Nov. 13, 1928. 1,691,333

H. M. BOE

OIL DISPLAY DEVICE

Filed March 16, 1927 2 Sheets-Sheet 1

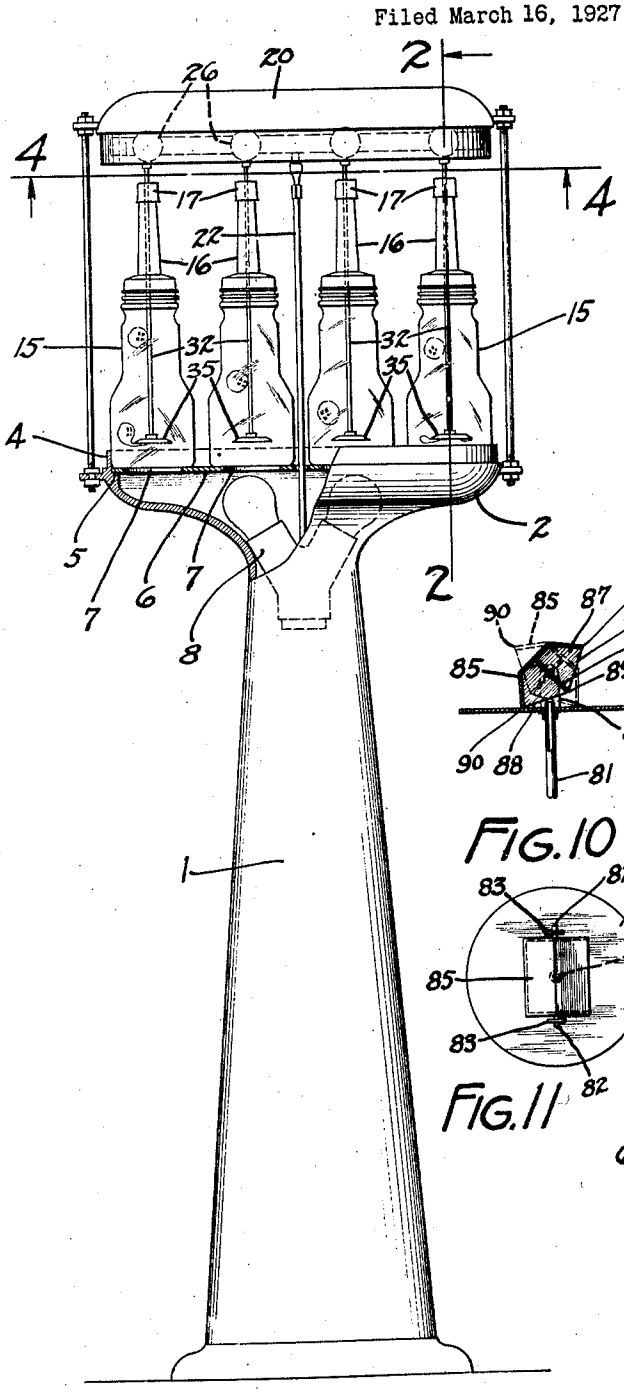



FIG. 1

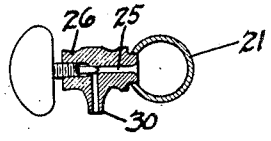



FIG. 3




FIG. 10




FIG. 11

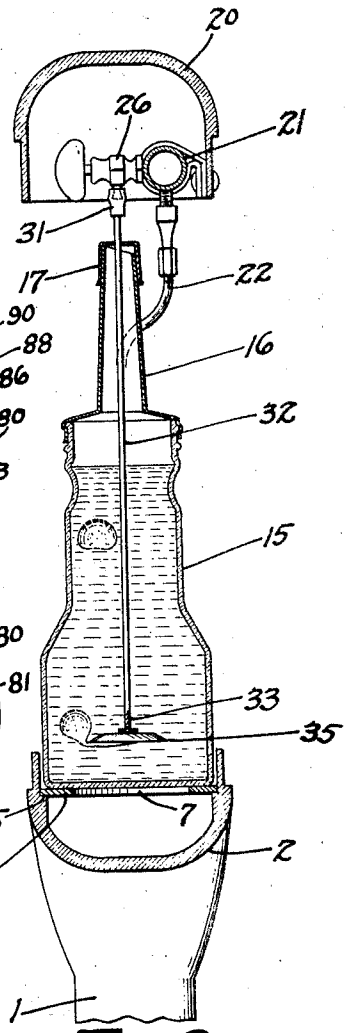



FIG. 2

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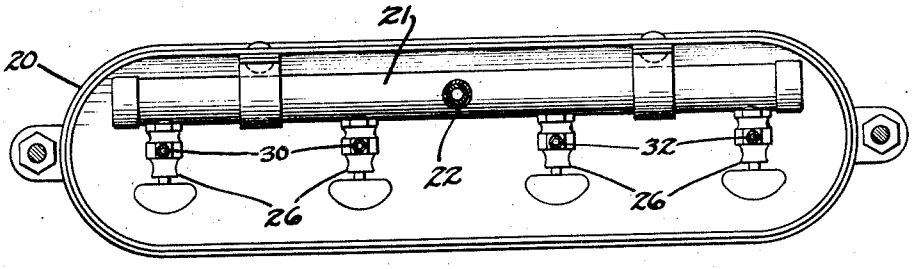



FIG. 4

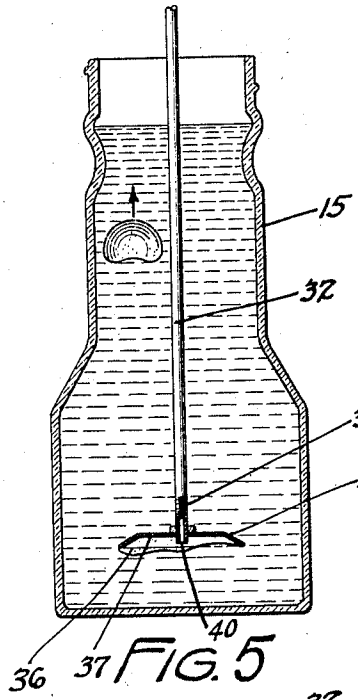



FIG. 5

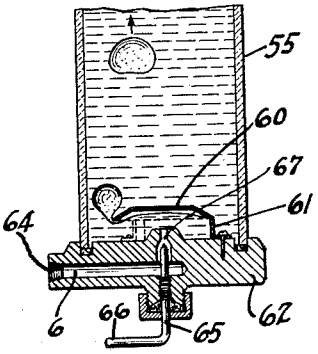



FIG. 8

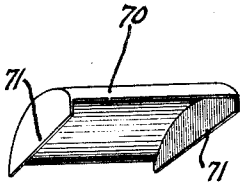



FIG. 9

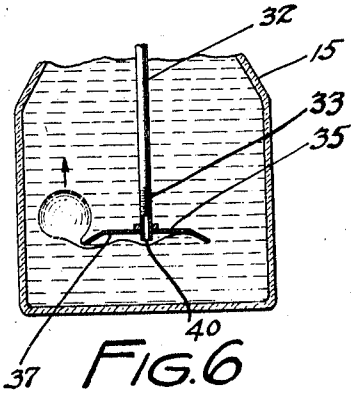



FIG. 6

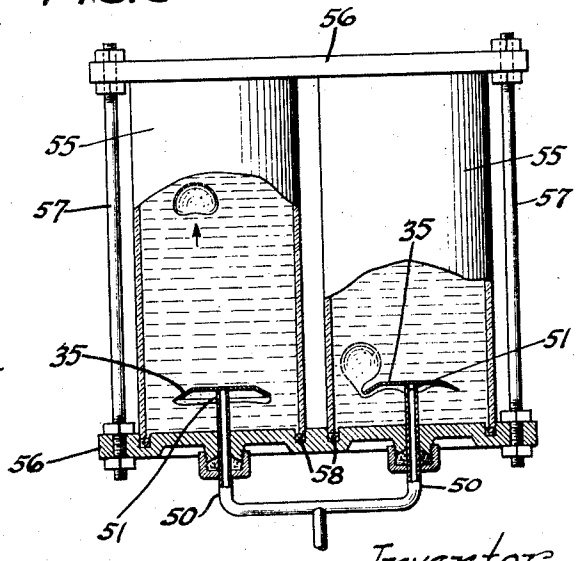



FIG. 7

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Patented Nov. 13, 1928. 1,691,333

# UNITED STATES PATENT OFFICE.

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## OIL-DISPLAY DEVICE.

Application filed March 16, 1927. Serial No. 175,903.

This invention relates generally to a method of advertising and displaying liquids, as well as to the specific means for producing bubbles within the liquids, and for timing their production.

An important object of the invention is to provide means whereby large bubbles may be successively produced in a liquid. Another important object is to provide means for producing bubbles at timed intervals. Other objects are to provide a display device in which the bubbles are produced, and in which the liquid is illuminated to heighten the effects of the bubbles as they travel upwardly through the liquid; to provide means for micro-metrically controlling the admission of air so that the bubbles may be formed at any desired interval, and so that the speed of formation may be made the same, or may be varied among the members of a series of containers; and to provide means for delivery of the oil beneath a bubble-forming, and releasing element.

Features of the invention include all the details of construction both of the apparatus per se for producing the bubbles, and its relation within a transparent liquid container, along with the various constructions and arrangement shown for producing an advertising or display device.

Another feature of the invention includes a device for producing bubbles and releasing the same alternately at opposite sides.

Advantages as well as other features and objects will be set forth in the specification, forming part of this application and in said drawings

Figure 1 is an elevation partly in section showing a brace of transparent oil containers, having means therein for forming bubbles, and also showing means for illuminating said bubbles and contents of the container or containers;

Figure 2 is a detailed section on line 2—2 of Figure 1;

Figure 3 is a detailed section through one of the valves;

Figure 4 is a bottom plan section on line 4—4 of Figure 1;

Figure 5 shows a bubble during formation;

Figure 6 shows a bubble about to be released;

Figure 7 is a vertical sectional elevation showing a modified form in which the bubble forming means is mounted above and to the air delivery means;

Figure 8 shows a modification of the invention, in which the bubble forming element is attached directly to the base;

Figure 9 is another modification showing the bubble forming element having a segmental cylindric contour;

Figure 10 shows a modification of the device adapted to deliver bubbles alternately from its opposite sides; and

Figure 11 is a plan view of the structure of Figure 10.

Numeral 1 designates a hollow pedestal having an elongated horizontal table-like head 2. This head is provided at the top with an upstanding flange 4 and is provided interiorly with a shoulder 5 upon which is disposed a plate 6 adapted to receive and support the bottles. This plate is provided with openings 7, and beneath the plate are arranged electric light bulbs 8, means thus being provided for simultaneously illuminating the bottles from beneath. In this instance two bulbs have been provided, and it will be understood that the bulbs may be either colored or uncolored, and may be similarly colored, or the coloring may be different, or the number of bulbs may be increased or decreased, to provide the desired character and variety of illumination.

The bottles 15 shown herein are of the type used at many oil stations to display and to dispense oil. Each bottle is provided with a filling and dispensing spout 16, and with a cap 17.

Spaced above the table 2, horizontally and at a level above the caps, is a hood 20 within which is mounted a manifold air supply pipe 21 having a suitable supply pipe 22 connected thereto, this pipe in this instance extending downwardly into the base as most clearly shown in Figure 1. It will be understood that proper air connections are made to the pipe 22 for delivering air into the manifold 21. This manifold delivers into the passages 25 of valves 26, in this instance of the needle type. This for the reason that greater accuracy can be had to govern the inlet of air, and therefore to govern the speed of production of the bubbles. The number of valves is equal to the number of bottles.

Connected in any suitable manner to the nipple 30 of each valve 26, in this instance

by rubber tubing 31, is a tube 32 which traverses the cap 17 and extends in this instance to a point adjacent the bottom of the bottle or receptacle, see Figure 2. The lower end of this tube is threaded as at 33, and engaged with the threads is a shallow concave disk 35 arranged in the liquid with its concave side downwardly. The design of this element to produce a single bubble of a maximum size has been a matter of much experiment. The experiments seem to indicate that in order to obtain a single large bubble only, the element should be shallow and the air should be delivered at some point lying at a level between the bottom edge 35 and under or top surface 37. It seems, as a result of the experiments, that the shallow form is the bast one by which a single very large bubble can be unfailingly produced. It will be understood that with a given air pressure the bubbles will be delivered at varying speeds according to the level of the delivery orifice 40 of the pipe 32 from the surface 37. This will also, within certain limits, determine the size of the bubble. For the above reason the disk 35 is made adjustable by means of the threads 33. It has also been found that if the delivery orifice 40 is projected a certain distance below the level of the bottom edge 36 of the element 35, one large bubble and one small bubble may be produced and released at timed intervals. When the discharge orifice 40 is arranged at some distance below the lower edge of the disk, numerous bubbles are obtained.

With the arrangement shown in Figure 1 wherein a plurality of display bottles are shown, individual control of each container can be had so that the timing intervals may be varied to cause all bubbles to be released simultaneously, or sucessively, or in any combination obtainable with a given number of containers. The timing can be further controlled as before stated by slight adjustments of the disks 35 in relation to the discharge orifice 40.

Inasmuch as the formation of the bubbles is an interesting phenomenon, I prefer to place the bubble forming means at such a level as would be conveniently observable. However, in some instances, it is desirable to add the element of mystery to the display and in this case, the bubble-producing means is hidden.

In Figure 7 a modification has been shown in which the shallow disk is shown as resting upon the top of a tube, which tube extends upwardly from beneath into the container. Any suitable means may be employed for connecting the disk 35 to the tube 50, but I prefer to connect it to the elements by soldering. In this case, an opening of suitable size 51 is provided, this being the discharge orifice, and being arranged at the proper level to obtain a single large bubble. As here shown, the container has the form of a cylindrical tube 55, two of such tubes have been shown. The tubes are clampingly held together by plates 56, secured in clamping relation by bolts 57. Suitable packings 58 are provided to seal the tubes against leakage.

Figure 8 shows a modification in which the bubble-forming element 60 is attached as by legs 61 directly to a base 62. The base in this instance is provided with an air inlet channel 63 arranged to deliver to the downwardly faced concave side of the element 60. The air supply pipe is connected at the point 64. This air passage 63 is controlled by a needle valve stem 65 having an operating handle 66 lying at the outer side as shown. The needle valve seats against the lower end of the delivery orifice 67.

In Figure 9 is shown a modified form of the bubble-forming element. This element 70 has a segmental cylindrical configuration, the ends of the segment being closed by end-forming elements 71 by which the device may be attached in any suitable manner to the base.

In Figures 10 and 11 a further modification of the bubble producing element has been shown. In this instance, a base plate 80 is suitably supported at the upper end of an air intake pipe 81. The bubble-forming element in this instance is made substantially as shown and is pivotally mounted as at 82 upon upstanding arms 83. The element 85 is provided with a central partition or division element 86. The closing end faces 87 of the element are suitably cut away as at 88 and the height of the division element is such that its lower end 89 can swing to one side or the other as shown respectively in full and dotted lines. The lower edges 90 of the element 85 form stops to limit the rotative movement of the element 85. The arrangement is such that air is first delivered into one pocket, which rocks the element to raise that pocket, and at the end of the upward limit the bubble is released. The opposite pocket is then filled and the device is rocked in the opposite direction to release the bubble from that side. A bubble is thus released alternately from opposite sides of the element. It will be noted that when in released position the uppermost wall lies slightly below the horizontal plane and in this manner a comparatively shallow receptacle is formed in the manner of the first forms of the invention.

Of course, as experiments show, the rate or speed of delivery of air is also important, and for this reason the micrometric control is most desirable. The main idea is to prevent separation of any of the introduced air, into separate numerous small bubbles, which separation would produce foaming and modify the color of the oil to such a degree as to give a false impression. The air or gas must be

introduced so that when small bubbles are separately formed beneath the bubble-former, they will always rise and become part of the air or gas pocket which is being formed, and whose formation is causing the displacement of the liquid. It has been found that if air is delivered directly against the bottom surface of the bubble-former there will be substantially no formation of small bubbles, because the air flowing in a substantially continuous stream against the under surface, gradually displaces the oil to the extent shown in Figure 7, and is eventually released as also shown in the figure. If, on the other hand, the air is delivered to any point below the under surface of the bubble-former, the air on its short upward passage may be broken up into small bubbles which rise and collect at the under surface, and eventually the same result is obtained. However, it is best to cause the gas to flow directly against the under surface of the bubble-former.

As best shown in the drawing, in Figure 6, the outer periphery of the element 35 is smooth and rounded, and as also shown in the drawing all parts of this periphery lie strictly in a horizontal plane. It has been found that if these parts are in a plane which is at an angle to the horizontal, small bubbles are formed, and since it is one of the objects of the invention to obtain the maximum sized bubble, without any accompanying small bubbles, it will be readily understood why the best results are obtained when the level and smooth condition of the periphery exists.

The glass display tube now used is approximately two and one-fourth inches inside diameter, and for such a diameter a bubble-forming element having a diameter of one and three-fourths inches at the base and about five-eighths of an inch deep is used, and seems to have the best proportions for producing the largest possible single bubble when the air is properly controlled or timed. This timing is obtained by providing a needle valve or micrometric control, as above stated. It has been found that the needle valve three-sixteenths of an inch in diameter and having the regular U. S. thread of twenty-four to the inch is barely sensitive enough to produce the best results. Threads thirty-two to the inch are more satisfactory. It has been found that it is best to release the bubble at intervals of five to ten seconds. This interval varies with the character or viscosity of the oil. It will be understood that it is necessary to use a separate valve control for each tube because each tube contains an oil of a different grade and the rate of intake of air must differ for each quality of oil.

I claim as my invention:

1. A display device comprising a tube of transparent material having liquid therein, a bubble-forming and releasing element submerged in the liquid and having a downwardly faced concave side, means for delivering a gas beneath the submerged element, and means for controlling gas delivery in a manner to form small bubbles, cause them to rise beneath the submerged element, and collect to form one large bubble, and to cause said bubble to gradually displace the liquid, and escape intact and rise.

2. A display device comprising a tube of transparent material having liquid therein, a bubble-forming and releasing element submerged in the liquid and having a downwardly faced concave side, means for delivering gas beneath the submerged element, and means for controlling the gas delivery in a manner to form small bubbles and cause them to rise beneath the submerged element and collect therebeneath to form one large bubble and to cause said bubble to displace the liquid and escape intact, and rise, said releasing element being relatively shallow.

3. A display device comprising a tube of transparent material having liquid therein, a bubble-forming and releasing element submerged in the liquid and having a downwardly faced concave side, means for delivering gas beneath the submerged element, and means for controlling the gas delivery in a manner to form small bubbles, cause them to rise beneath the submerged element, and collect to form one large bubble and to cause said bubble to displace the liquid, and escape intact and rise, the delivery of gas being made at a point immediately adjacent the topmost under surface of said bubble-forming element.

4. A display device comprising a tube of transparent material having liquid therein, a bubble-forming and releasing element submerged in the liquid and having a downwardly faced concave side, means for delivering gas beneath the submerged element, and means for controlling the gas delivery in a manner to form small bubbles and cause them to rise beneath the submerged element and collect to form one large bubble and to cause said bubble to displace the liquid, and escape intact and rise, said releasing element being relatively shallow, and the delivery of gas being made at a point immediately adjacent the topmost under surface, of said bubble-forming element.

5. A display device comprising a tube of transparent material having liquid therein, a bubble-forming and releasing element submerged in the liquid and having a downwardly faced concave side, means for delivering gas beneath the submerged element, and means for micrometrically controlling gas to cause the same to slowly displace the liquid.

6. A display device comprising a tube of transparent material having liquid therein, an element submerged in the liquid and having a downwardly faced concave side, the element providing a circular periphery, all parts

of which lie in a horizontal plane, a conduit for delivering gas beneath the submerged element, and means micrometrically operable to control flow through the conduit to cause the gas to gradually collect beneath the submerged element and displace the liquid.

7. A display device comprising a tube of transparent material having liquid therein, an element submerged in the liquid and having a downwardly concave side, means for delivering gas beneath the element, and means timing the introduction of the gas in a manner to displace the liquid and release a bubble of maximum size.

In witness whereof, I have hereunto set my hand this 14th day of March, 1927.

HANS M. BOE.