Sept. 16, 1930. J. E. KOBERNIK 1,776,032

DUPLEX BUBBLE CAP

Filed Jan. 5, 1928

Fig. 1.

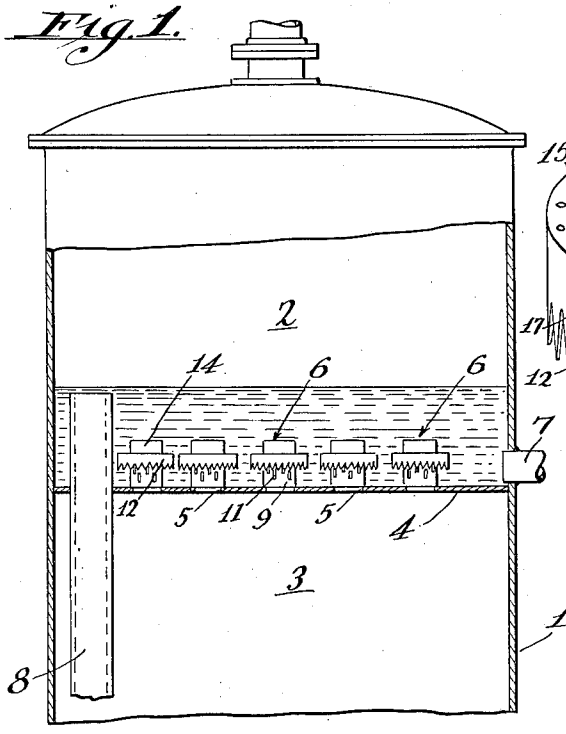


Fig. 2.

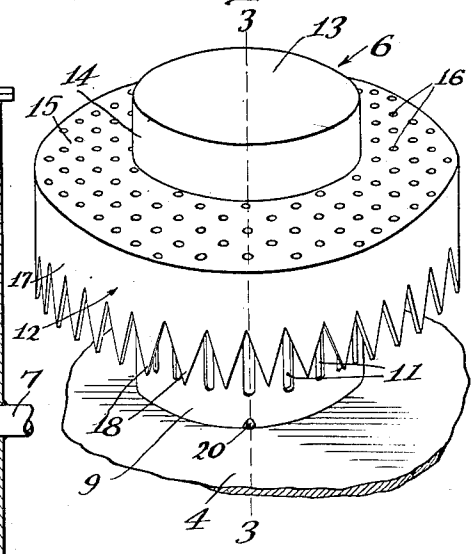
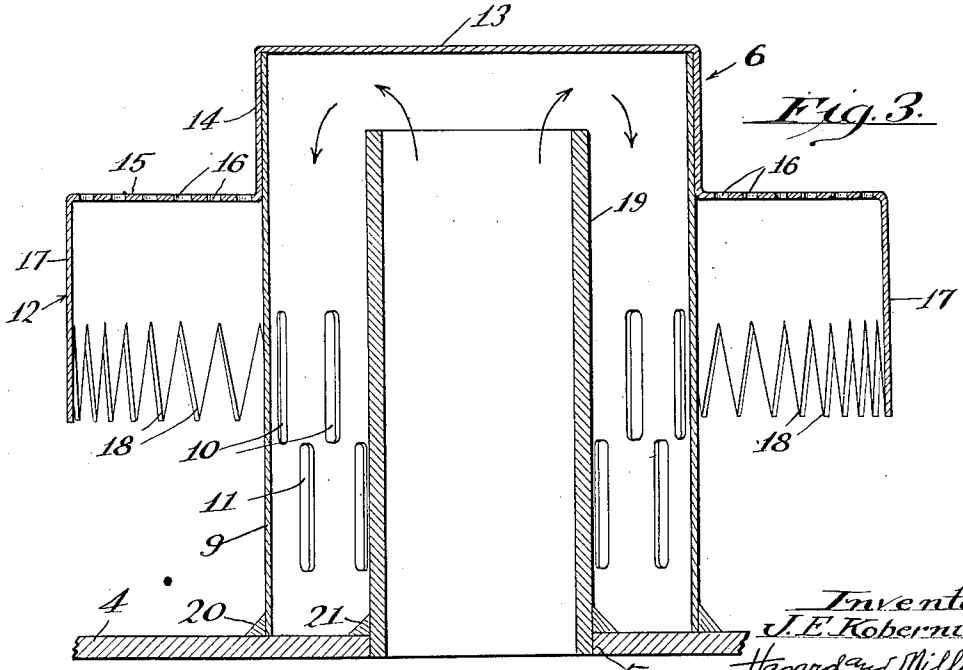


Fig. 3.



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UNITED STATES PATENT OFFICE

JULIUS E. KOBERNIK, OF LOS ANGELES, CALIFORNIA

DUPLEX BUBBLE CAP

Application filed January 5, 1928. Serial No. 244,614.

My invention relates to a bubble cap for use in apparatus for treating hydrocarbons, and in which absorbing, distilling, fractioning or stabilizing operations are carried on, especially in connection with the production of motor fuel. There are many different types of apparatus of the class referred to, but my invention may be applied to any of them in which a gas or vapor is caused to pass upwardly through a series of reaction or mixing chambers, and in its upward passage is repeatedly and intimately brought in contact with a liquid hydrocarbon passing in the opposite direction by gravity.

The apparatus of the class referred to contains a series of mixing chambers vertically arranged one above the other, the partitions separating them being perforated, and over these perforations so called bubble caps are disposed; the object of such bubble caps being to divide into minute bubbles the ascending gases and vapors and to thoroughly mix such bubbles of gas and vapors with the hydrocarbon liquid in which the bubble caps are immersed.

The present invention relates to a bubble cap, and it is an object of this invention to provide a highly efficient yet simple structure which is easily manufactured, assembled and installed.

My invention consists in the construction and arrangement of parts hereinafter described and claimed.

Referring to the accompanying drawings which form a part of this specification:

Figure 1 shows a fragmentary view partly in section, of an apparatus for treating hydrocarbons.

Fig. 2 is a perspective view of my improved bubble cap showing a portion of the partition on which it is mounted.

Fig. 3 is a central, vertical section taken on the lines 3—3 of Fig. 2.

The particular type of apparatus as stated before, is immaterial; the invention relating merely to the bubble cap placed over a perforation of a partition separating the reaction chambers.

1 indicates the shell of the apparatus; 2 and 3 are superimposed reaction or mixing chambers separated by a partition 4. The partition is provided with perforations 5 over each of which a bubble cap designated as an entirety by the numeral 6 is mounted. The liquid hydrocarbon enters the reaction chamber 2 by means of an inlet 7, and the bubble caps 6 are submerged in the liquid which is maintained at a predetermined level by means of an overflow pipe 8 conducting the hydrocarbon liquid from chamber 2 to the chamber 3 immediately below said chamber 3, having the same construction of partition bubble caps as shown in chamber 2.

The bubble cap consists of an outer tube 9 preferably circular in cross section, which is provided in its lower portion with two series of vertical slots 10 and 11 arranged horizontally, the slots of one series being in staggered relation to the other. It will be noted that the lower ends of the slots of series 10 and the upper ends of the slots of the series 11, lie in substantially the same horizontal plane. A hood or spreading member indicated as a whole by the numeral 12 is placed on the outer tube 9. The hood 12 consists of the lid portion 13 closing the upper end of outer tube 9. Integral with the lid portion 13 is a tubular portion 14 extending vertically downwardly therefrom and fitting over the outside of the outer tube 9. From the lower end of the tubular portion 14 extends an annular flange 15 provided with perforations 16. From the outer periphery of the annular flange 15 a ring-like apron 17 extends downwardly, the lower portion of which terminates in a plurality of V-shaped projections 18. The inner tube 19 is of a size to fit the perforation 5 of the partition 4, and is concentrically arranged with relation to the outer tube 9, the upper end of which is spaced from the lid portion 13. The inner and outer tubes are secured to the partition 4 preferably by welding, indicated at 20 and 21.

The operation is as follows:

The gas and vapor ascending from chamber 3 will pass upwardly through perforation 5 through inner tube 19 and will be deflected downwardly as indicated by the arrows, and will, on its exit therefrom, be caused to flow downwardly and out of the slots 10 and 11

of the outer tube 9. Passing upwardly into the annular space provided by the annular flange 15 and the apron 17 of the hood 12, the gas and vapor will be divided into minute bubbles passing through the smaller perforations 16 in the annular flange 15. If the gas and vapor should not pass through it with sufficient rapidity, a pressure will be built up in the space below the annular flange 15 until the gas and vapor will pass between the slots provided by the V-shaped projections 18 and bubble through the hydrocarbon liquid in which the bubble caps are immersed. The construction of the duplex bubble cap is such that the gas and vapor will be caused to be divided into minute bubbles by passing through perforations 16 in the annular flange 15 and through the serrations formed by the V-shaped projections 18 in the apron 17, and a violent boiling action will take place around each bubble cap, thus effecting an intimate mixture between the liquid, the vapor and the gas. It will be understood that the gas and vapor ascending upwardly are under a sufficient pressure to prevent any appreciable amount of the liquid hydrocarbon from flowing downwardly through the perforation 5.

While the bubble cap described is especially intended for use in hydrocarbon treatment apparatus, it will be understood that its use is not limited thereto, but may be employed in any apparatus where any gas or vapor is made to contact with a liquid.

Various changes in the construction and arrangement of parts may be made by those skilled in the art, without departing from the spirit of the invention as claimed.

I claim:

1. A duplex bubble cap for use in a hydrocarbon treatment apparatus of the class described, comprising an open-ended outer cylindrical tube provided in its lower portion with a plurality of horizontal series of vertical slots, the slots of one series alternating with the slots of the other series and their adjacent ends being in substantially the same horizontal plane, a hood mounted on said outer tube forming a lid therefor, said hood having a horizontal perforated annular flange and a vertical apron depending from the annular flange, the lower portion of said apron being provided with a series of V-shaped projections and an inner imperforate open-ended tube concentrically arranged in said outer tube, the top of said inner tube being spaced from the upper end of the outer tube.

2. A duplex bubble cap for use in a hydrocarbon treatment apparatus of the class described, comprising an open-ended tube provided in its lower portion with a series of vertical slots, a hood mounted on said outer tube and forming a lid therefor, an annular perforated flange integral with said lid and provided with a depending apron, said apron terminating in a series of serrations, and an inner imperforate open-ended tube concentrically arranged in said outer tube, the upper end of said inner tube being spaced from said lid.

3. A duplex bubble cap for use in a hydrocarbon treatment apparatus of the class described, comprising an open-ended tube provided with a series of openings in its lower portion, a hood mounted on said outer tube forming a lid therefor and provided with a horizontal perforated flange, said flange having a depending apron provided at its lower edge with a series of serrations, and an inner imperforate open-ended tube concentrically arranged in said outer tube, the upper end of said inner tube being spaced from said lid.

4. A duplex bubble cap of the class described, comprising an open-ended outer tube provided with a series of openings in its lower portions, a lid closing the upper end thereof, a perforated flange connected to said lid and extending laterally from said outer tube, said flange having a depending apron, and an inner open-ended tube in said outer tube, the upper end of said inner tube being spaced from said lid.

In testimony whereof I have signed my name to this specification.

JULIUS E. KOBERNIK.