S. H. BLICHFELDT.

EMULSIFYING APPARATUS.

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1,166,319. Patented Dec. 28, 1915.

Fig 1

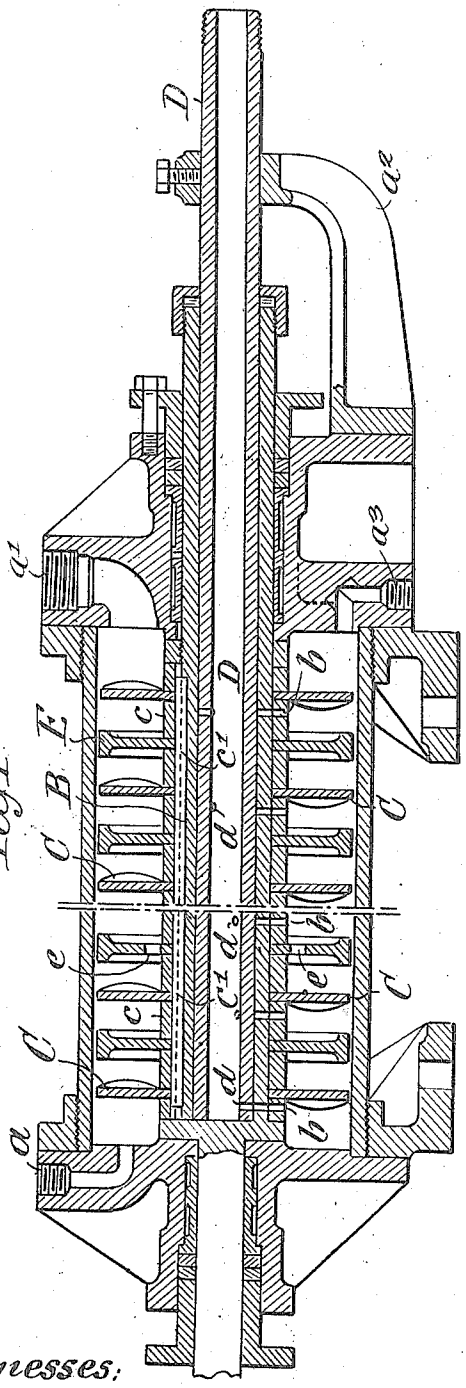
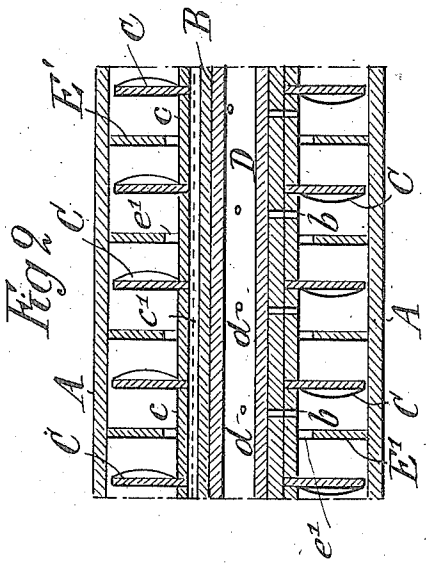


Fig 2



Witnesses:

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UNITED STATES PATENT OFFICE.

SØREN HØY BLICHFELDT, OF SOUTHALL, ENGLAND, ASSIGNOR TO FLAKES A/S, OF COPENHAGEN, DENMARK.

EMULSIFYING APPARATUS.

1,166,319. Specification of Letters Patent. Patented Dec. 28, 1915.

Application filed August 24, 1914. Serial No. 858,350.

To all whom it may concern:

Be it known that I, SØREN HØY BLICHFELDT, a subject of the King of Denmark, residing at Merston House, Southall, in the county of Middlesex, England, have invented certain new and useful Improvements in Emulsifying Apparatus, of which the following is a specification.

This invention relates to the production of emulsions and provides improvements in apparatus for manufacturing emulsions for use as food stuffs or for other purposes.

According to my invention the emulsion is obtained by the progressive addition of the second ingredient to the first ingredient through successive inlets in a chamber or chambers having emulsifying agitating members adapted to churn the liquid in bulk, through which chamber or chambers the progressively enriched liquid continuously flows.

The agitating members may be constituted of rotating blades, or they may be of reciprocating or other suitable type. In the simplest form of apparatus a series of rotating agitators may be provided in a longitudinal shaft in a single cylindrical casing, at one end of which is the inlet for the first ingredient (usually the watery one) while the outlet for the emulsion is situated at the other end and the successive inlets for the second or fatty ingredient are arranged longitudinally.

To form successive emulsifying chambers the casing may be divided by a series of transverse partitions fixed either on the shaft or inside the casing forming compartments each containing one or more agitators and one or more inlets for the second ingredient, suitable apertures allowing the liquid to flow continuously to the outlet, while it becomes gradually enriched on its way. The construction of apparatus may however vary considerably.

The second ingredient may be added at the various inlets either continuously or intermittently and a valve arrangement may be employed for intermittent supply. A convenient construction is one employing an axial tube passing through a hollow agitator shaft with perforations in the tube and shaft adapted to register successively. The proportions admitted through the successive inlets may be regulated according to circumstances and according to the nature of the emulsion required.

In order that the said invention may be clearly understood and readily carried into effect, the same will be described more fully with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal section of one construction of emulsifying apparatus according to my invention, and Fig. 2 is a detail section showing a slight modification.

A is a cylindrical casing in which the ingredients are mixed, having at one end an inlet *a* for one ingredient, and at the other end an outlet *a'* for the emulsion.

B is a hollow shaft passing longitudinally through the said casing.

C, C are the agitators on the shaft.

D is an axial supply pipe for the second ingredient passing through the shaft B and having a series of perforations *d* arranged spirally at intervals throughout its length.

The first ingredient, usually the watery one, enters at *a* and receives at regular intervals on its way to the outlet *a'* a supply of the second ingredient through the axial pipe D the perforations *d* of which, being arranged spirally around the pipe, which is stationary, registers successively with the perforations *b* in the agitator shaft B as the latter is rotated, so that the supply is both intermittent and is timed to occur at different times for different points of the casing. The pipe D is supported at its outer end by the bracket a^2. The agitators C are shown in the form of propellers mounted between collars *c* secured by the key *c'* on the shaft B, and rotate at considerable speed, driving the mixing ingredients from the inlet to the outlet end of the casing and bringing them into intimate contact at all stages, the progressive additions of the fatty ingredient causing a gradual enrichment of the mixture up to the final stage. A draining outlet a^3 is shown at the bottom of the casing A for emptying the apparatus.

The casing A may be divided into a succession of chambers in each of which an agitator C is placed, by means of the disks or partitions E on the shaft B, which disks are flanged and approach closely to the sides of the casing A, leaving narrow emulsifying channels through which the liquid is

driven. Or a free passage for the liquid may be provided by holes *e* close to the shaft B (shown by way of illustration in one of the disks E) the liquid flowing from chamber to chamber through the holes *e* so that the actual path of the ingredients is lengthened by the alternate expansions and contractions of the channel.

Fig. 2 shows a slight modification in which the flanged disks E on the shaft B are replaced by partitions E′ on the inner side of the casing A, a central hole *e′* in each partition allowing the shaft B to pass, with sufficient clearance for the flow of liquid. Both the partitions E′ and the rotating disks E may be used in the same apparatus, in which case the ingredients must pass alternately through the central openings *e′* in the partitions E′ and through the narrow annular channels between the moving periphery of the disks E and the stationary casing wall. The emulsifying action may be somewhat facilitated by this arrangement.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In emulsifying apparatus, a casing receiving the liquid ingredients of the emulsion, a series of agitating members immersed in the liquid and adapted to churn it in bulk, means for supplying one ingredient toward one end of the casing and means for supplying the second ingredient at successive points in the path of the first ingredient during the churning action.

2. In emulsifying apparatus, a casing receiving the liquid ingredients of the emulsion, a series of agitating members immersed in the liquid and adapted to churn it in bulk, means for supplying one ingredient toward one end of the casing and means for intermittently supplying the second ingredient at successive points in the path of the first ingredient during the churning action.

3. In emulsifying apparatus, a casing receiving the liquid ingredients of the emulsion, a series of rotatory agitating blades immersed in the liquid and adapted to churn it in bulk, means for supplying one ingredient toward one end of the casing and means for supplying the second ingredient at successive points in the path of the first ingredient during the churning action.

4. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion, a succession of inlets for the second ingredient displaced longitudinally and an outlet at the other end for the emulsion, a longitudinal shaft passing through the casing and a series of rotatory agitating blades mounted on the said shaft so as to be immersed in the liquid and to churn it in bulk in the said casing.

5. In emulsifying apparatus, a casing receiving the liquid ingredients of the emulsion, partitions dividing the casing into communicating compartments each containing liquid in bulk, a series of agitating members immersed in the liquid in the said compartments adapted to churn the liquid in bulk, an inlet for one ingredient of the emulsion in the first chamber, successive inlets for the second ingredient in the successive chambers and an outlet for the emulsion in the final chamber.

6. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion, a succession of inlets for the second ingredient displaced longitudinally and an outlet at the other end for the emulsion, a longitudinal shaft passing through the casing, transverse partitions encircling the shaft and dividing the casing into a longitudinal series of communicating chambers each containing liquid in bulk, and a series of rotatory agitating blades mounted on the said shaft so as to be immersed in the liquid and to churn it in bulk in the said chambers.

7. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion, a succession of inlets for the second ingredient displaced longitudinally and an outlet at the other end for the emulsion, a longitudinal shaft passing through the casing, transverse partitions carried by the shaft and extending almost to the walls of the chamber and a series of rotatory agitating blades mounted on the said shaft.

8. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion, a succession of inlets for the second ingredient displaced longitudinally and an outlet at the other end for the emulsion, a longitudinal shaft passing through the casing, flanged transverse partitions carried by the shaft, extending almost to the walls of the chamber and provided with apertures close to the shaft, and a series of rotatory agitating blades mounted on the said shaft.

9. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion and an outlet at the other end for the emulsion, a tubular shaft having a series of perforations along its length, a fixed tube supplying the second ingredient and provided with perforations adapted to register intermittently with the said shaft perforations and a series of rotatory agitating blades mounted on the said shaft.

10. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion and an outlet at the other end for the emulsion, a tubular shaft having a series of perfora-

tions along its length, a fixed tube supplying the second ingredient and provided with perforations adapted to register intermittently with the said shaft perforations, one set of perforations being displaced in spiral order with relation to the second set, and a series of rotatory agitating blades mounted on the said shaft.

11. In emulsifying apparatus, a horizontal cylindrical casing having an inlet at one end for one ingredient of the emulsion and an outlet at the other end for the emulsion, a tubular shaft having a series of perforations along its length, a fixed tube supplying the second ingredient and provided with perforations adapted to register intermittently with the said shaft perforations, a series of transverse partitions surrounding the hollow shaft and dividing the casing into a longitudinal succession of emulsifying chambers, and a series of rotatory agitating blades mounted on the said shaft.

In testimony whereof I affix my signature in presence of two witnesses.

SØREN HØY BLICHFELDT.

Witnesses:

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WALTER J. SKERTEN.