

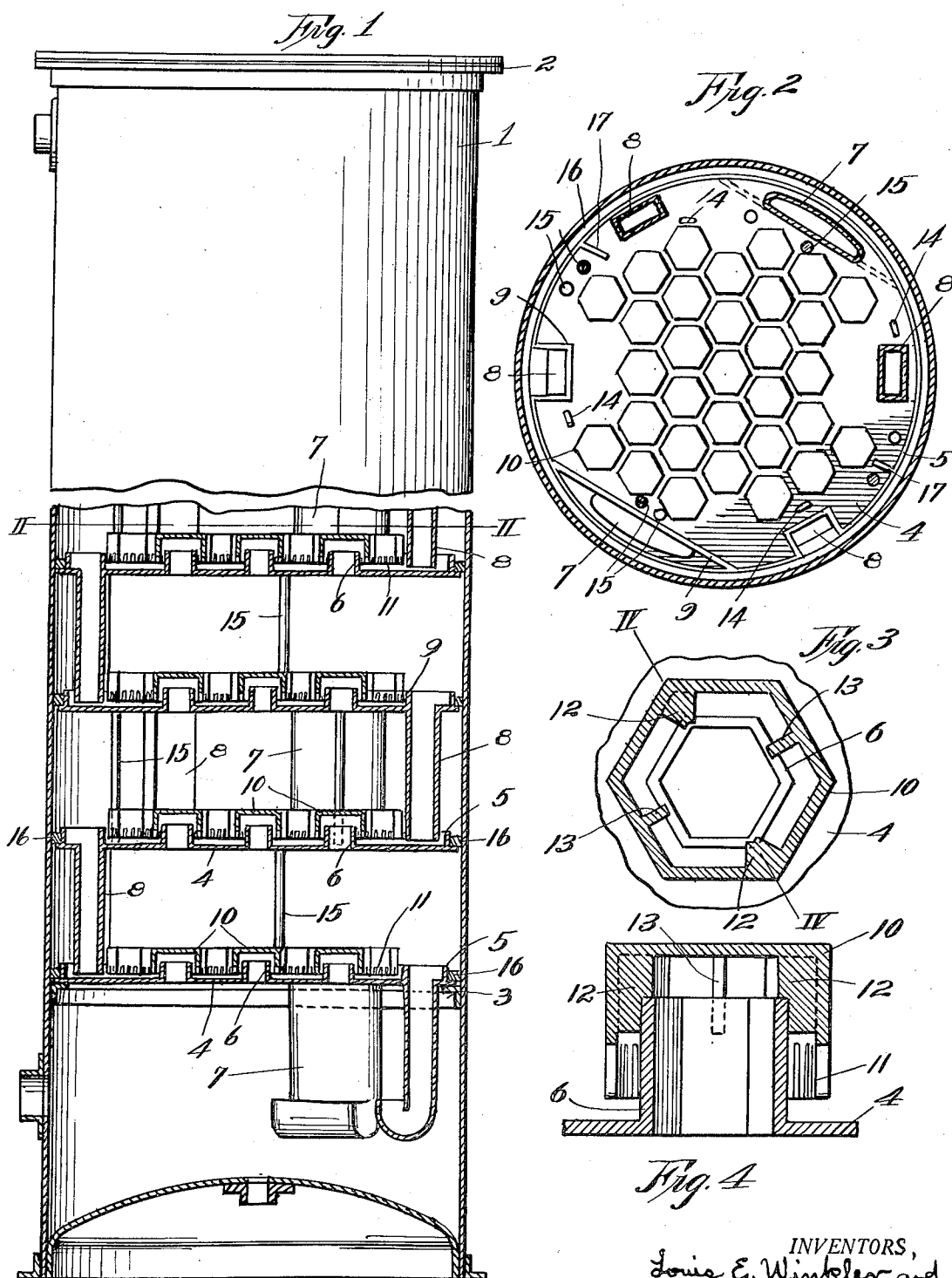
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BUBBLE TOWER

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BUBBLE TOWER.

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This invention relates to bubble towers and our object is to produce a construction whereby most all types of fractionating towers may be readily, efficiently and comparatively inexpensively changed or altered into a bubble tower, this object being accomplished by the production of a new and useful type of deck which may be lowered into a tower from the upper end thereof.

Another object is to produce an improved type of deck in which the overflows are arranged to secure a uniform discharge of liquid from deck to deck and to equalize this flow so that it shall be substantially the same over the whole surface of the deck, thus eliminating local eddies or pockets of still or non-flowing liquid in effect by-passing certain caps.

A still further object is to produce an improved type of cap of hexagonal shape, it being found that by this arrangement a greater number of caps to a given area can be provided and that the distance between adjacent faces of all the caps is maintained the same. It is found that this construction provides a greater number of comb teeth and thereby better insures the breaking up of the gas and the more efficient deformation of the bubbles through striking the bubbles emitted by the next adjacent cap.

With the general objects named in view, the invention consists in certain novel and useful features of construction and organization of parts as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawing, in which:—

Figure 1 is a side view of a bubble tower embodying the invention, partly in central vertical section.

Figure 2 is a section on the line II—II of Figure 1.

Figure 3 is an enlarged horizontal section taken through one of the hexagonal caps.

Figure 4 is a section taken on the line IV—IV of Figure 3.

In the said drawing, where like reference characters identify corresponding parts in all of the figures, 1 indicates a suitable tower and 2 the removable top thereof. Secured to the inner face of the wall of the tower at the desired point above the bottom thereof is an inwardly projecting supporting flange 3.

The decks 4 of the invention preferably comprise circular cast members of sufficient

diameter to snugly fit within the tower, and each deck is formed with a circumferential upwardly projecting flange or rim 5 spaced slightly from the periphery of the deck as illustrated in Figure 1. Practically the entire deck is formed with the desired number of upwardly projecting collars 6 of hexagonal shape to provide exits for the gas as common in bubble tower construction, it being understood that the collars are equally spaced in all directions, and extend slightly higher than the overflow weirs hereinafter referred to.

In order to provide for the discharge of the liquid from one deck to another and to secure uniform flow across each deck, every deck is preferably formed integrally with three downflows, a large downflow 7 and a pair of smaller downflows 8 located equal distances and in opposite directions from the large downflow, each downflow being formed with a weir 9 of the required height to provide the desired amount of submergence on the deck.

The caps 10 for the collars 6 comprise hexagonal members formed with downwardly depending teeth 11 to break up the vapor emitted from the collars, said caps being integrally formed with a pair of oppositely facing internal corner lugs 12 to snugly receive and to overlie and rest on opposite corners of the collars to support said caps with their lower edge spaced from the deck and also to prevent accidental rotation of the caps on the collars. At right angles to the lugs 12 a pair of auxiliary lugs 13 are formed on the caps to snugly fit against and overlie the collars to insure the proper retention of the caps in horizontal position.

In order to provide means for the easy handling of the decks to place them in position within a tower, each deck is provided with four projecting ring bolts 14 spaced around the deck in such positions as not to interfere with the collars or downflows. For the proper spacing and support of the decks within the tower, each of said decks in addition to the ring bolts is provided with four spacing and supporting rods or bolts 15 secured in any suitable or desired manner to the decks.

The decks are assembled within a tower as follows: The lower most deck having the lower end of its downflows terminating in a return-bend, as common in bubble tower construction, is lowered by a suitable cable (not

shown), engaged with the eye bolts mentioned, into position until it comes to rest on the flange 3.

The peripheral joint between the tower and the deck 4 is now sealed by packing the space between the rim 5 and the tower with any suitable asbestos or other packing 16. The next deck is now lowered into position until it comes to rest on the spacing rods 15, care being taken to place the deck so that its main or largest downflow shall be diametrically opposite the main or largest downflow of the lower deck. The rim of this deck is now packed as above described. The remaining decks of the tower are now lowered in turn, it being understood that in each instance the position of the main or largest overflow is on the opposite side of the tower from the equivalent overflow of the lower adjacent deck. As many decks as desired may be placed as described until the breaking point of the flange support of the lowest deck is approached. When this point is reached another flange (not shown) is secured to the tower and an additional number of decks are built up until the desired number is attained.

By staggering the position of the main or principal downflows it will be apparent that each downflow discharges the liquid onto a particular deck on the opposite side from the downflow of such deck and thus insures that the flow of liquid shall run across the entire face of the deck. It will be evident that if a single downflow is depended upon for the discharge of liquid that practically all of the liquid will follow the same path across a deck, permitting side pockets of still or non-flowing liquid to accumulate. As this is objectionable we have provided the auxiliary downflows 8 at each side of the principal or main downflow, thus insuring a flow of liquid across the entire surface of each deck. It has been found, however, in order to prevent the by-passing of the discharge from the small downflows around any of the caps by following the rim of the deck, that it is desirable to form said deck with a pair of deflectors 17 extending inwardly from the rim as shown most clearly in Figure 2.

From the above description it will be apparent that we have produced a bubble tower deck and assembly which possesses all of the features pointed out as desirable; and it is to be understood that while we have described and claimed the preferred embodi-

ment of the invention we reserve the right to make all changes properly falling within the spirit and scope of the appended claims.

We claim:

1. In a bubble tower, the combination of a tower, a bubble deck fitted in said tower and supported some distance from the bottom thereof, a rim formed adjacent the periphery of said deck, packing fitted against the outside of the rim and sealing the space between the periphery of the deck and the wall of the tank, a second deck received within said tank, and spacing rods between said first and second deck for the spacing and support of said second deck.

2. A bubble tower having a plurality of decks, each of said decks being provided with a plurality of downflows, the downflows of each deck being arranged to discharge onto a deck at points diametrically opposite the downflows of such decks, caps on each deck, and deflectors on each deck to prevent the by-passing of any of the caps.

3. In a bubble tower, the combination of a tank, a bubble deck fitted in said tank and having its periphery in proximity to the wall of the tank, a rim formed adjacent the periphery of the deck, and packing received between the outside of the rim and sealing the space between the periphery of the deck and the wall of the tank.

4. A bubble tower having a plurality of decks, each of said decks being provided with a plurality of downflows, so arranged that the downflows of adjacent decks are on opposite sides of the centers of said decks in order that each downflow shall discharge liquid in proportion to its relative position with regard to the downflows of the next adjacent deck to insure an even flow across such next adjacent deck.

5. A bubble deck formed with upwardly projecting hexagonal collars, and hexagonal caps received on and supported by said collars and having their walls equally spaced in all directions from the walls of said caps; said caps and collars being so arranged on the decks that the proximate walls of all adjacent caps and collars shall be in parallel relation.

In witness whereof we hereunto affix our signatures.

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