Dec. 13, 1949 E. D. RAPISARDA ET AL 2,491,209

BUBBLE CAP ASSEMBLY

Filed Feb. 12, 1949

Fig. 2.

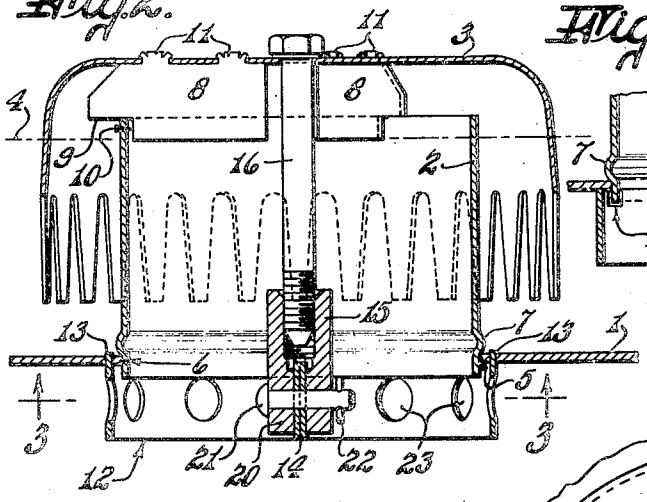


Fig. 4.

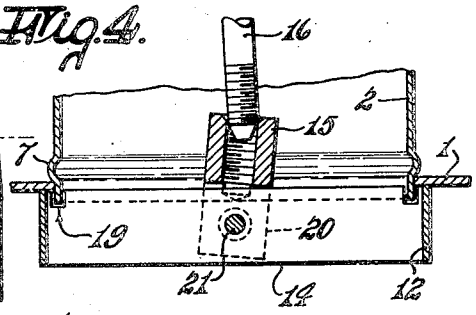


Fig. 1.

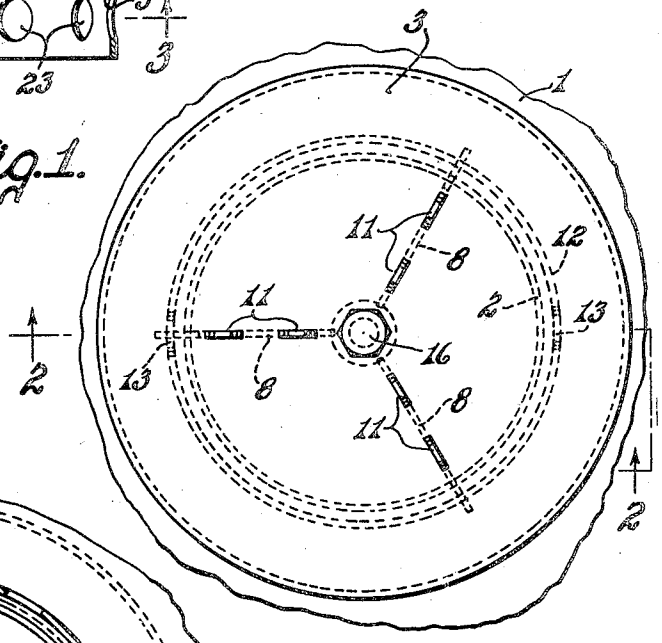
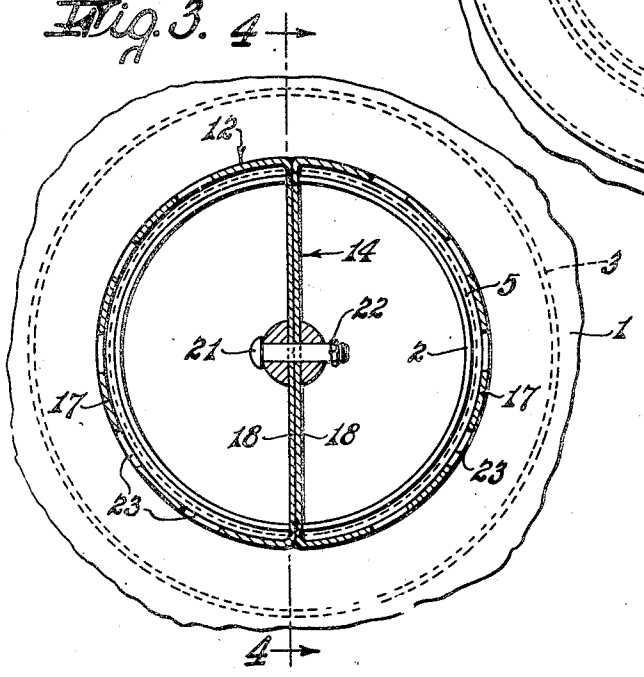


Fig. 3.



INVENTORS
EDWARD D. RAPISARDA
AND HARRY F. TAPP
BY Chapin & Neal
ATTORNEYS

Patented Dec. 13, 1949 2,491,209

UNITED STATES PATENT OFFICE

2,491,209

BUBBLE CAP ASSEMBLY

Edward D. Rapisarda, Agawam, and Harry F. Tapp, Longmeadow, Mass., assignors to Gilbert & Barker Manufacturing Company, West Springfield, Mass., a corporation of Massachusetts

Application February 12, 1949, Serial No. 76,132

2 Claims. (Cl. 261—114)

1

This invention relates to improvements in bubble cap assemblies, such as are used in fractionating towers and the like for the purpose of intimately contacting a gas with a liquid.

The invention has for an object the provision of an improved bubble cap assembly which is adapted for quantity production manufacture at low unit cost and which enables the chimney and cap to be readily mounted on the floor of a tray of the bubble tower and secured thereto by the hold down bolt, working from a position above the tray or deck, and which enables easy removal of the cap and chimney, leaving the tray or deck free of protuberances or other obstructions to facilitate cleaning of the deck.

Another object of the invention is to provide a bubble cap assembly of improved construction to enable the chimney to be mounted in, or demounted from, a gas escape opening in the floor plate of the bubble tray and, when mounted therein, to be clamped in leak-proof fashion to the floor plate, the construction being characterized in that the floor plate, which may be of thin metal, is clamped between a shoulder on the outer peripheral wall of the chimney and an anchor ring fixed to the bottom of the plate, the shoulder extending completely around the periphery of the chimney and the ring having a similar peripheral shape and extent, whereby clamping pressure may be applied to press the plate against the shoulder at all points in the periphery of the latter.

Another object of the invention is to provide an anchor ring for the purpose described of novel construction enabling economical manufacture.

These and other objects of the invention will best be understood from the following detailed description of the illustrative examples of the invention in the accompanying drawings in which:

Fig. 1 is a top plan view of a bubble cap assembly embodying the invention;

Fig. 2 is a sectional elevational view taken on the line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view; and

Fig. 4 is a fragmentary cross sectional view taken on the line 4—4 of Fig. 3.

Referring to these drawings; 1 represents a portion of the floor or deck of a bubble tray, which, as is well known, is adapted to be mounted in a bubble tower. A plurality of these trays are mounted in the tower at different levels, in the general manner disclosed in Patent No. 1,167,136, to Alexander, granted April 24, 1928. It is desirable that the floor plate 1 be made of

2

non-corrosive metal, such as stainless steel for example, and, since this metal is relatively expensive, the floor plate is made as thin as feasible. In each bubble tray are mounted many of the bubble cap assemblies, which form the subject matter of this invention. All parts of each bubble cap assembly are preferably made of non-corrosive metal, such as stainless steel for example. A single one of these assemblies will be described herein.

Each bubble cap assembly includes a chimney 2 (Fig. 2) rising from the floor plate 1 of the bubble tray and conducting through it the gas or vapor, which rises from below the plate. Seated on top of the chimney in vertically spaced relation is a bubble cap 3, which deflects the rising gas or vapor, forcing it downwardly and causing it to pass through liquid, which is maintained on the tray as disclosed in said patent to a level indicated by the dot-dash line 4. The chimney 2 may be of any suitable cross sectional shape, although it is herein shown (Fig. 3) as cylindrical. This chimney (Fig. 2) has a shoulder 5 thereon which extends entirely around its external periphery, is spaced from its lower end, and is located in a plane at right angles to the vertical axis of the chimney. The lower end of chimney 2 is seated in an opening 6 of like cross sectional shape in the floor plate 1 with the shoulder 5 abutting the upper surface of the plate. The shoulder 5 may be conveniently formed by rolling a bead 7 in the chimney.

The cap 3 has generally the shape of an inverted bowl. It is supported from the top of chimney 2, and spaced from the upper end thereof, by means of a plurality (three as shown) of horizontal vanes 8 (see also Fig. 1) which are fixed to the top wall of the cap and located inside the same. These vanes extend from a position near the center of the cap radially outward in diverging relation to and beyond the chimney 2, having notched outer ends (Fig. 2), providing on each a horizontal seat 9 to rest on top of the chimney and a vertical shoulder 10 to lie inside the same. These shoulders serve to locate the cap 3 approximately coaxially of chimney 2. Each vane is fixed in any suitable way to the cap. As shown, each vane 8 may have two projections 11, which extend upwardly through slots in the top of the cap and are held thereto by "staking," as indicated.

The bubble cap 3 and chimney 2 are held together and to the floor plate 1 of the bubble tray by means of a bolt and nut connection between the cap 3 and an anchor ring which underlies the

floor plate. The anchor ring is designated 12. It has the same cross sectional shape as the chimney 2 (Fig. 3), in this case circular, and its upper end affords an annular seat which is located in a plane at right angles to the vertical axis of the ring and which abuts the lower face of the floor plate 1 at all positions around its periphery. This ring may be held to the floor plate in any suitable way. For example, the ring (Fig. 2) may have projections, such as 13, which extend through slots in the plate 1 and are staked, as indicated in Fig. 1, to hold the ring against the under side of the plate. The anchor ring has a cross bar 14 (Figs. 3 and 4), carrying a nut 15 (Figs. 2 and 4) to receive a bolt 16, which is passed through a central hole in cap 3 (Fig. 2) and extends downwardly through the chimney with its lower end threaded into the nut. The head of the bolt 16 engages the top of cap 3 and is operatively engaged with the chimney through vanes 8 to draw the chimney and anchor ring together. When the bolt 16 is tightened the cap 3 and chimney 2 are drawn together and the chimney is drawn downwardly until the floor plate 1 is tightly clamped against the shoulder 5 and the anchor ring 12. An annular area of the floor plate is thereby clamped against the shoulder 5 to provide a leaktight joint. The engaged portions of plate 1 and shoulder 5 are parallel and are drawn into close contact. The clamping area extends completely around the periphery of the engaged parts, preventing bending of the thin floor plate, such as might occur intermediate the clamped points, if as has heretofore been common practice, a spider with angularly-spaced radiating arms is used in place of the continuous anchor ring.

The anchor ring has been shown as made in two halves or D-shaped sections (Fig. 3), each having a semi-cylindrical part 17 and a diametrical part 18, the ends of which are welded together. The two parts 18 together form the cross bar described. This cross bar is recessed as at 19 (Fig. 4) to clear the lower end of chimney 2. The nut 15 may have a forked lower end 20 (Figs. 1 and 4) which straddles the cross bar 14 and is held thereto by a pin 21. This pin, in turn, is held in place by a cotter pin 22. This pin and fork connection (Fig. 4) enables a limited pivotal movement of the nut relatively to the cross bar, which may be desirable in aligning the bolt and nut. For convenience in assembly, the bolt 16 preferably has a pointed lower end and the entrance end of nut 15 is countersunk as shown in Fig. 4. The anchor ring 12 may have a series of angularly-spaced holes 23 therein to enable greater freedom of flow into the lower end of chimney 2.

With this invention the chimney of the bubble cap assembly is demountable from the floor plate 1, when required, and it is also firmly clamped in leaktight fashion to this floor plate, which usually is of thin metal, such as stainless steel, or other suitable non-corrosive metal. The floor plate is held between a shoulder on the chimney and an anchor ring with a clamping area which extends completely around the periphery of the engaged parts, avoiding bending of the thin metal away from the shoulder of the chimney, which would occur if for example a spider with

radiating arms were used in place of the continuous ring. This result is secured with a simple structure which is capable of economical manufacture. The anchor ring can be formed economically from two metal stampings and a standard nut which is welded in place in one of the stampings. The stamped out parts can be easily and quickly assembled without the aid of tools and the assembly mounted on and secured to the floor plate in the simple manner described.

We claim:

1. A bubble cap assembly for covering an opening in the floor plate of a bubble tower tray and comprising in combination, a floor plate provided with an opening, a cylindrical chimney having its lower end engaged in said opening and rising from said floor plate, said chimney having a shoulder extending completely around its outer periphery in a plane at right angles to the vertical axis of the chimney, an anchor ring substantially the same in cross sectional shape as the chimney and mounted on the underside of said plate and encircling said opening in closely adjacent relation, a cross bar fixed to the anchor ring and extending across the same, a nut upstanding from the cross bar, a bubble cap mounted on top of the chimney, and a bolt having its head engaged with the top of the cap and extending through the latter and the chimney with its lower end threaded into said nut, the latter being connected to the cross bar for limited pivotal movement to facilitate alinement of the bolt and nut.

2. A bubble cap assembly for covering an opening in the floor plate of a bubble tower tray and comprising in combination, a floor plate provided with an opening, a chimney having its lower end engaged in said opening and rising from said floor plate, said chimney having a shoulder extending completely around its outer periphery in a plane at right angles to the vertical axis of the chimney, an anchor ring composed of two D-shaped sections fastened together with their flat sides in abutment and forming an annular ring with a diametrical cross bar composed of said flat sides, said annular ring being fixed to the under side of said plate coaxially of said opening and tube and encircling the latter in closely adjacent relation, a bubble cap mounted on top of the chimney, a nut carried by the anchor ring centrally thereof, and a bolt having its head engaged with the top of said cap and extending through the latter and the chimney with its lower end threaded into said nut, whereby to draw the cap against the chimney and clamp the plate between said shoulder and ring.

EDWARD D. RAPISARDA.
HARRY F. TAPP.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,055,048	Puls	Sept. 22, 1936
2,438,536	Cairns	Mar. 30, 1948
2,461,729	Glitsch	Feb. 15, 1949