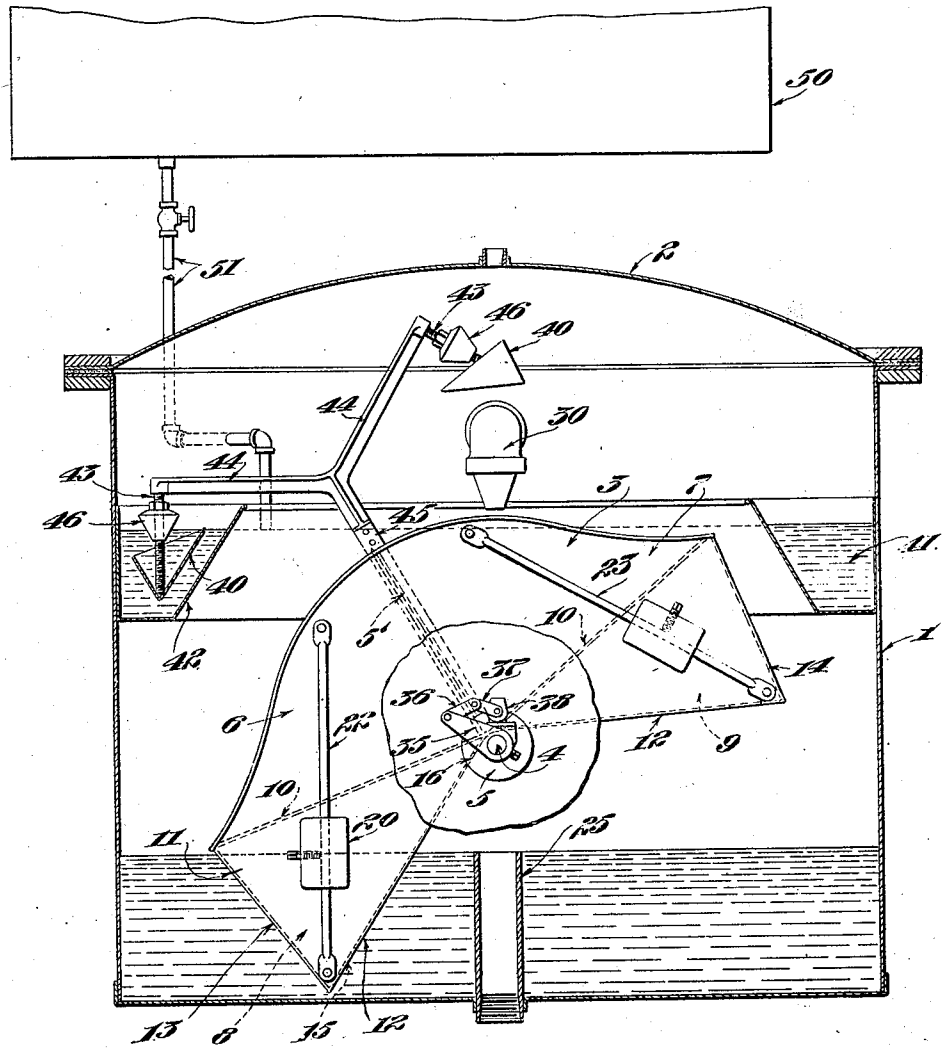
March 2, 1926. 1,575,433

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DENATURING MACHINE

Filed Feb. 14, 1924 2 Sheets-Sheet 1

Fig. 1



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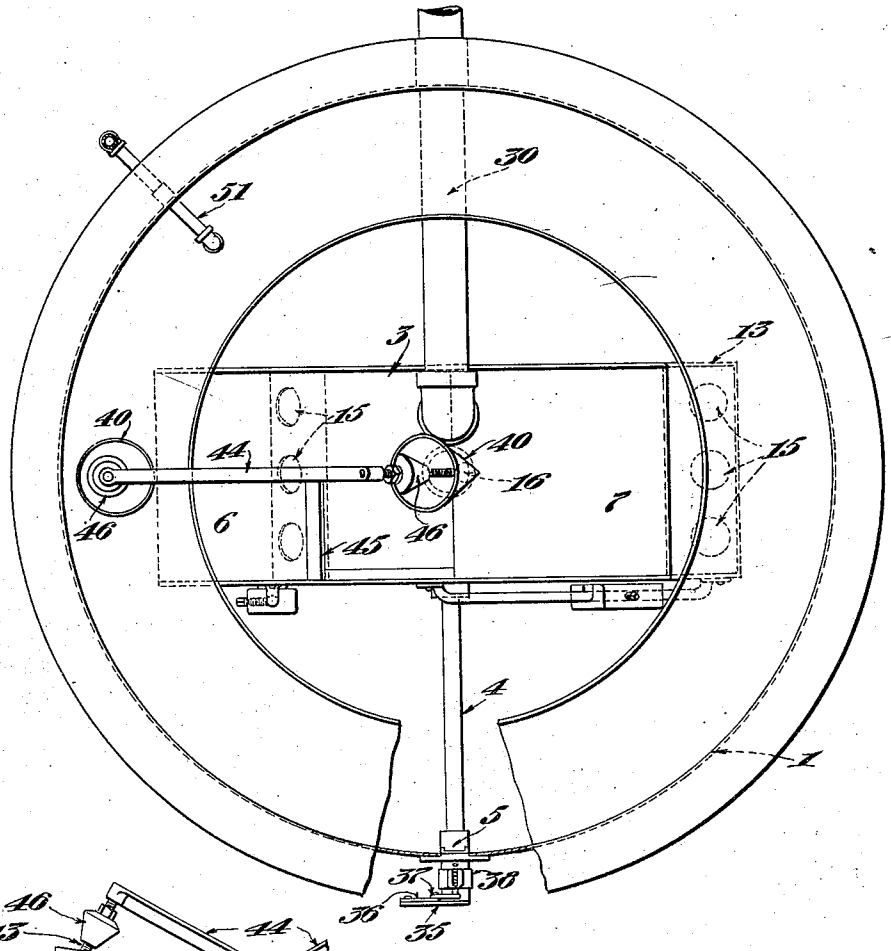
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Fig. 2



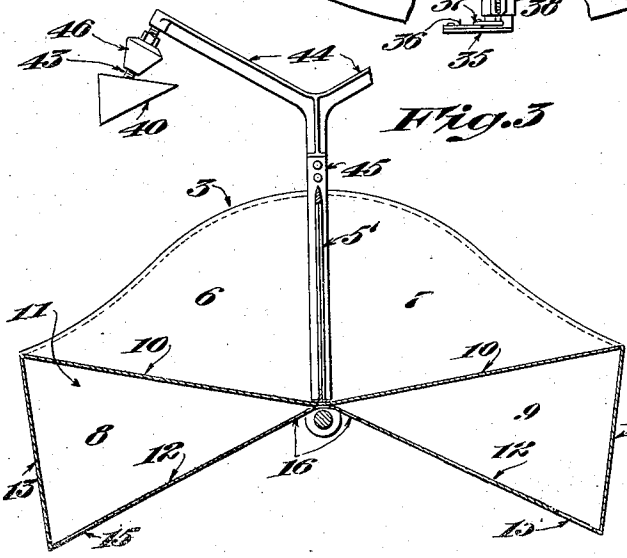


Fig. 3

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UNITED STATES PATENT OFFICE.

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DENATURING MACHINE.

Application filed February 14, 1924. Serial No. 692,697.

To all whom it may concern:

Be it known that I, FRANK E. LICHTENTHAELER, a citizen of the United States, residing at Newton Highlands, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Denaturing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improvement in denaturing machines.

The object of the invention is to produce an efficient, simple, reliable and inexpensive machine for denaturing alcohol or for use in mixing certain small quantities of denaturant liquid with certain large quantities of fuel liquid, such as alcohol, in constant and fixed ratio. To these ends the present invention consists in the denaturing machine hereinafter described and particularly defined in the claims.

In the accompanying drawings illustrating the preferred form of the invention, Fig. 1 is a sectional elevation; Fig. 2 is a plan of the recovery unit; and Fig. 3 is a sectional elevation of the tilting trough.

The illustrated embodiment of the invention is described as follows: Generally considered, this apparatus consists of a vessel in which the operation of mixing the alcohol and denaturant is performed. The vessel contains a tilting trough pivoted on a horizontal axis. The trough has two buckets which are V-shaped in cross-section, and have their apexes at the axis. The normal position of the trough is with one of the buckets in raised position located under the alcohol inlet. This bucket gradually fills from the inlet and finally over-balances the trough, which tilts or turns so as to discharge the contents of the filled bucket into the bottom of the vessel. Secured to the trough are two denaturing spoons which dip, first one and then the other, into a pool of denaturant. One denaturant spoon is submerged in the denaturant while one of the buckets is being filled. When the trough tips, this spoon rises from the denaturant pool and pours its contents into the alcohol or into the empty bucket which is brought by the tipping movement under the alcohol inlet. The trough is provided at its under side with two air chambers having holes, which are adapted when the trough falls to strike the body of liquid in the vessel and prevent the trough from being suddenly arrested in its tipping movement.

Specifically, the vessel in which the denaturing operation is performed is a tank 1 provided with a cover 2. In the tank is supported a tipping trough 3. It is fixedly mounted on the shaft 4 which turns in bearings 5 supported in the walls of the tank. The trough 3 consists of two buckets, V-shaped in cross section, and having their apexes at or near the shaft 4. The partition 5′ divides the bucket 6 from the bucket 7. Below the bucket 6 is an air chamber 8, and below the bucket 7 is an air chamber 9. The air chamber 8 is completely enclosed, on top by the bottom 10 of the bucket 6, on the side by the wall 11, and on the bottom by the wall 12. The ends of the air chamber are closed by plates 13 and 14. The bottom 12 of the air chamber is provided with two large holes 15 and 16. The lower hole 15 is near the edge of the bucket, and the upper hole 16 is near the rock shaft on which the trough is mounted. When the trough turns to spill the contents of the receiving trough, one of the air chambers strikes the liquid in the bottom of the tank and prevents the trough from reaching the limit of its throw with a jar or blow, because movement of the air chamber into the liquid retards its speed and gradually brings it to rest as the liquid flows into the lower opening 15 and the air in it flows out through the upper hole 16.

Balancing weights 20 and 21 are mounted on rods 22 and 23 secured to the sides of the trough. By moving the weights on the rods, the trough may be brought to a nice balance, and their positions determine the amount of liquid which may enter one of the buckets before the trough tips and spills the contents of the filled bucket into the tank below. The liquid is maintained in the bottom of the tank by means of the standpipe 25, which rises from the bottom of the tank and retains a certain level of liquid at all times.

The inlet for alcohol is the pipe 30 which enters through the side of the tank and has a discharge nozzle in the center over the trough. The liquid flows into the top receiving bucket until it over-balances the structure and the trough tilts and dumps its

contents. Then the other bucket fills and the trough tips in the opposite direction.

The number of oscillations of the tilting trough constitutes a measure of the alcohol mixture flowing through the apparatus. For counting the oscillations an arm 35 is mounted on the end of the rock shaft 4 connected by means of a link 36 with the arm 37 of a counter 38 by which the number of double movements of the tipping trough are registered. Readings on the counter correspond to the number of double bucket contents dumped in the tank.

The tipping trough is provided with two spoons or denaturant cups 40, which dip denaturant from a pool 41 at each oscillation of the trough, and pour it into the receiving bucket of the trough. This pool of denaturant is contained in an annular trough 42 which is supported from the side walls of the tank 1, and contains a large, continuous supply of denaturant. The denaturant spoons are mounted on rods 43 secured in arms 44 carried by the bracket 45 secured to one end of the tipping trough. The capacity regulators 46 on the rods 43 may be screwed up and down on the rod to effect a nice adjustment of the quantity of denaturant dipped by the spoons from the pool. These denaturant regulators 46 are secured in adjusted position by lock nuts. They are solid brass bodies and when moved up or down on the rods the balance of the tipping trough may be restored by readjustment of the balancing weights 20 and 21.

In operation it will be observed when the denaturant spoon rises from the pool of denaturant, it contains a certain amount of denaturant which, as the tipping trough moves, is raised out of the pool and presently, owing to the continued turning movement of the trough, poured into the alcohol flowing into the tank. If this denaturant alcohol falls into the empty bucket this will contribute to the intimate mixing of the denaturant and alcohol because the stream of entering alcohol strikes the denaturant in the bucket and mixes itself with the denaturant by the agitation incident to the flowing of the alcohol into the bucket.

The denaturant in the pool is maintained at an exact level by means of an elevated Mariotte liquid feed tank 50, which maintains a constant head and delivers the denaturant through the pipe 51 sealed at its outlet end by the liquid in the pool at the exact level required. The denaturant flows into the pool as fast as it is required in order to keep a constant level of denaturant in it by exposing the end of the pipe 51 when the liquid falls in level so as to permit more liquid to flow in. This is ordinarily called a chicken feed supply because of its resemblance to the chicken feed water jugs.

The air chambers on the tipping trough not only prevent the jar which would otherwise be incident to the falling of the tipping trough when it is over-balanced by the contents of the upper bucket, but it slows up the motion of the trough so that the denaturant spoon enters the denaturant pool without splashing, which would otherwise cause irregular additions of denaturant to the inflowing alcohol. The denaturant spoons are made conical in form so that they enter the denaturant in such a manner as to further prevent splashing.

Various types of dash pot contrivances may be used in connection with the tipping trough, the requisite being that it shall operate to cause the tipping trough slowly to approach and arrive at the limit of its movement in each direction. But the particular form of dash pot illustrated and described herein is of specific value by reason of its simplicity and its certainty of operation.

While this apparatus is denominated a denaturing apparatus and is particularly adapted for this purpose, it is to be understood that this terminology is not intended as a limitation of the invention to this particular use. The invention may be used for other purposes where it is desired to mix a small quantity of one liquid with a large quantity of another liquid.

One of the features of this apparatus is that it is operated by the flow of the liquid through it, there being no power required to actuate it. It may be started and stopped by turning on and off the flow of liquid to the apparatus. When the liquid is turned on and begins to flow through it the denaturing process begins, and when the liquid is turned off the apparatus stops running.

Having thus described the invention, what is claimed is:

1. A denaturing machine having, in combination, a tank, a double bucket tipping trough, an alcohol supply pipe for discharging alcohol into the receiving bucket of the tipping trough, a denaturant container, a denaturant spoon, connections between the spoon and the trough for operating the former to immerse it in the denaturant and on tipping movements of the trough to dip out a quantity of denaturant and introduce it into one of the buckets of the trough.

2. A denaturing machine as described in claim 1 in which the denaturant spoon pours its contents into the empty bucket.

3. A denaturing machine having, in combination, a tank, a double bucket tipping trough, a supply pipe for discharging alcohol into the receiving bucket of the tipping trough, a denaturant container, a denaturant spoon mounted on the tipping trough, the denaturant trough being so positioned with relation to the tipping trough that on tipping movements of the trough the spoon is immersed in the denaturant and on a sub-

sequent tipping movement a quantity of denaturant is dipped out of the trough and introduced into the alcohol.

4. A denaturing machine having, in combination, a tank, a double bucket tipping trough, each bucket being provided with a substantially closed air pocket dash pot contrivance having a small liquid admitting opening, a supply pipe for discharging alcohol into the trough, means for maintaining such a level of liquid in the tank that the air pocket contrivance strikes the liquid in the tank and deliberately brings the tipping trough to rest at the end of each tipping movement.

5. A denaturing machine as described in claim 4, having denaturant supplying means for introducing denaturant into the alcohol as it passes through the tank.

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