A. E. HOLLEY & O. E. MOTT.

APPARATUS FOR THE TREATMENT OF ONE LIQUID WITH ANOTHER.

APPLICATION FILED DEC. 5, 1917.

1,297,171. Patented Mar. 11, 1919.

Fig. 1.

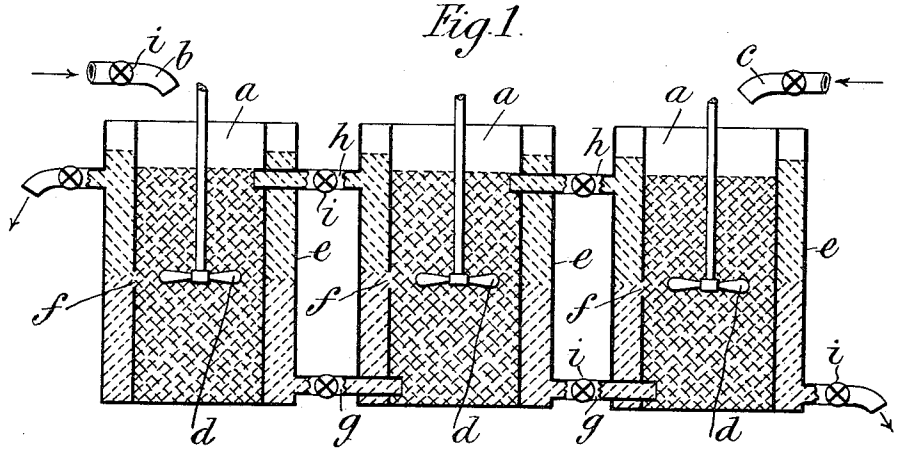
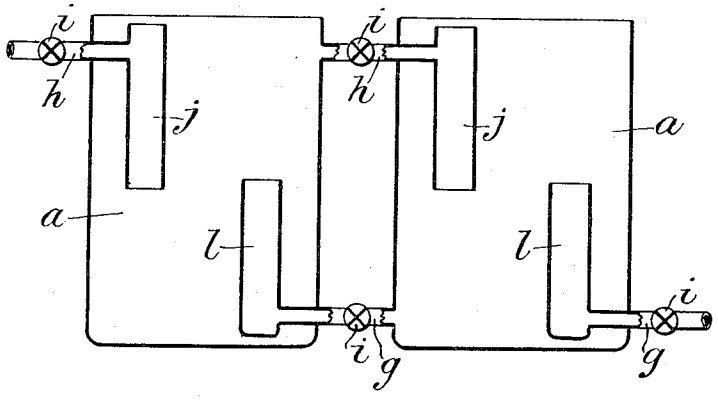


Fig. 2.



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APPARATUS FOR THE TREATMENT OF ONE LIQUID WITH ANOTHER.

1,297,171. Specification of Letters Patent. Patented Mar. 11, 1919.

Application filed December 5, 1917. Serial No. 205,574.

To all whom it may concern:

Be it known that we, ALFRED EWART HOLLEY, residing at Chemical Works, Oldbury, England, and OWEN EDWIN MOTT, residing at the Research Department, Royal Arsenal, Woolwich, England, subjects of the King of Great Britain, have invented an Improved Apparatus for the Treatment of One Liquid with Another, of which the following is a specification.

The invention relates to an improved apparatus for the treatment of one liquid with another.

By the term "liquid" it is intended to include suspensions, emulsions and solutions, but the process is limited to cases in which there are two liquids of different specific gravities and not completely miscible.

According to this invention one liquid is treated with another liquid by mixing them in a series of vessels fitted with stirrers and all at the same level, which vessels are hereinafter referred to as agitators, and allowing the mixture to flow into vessels at the same level as the agitators and hereinafter referred to as separators, in which gravity may cause a separation, and from which heavier liquid passes by an opening near the bottom and lighter liquid by an opening near the top, the passage from the agitator to the separator lying between these openings. The stirrer may take the form of an injector for air or steam.

Physical or chemical interactions may be carried out by these means and provisions may be made for cooling or heating the liquids.

The apparatus is particularly applicable for nitrating organic matter and for washing nitro compounds but the plant is useful for many other physical and chemical interactions.

The lighter liquid from any separator passes to the agitator next in the series in one direction and the heavier liquid from that separator to the next agitator in the other direction. Thus, provided light liquid is supplied to the first agitator and heavy liquid to the last, there will be, due to the head produced in the separator, a constant flow of light liquid from the last separator and of heavy liquid from the first, the flow of the liquid being controlled by valves.

The invention is illustrated in the accompanying drawings in which Figure 1 is a section and Fig. 2 is a similar view showing a modification.

In the drawings *a* are the agitators to the first of which heavy liquid is supplied by the pipe *b*, and to the last of which light liquid is supplied by the pipe *c*.

The liquid in the agitators is stirred by the stirrers *d*.

e are the separators communicating with the agitators by a passage *f*. *g* are pipes leading from the bottom of the agitators to the bottom of the separators and *h* are pipes leading from the top of the agitators to the top of the separators.

i are valves for controlling the flow of the liquid.

The separators need not be in one with the agitators but may be separate vessels communicating with the agitators at about half way up.

Each separator also may consist of two parts one for the light and one for the heavy liquid.

This is illustrated in Fig. 2 which shows only these features the apparatus being otherwise identical with Fig. 1. Similar parts are indicated by the same letters.

The separator consists of two parts *j* and *l*, the part *j* being open top and bottom and collecting the lighter liquid and the part *l* being closed at the bottom and open at the top and collecting the heavier liquid.

What we claim is:—

1. Apparatus for the treatment of one liquid with another, comprising a series of agitators all at the same level, a series of separators at the same level as the agitators, the bottom of a separator being connected to the bottom of an agitator in one direction and the top of a separator to the top of an agitator in the other direction, and each

separator being in direct communication with the agitator at a point situated between the other connections.

2. In apparatus for the treatment of one liquid with another comprising a series of agitators all at the same level, a series of separators communicating with and at the same level as the agitators and means whereby the flow of the two liquids in opposite directions is caused solely by the head produced in the separators.

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