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R. E. BURK

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LIQUID DIVISION

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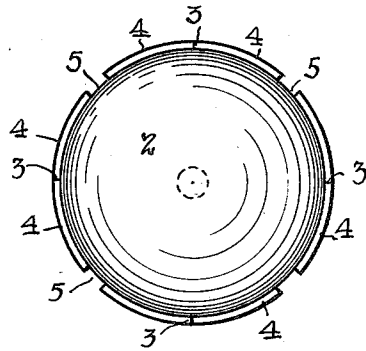


Fig. 1

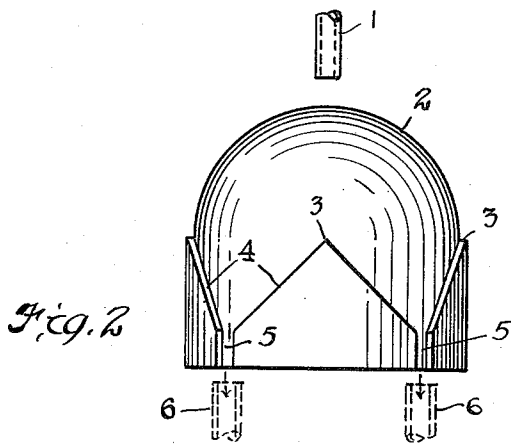


Fig. 2

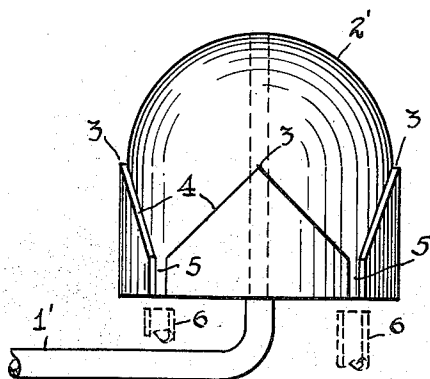


Fig. 3

INVENTOR.

ROBERT E. BURK

BY

Oberlin, Limbach & Day
ATTORNEYS

UNITED STATES PATENT OFFICE

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LIQUID DIVISION

Robert E. Burk, Cleveland Heights, Ohio, assignor
to The Standard Oil Company, Cleveland, Ohio,
a corporation of Ohio

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10 Claims. (Cl. 137—166)

The equal division or distribution of liquid is a problem which has received much attention in various relations, as for instance in fractionation, supply of absorbent or contact liquids, etc. The commonly used construction involves a plurality of tubes, the number depending upon the extent of distribution desired, but these have been subject to the objection that their action is modified by the characteristics of the entry to and egress from such fine tubes, and clogging also commonly occurs. Particularly where the amount of liquid to be distributed is small, the difficulty increases. In accordance with the present invention a distribution or division of liquid on various scale is possible however, and by means simple and positive in character.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing—

Fig. 1 is a plan view, and Fig. 2 is a side elevational view, showing construction embodying the invention; and Fig. 3 is a side elevation of a modification.

The liquid to be distributed or divided into portions, and as forwarded by any suitable means, as for instance pipe 1, Fig. 2, is directed onto a rounded receiving surface 2. Here, the capillary forces and surface tension cause the liquid to spread evenly and thus flow downwardly to a lower zone where it encounters dividing fins or projections which divert it into segregated streams of the number desired in any given instance, and more or less than the number illustrated may be arranged. The rounded surface 2 is at least symmetrical to the down-flowing liquid, and it may be an oblate spheroid, but preferably, the surface is mathematically spherical. Desirably also, the separating portion therebelow may be in the general form of a cylindrical extension providing diverting channels of desired number for separating discharge streams. The dividing fins or projections may satisfactorily be formed of dividing apices 3, whence sloping ledges 4 lead to channels 5, and preferably the fins are along the horizontal great circle, or circle whose diameter is that of the sphere and whose plane is perpendicular to the

feed at the top. As noted, the number of fins or projections of liquid channels 5 may be as desired in any given case in accordance with the number of final discharge streams coming from the channels, as may be predetermined. The detail of the projections or fins may vary, within the general qualifications of providing diverting surfaces or channels for the respective number of ultimate discharge streams required. Thus, in the operation, liquid supplied from the pipe 1 at the top of the round surface 2 flows down in even distribution on all sides, and discharges in separated streams as indicated by the arrows, Fig. 2. Where the liquid divided is to be received by vertical surface fractionating columns for instance, reflux liquid is given an initial distribution into areas at the top of the column, and the quality of distribution is maintained whether the feed be large or small. Where the streams as discharged from the channels 5 are not to be further spread, the discharge from the channels may be received into respective tubes or pipes 6, as indicated in dotted lines, Fig. 2. Thus, also for an internal combustion engine the fuel as evenly divided is directed in even feed to each cylinder.

Instead of supplying the feed from a pipe 1 as in Fig. 2, above the rounded surface 2, a pipe 1' may continue as a central bore which opens at the top of the rounded or spherical surface 2' as in Fig. 3, so that the liquid overflows onto the surface and distributes to the dividers or fins which are as above described.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. Liquid dividing means, comprising a hemispherical receiving surface with a cylindrical extension below provided with projections having liquid separating apices sloping to channels between projections and means for delivering liquid to the top of said hemispherical surface.

2. Liquid dividing means, comprising a receiving surface of revolution curved outwardly and downwardly in rounded form and having an extension below with diameter at least as great, liquid separating projections on said extension, and a bore opening through the rounded surface at the top for supplying liquid to be divided.

3. Liquid dividing means, comprising a spherical receiving surface and means for delivering

liquid to said spherical surface at substantially its highest point to provide a free flowing film thereon independent of coating liquid-restraining walls, said spherical surface having a plurality of separate liquid-forwarding surfaces extending downwardly therefrom.

4. Liquid dividing means, comprising feed means for supplying the liquid at a central point, and a receiving surface curved outwardly and downwardly in hemispherical form and having below a cylindrical extension with diameter at least as great, and liquid dividing projections on said cylindrical extension separating liquid into respective streams.

5. Liquid dividing means, comprising a surface of a sphere having a cylindrical extension below, means for feeding liquid to the top of said surface, and liquid-dividing projections along the horizontal great circle of the surface.

6. Liquid dividing means, comprising a receiving surface curved outwardly and downwardly in dome-like circular form and having an extension below with diameter at least as great as the circle of said dome, liquid separating projections on said extension, and means for supplying liquid to the top of said receiving surface.

7. Liquid dividing means, comprising a spherical liquid receiving surface provided with projections adjacent thereto below said receiving sur-

face having liquid separating apices sloping downwardly to channels between said projections, and means for delivering liquid to the top of said spherical liquid receiving surface.

8. Liquid dividing means, comprising a spheroidal surface, means to discharge liquid on the top of said surface, and projections below said liquid receiving surface having liquid separating apices sloping to channels between said projections for dividing the liquid flowing downwardly on said surface between said apices and directing it to the channel.

9. Liquid dividing means, comprising a spheroidal liquid receiving surface provided with projections adjacent thereto below said liquid receiving surface having liquid separating apices sloping downwardly to channels between said projections, and means for delivering liquid to the top of said spheroidal liquid receiving surface.

10. A liquid fuel divider comprising a receiving surface curved outwardly and downwardly in rounded form and circular in cross section and having an extension below with diameter as great, means for discharging liquid fuel on the top of said surface, separating projections for dividing the downflow liquid on said extension, and means for conducting the divided liquid fuel to the points of use.

ROBERT E. BURK.