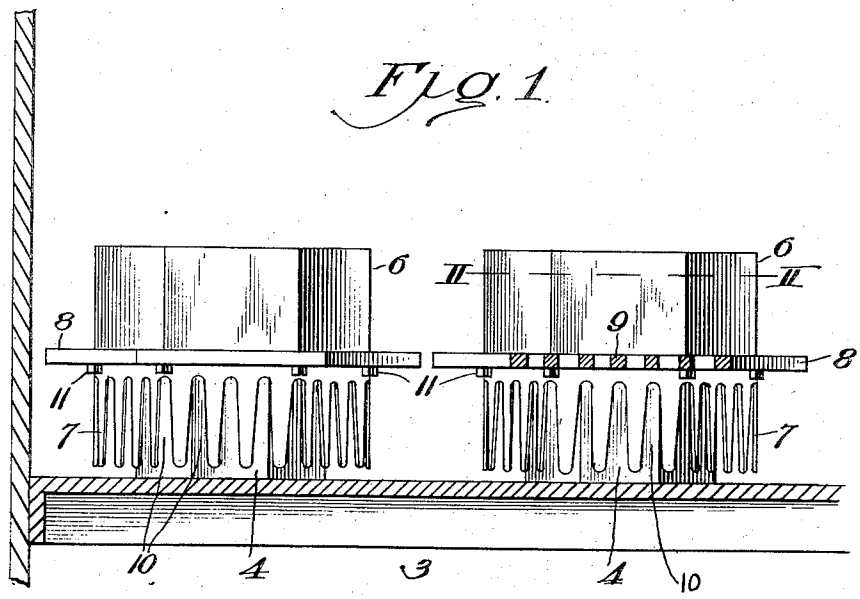
Sept. 2, 1930. L. E. WINKLER ET AL 1,774,581

BUBBLE TOWER GRID

Filed Aug. 1, 1927

FIG. 1.



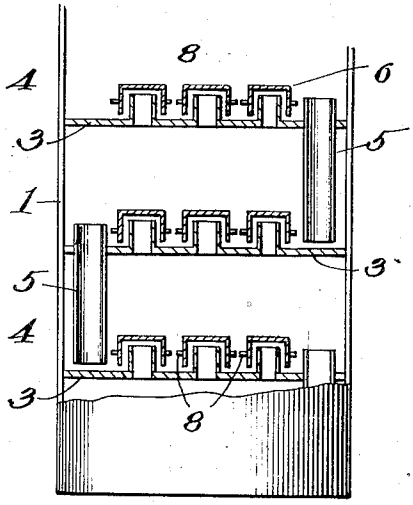


FIG. 3.

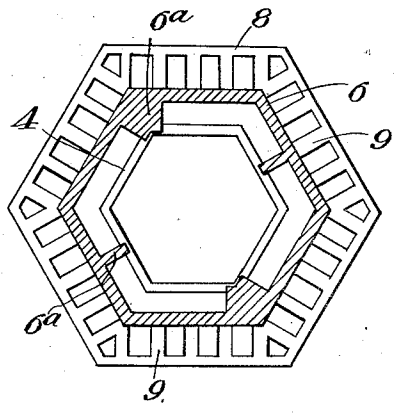


FIG. 2.

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UNITED STATES PATENT OFFICE

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BUBBLE-TOWER GRID

Application filed August 1, 1927. Serial No. 209,973.

This invention relates to an improvement in bubble caps used in absorption or fractionating towers and has for its general object to insure a more complete contact between the liquid on a deck and the vapor or gas bubbling up through the liquid so that the rate and quantity of absorption of gas or vapor by the liquid shall be materially increased within a given time over the standard type of bubble cap.

In all bubble caps with which we are familiar, a row of vertical teeth are provided to break up the escaping gas or vapor into bubbles which pass upwardly through the liquid on a deck, said bubbles being relatively large and only the vapor on the exterior of the bubble coming into contact with the liquid. With the ordinary bubble cap it has also been found that gas exiting from adjacent caps at an angle of approximately 45° with respect to the deck, meet and entrain liquid between them, the liquid being thrown into the vapor space above the deck and perhaps being entrained through the entire series of decks, thus materially decreasing the absorption or fractionating power of the absorption or fractionating tower or column.

The ordinary bubble cap is still further objectionable as it has been found that frequently a surging of the liquid back and forth upon each deck occurs, the gas escaping first on one side of a cap and then on the other, and in extreme cases first one side of a cap and then the other is entirely uncovered and gas escapes into the vapor space without being subjected to contact with the liquid on the deck. It will be evident that such surging materially reduces the efficiency of a tower or column.

In order to obviate the objectionable features of bubble caps, we have produced a structure which will break up the bubbles as they exit from the vertical teeth into many very fine bubbles, thus increasing the quantity of gas or vapor subjected to direct contact with the liquid. The structure of the invention also serves to lower the rate of speed at which the bubbles leave the surface of the liquid and consequently materially reduces the geyser effect of the gas or vapor leading to the entrainment of liquid into the vapor space above a deck and also serves to entirely stop the surging of the liquid back and forth across the decks.

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 broken sectional view of a part of a bubble deck equipped with devices embodying the invention.

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

Figure 3 is a diagrammatic central vertical section through a bubble tower equipped with caps embodying the invention.

In the said drawing, where like reference characters identify corresponding parts in all of the figures, 1 indicates a bubble tower equipped with decks 3, gas or vapor escape passages 4, and downflows 5 all of common and well known construction or of any preferred type.

Mounted upon each gas or vapor escape passage is a bubble cap 6 having internal supporting lugs 6^a resting on the upper ends of the collars 4 and being formed with the customary downwardly depending teeth 7 for breaking up the gas or vapor escaping into the liquid on the decks as common in the art. In this connection it will be noted that the bubbles are relatively large and are propelled upwardly at angles at approximately 45° with reference to the deck at increasing speeds as they approach the surface. As the rate of speed at which a gas is forced through the tower is increased, it will be evident that an increasing geyser effect is produced leading to entrainment of liquid, with a resultant increase in surging of the liquid back and forth across the decks. In order to break up the bubbles and prevent surging as above stated, we have found it necessary to provide a secondary perforate or skeleton screen or barrier parallel to the surface of the liquid and preferably about one-fourth inch below the surface of such liquid, said screen being

of any desirable character to intercept the path of travel of the rising bubbles, but preferably of the type shown in the drawing. In the drawing, 8 indicates a plate which may be integral with the cap or separable, as illustrated, the cap having lugs 11 to support the plate, said plate being of contour to encircle the bubble caps and having a series of teeth 9 vertically above the slots 10 between the teeth 7 of the bubble caps, to insure the breaking of the relatively large bubbles, issuing through said slots 10, into a multitude of fine bubbles to increase the contact between the gas or vapor and liquid, thus making it possible for the tower to handle a greater volume of gas in the same length of time than with the common and ordinary type of bubble cap.

It will be evident from the above description taken in connection with the drawing, that the horizontal grid or perforate, skeleton barrier makes it possible for the bubble caps to be operated at a higher rate of speed than was formerly possible and that it materially reduces the entrainment of liquid, and insures a greater amount of intimate contact between the gas or vapor and the liquid and a more mild even boiling of the entire surface of the liquid on a deck without any wild surging of the liquid leading to a geyser effect: and it is to be understood that while we have described and claimed the preferred embodiment 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. The combination of a bubble cap adapted for use on a liquid supporting deck, said cap having a plurality of gas or vapor escape passages, of a perforate barrier above said passages and below the liquid level and at right angles to the cap for intercepting the path of travel of gas or vapor escaping from said passages.

2. The combination of a bubble cap adapted for use on a liquid supporting deck, said cap having a plurality of gas or vapor escape passages, and a horizontal grid above said passages and below the liquid level to intercept the path of travel of gas or vapor escaping therefrom.

3. The combination of a bubble cap adapted for use on a liquid supporting deck, said cap having a plurality of gas or vapor escape passages in its vertical walls, and a horizontal grid provided with imperforate portions, said grid being below the liquid level and having its imperforate portions vertically above the gas or vapor escape passages to intercept the path of travel of gas or vapor escaping therefrom.

4. A bubble cap adapted for use on a liquid supporting deck, said cap having a plurality of gas or vapor escape passages below the liquid level on said deck, and a slotted grid having the center of its imperforate portions arranged in the same vertical planes as the centers of cooperating underlying gas or vapor or escape passages to intercept the free upward travel of the gas or vapor escaping from said passage.

In testimony whereof we affix our signatures.

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FRED C. KOCH.