a riser opening **14**. The bubble cap **12** is of conventional construction, having a plurality of spaced slots **15** in its depending skirt portion and resting upon the deck **13**. An axial opening **16** is formed in the top of the cap for co-acting with the riser **11**, as will be hereinafter more fully explained.

The riser includes a short tubular body or collar **17** which has its lower end swaged or flared radially outward to provide an external, peripheral flange **18** for engaging beneath the edge portion of the deck surrounding the riser opening **14**. The collar **17** preferably is formed from a flat sheet of relatively-thin metal which may be extruded to cup shape. In removing the bottom of the cup, a pair of diametrically-opposed blanks or projections **19** are left

and these projections are adapted to be bent inwardly upon themselves so as to function as short arms or supports extending longitudinally within the collar.

It is noted that it is desirable to remove only the flat portion of the cup bottom, whereby the curved or arced margin **20** of said bottom remains (Figs. 1, 3, and 6) for reinforcing the upper margin of the collar. The arms **19** depend from the inner peripheral edge portion of the margin **20** within the collar and in substantially parallel, spaced relation to its wall. An elongated opening or slot **21** extends longitudinally of each arm and its free or lower end may be rounded or bevelled as shown by the numeral **22** (Fig. 6). The external flange **18** is formed upon extrusion of the cup or subsequent thereto.

A transverse member or cross bar **23** is adapted to be supported by the riser arms **19** and preferably is substantially rectangular and flat in shape. Each end of the cross bar **23**, which is of a length slightly greater than the distance between the arms, is reduced in width to provide a short projection or tongue **24** for engaging within the slot **21** of one of said arms. The tongues **24** preferably are disposed intermediate the corners or longitudinal edge portions of the cross bar whereby said corner portions are offset inwardly and bear against the inner surfaces of the arms when said tongues are engaged in the slots of said arms. As shown by the numeral **25**, the lower corner portions of the cross bar preferably are offset to a greater extent than the upper corner portions to permit inward flexing of the arms into more positive engagement with said cross bar when an upward pull is exerted upon the latter. If desired, the lower corner portions may be bevelled or rounded as shown.

For connecting the cross bar **23** to the bubble cap **12**, a cylindrical member or stud **26** is secured to said cross bar and projects transversely from the medial portion thereof at substantially a right angle. The stud **26** is provided with screw-threads **27** at its free or outer end and is adapted to project above the riser collar through the opening **16** of the bubble cap when the elements are assembled. A nut **28** is threaded upon the stud so as to overlie and bear against the top of the bubble cap. With the riser **11** extending upwardly through the opening **14** of the deck **13** and with the cross bar **23** in place, the connection of the cap **12** to the stud **26** by the nut **28** fastens said riser within its opening and its peripheral flange **18** is drawn upwardly into fluid-tight sealing engagement with the marginal edge portion of said deck which surrounds said opening. The cross bar **23** and stud **26** thus constitute a holddown means for the bubble cap.

As is most clearly shown in Figs. 4 and 5, the stud has a lateral projection or radial lug **29** at its lower portion for engaging within a complementary opening **30** formed in the medial portion of the cross bar. The lug **29** and opening **30** preferably are cylindrical and said lug is forged or otherwise formed from the stud by deforming said stud as shown by the numeral **31**. Upon engaging the lug in the cross bar opening and deforming said lug, the stud is securely fastened to said cross bar. In order to locate the stud axially of the riser, it is preferable to deform the medial portion of the cross bar by bending the same around substantially one-half of said stud as shown by the numeral **32**. Of course, this bending of the cross bar distorts the opening **30** and permits lateral spreading of the deformed lug (Figs. 2 and 5) whereby relative movement between the stud and cross bar is prevented. It is noted that the cross bar and stud co-act with the arms to provide a support for the bubble cap as well as a connection between the riser and cap.

From the foregoing, it is believed to be readily apparent that an efficient bubble cap riser of inexpensive, simple construction has been provided. Due to the fact that the riser arms are formed from normally waste or scrap metal, the same are obtained at practically no cost and a saving is effected by eliminating the necessity of attaching separate arms to the riser collar. In addition, the riser may be readily assembled in a minimum period of time to further increase the economy of manufacture. The simplicity and economy of construction of the bubble cap holddown is an important feature of the invention. The stud **26** may be formed from cylindrical bar stock or a

screw-threaded stud purchased on the open market and the lug **29** may be readily and inexpensively forged therefrom. Manifestly, the attached cross bar and stud may be easily fastened to the riser collar by pushing or forcing the same downwardly into said collar so as to engage the tongues **24** in the slots **21** of the arms **19**. Due to the greater offset of the lower corner portions **25** of the cross bar, the arms are urged or flexed inwardly into snug engagement with the ends of said cross bar when the stud is urged upwardly by tightening of its nut.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. A riser for a bubble cap including, an upright tubular body, a pair of elements disposed within the body and depending from the upper end of said body in spaced relation thereto, each element having an opening therein, and a bubble cap holddown including a cross bar disposed between the elements and having the ends of the cross bar engaging in the openings of said elements, the holddown having means for connection with a bubble cap, said elements being movable inwardly into more positive engagement with said cross bar when said holddown is pulled upwardly.

2. A riser for a bubble cap including, an upright tubular body, a pair of arms made integral with the upper end of the body and bent inwardly and downwardly so as to depend within said body in spaced relation thereto, each arm having an opening therein, and a bubble cap holddown having means for connection with a bubble cap and a cross bar disposed between the arms with its ends engaging in the openings of said arms, said arms being movable inwardly into more positive engagement with the cross bar when said holddown is pulled upwardly.

3. A bubble cap riser as set forth in claim 2 wherein the bubble cap holddown includes a stud attached to the cross bar and projecting above the body for connection with a bubble cap.

4. A bubble cap riser as set forth in claim 2 wherein the bubble cap holddown includes an upwardly projecting member for connection with a bubble cap, the member having a projection and the cross bar having an opening for receiving the projection, said projection being deformed in the opening to fasten said member to said cross bar.

5. A bubble cap riser as set forth in claim 2 wherein the cross bar has its end portions reduced to provide lugs for engagement in the openings of the arms.

6. A riser for a bubble cap including, an upright tubular body, a pair of opposed arms made integral with the upper end of the body and bent inwardly and downwardly so as to depend within said body in spaced relation thereto, each arm having a slot extending longitudinally thereof, a flat cross bar between the arms with its ends engaging in the slots of said arms, said arms being movable inwardly into more positive engagement with the cross bar when said cross bar is pulled upwardly, and an axial stud extending upwardly from said cross bar for connection with a bubble cap, the stud having a lateral projection and said cross bar having an opening in which the projection is engaged, said stud and cross bar being connected by bending said bar around substantially one-half of said stud and by deforming said projection in the opening.

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