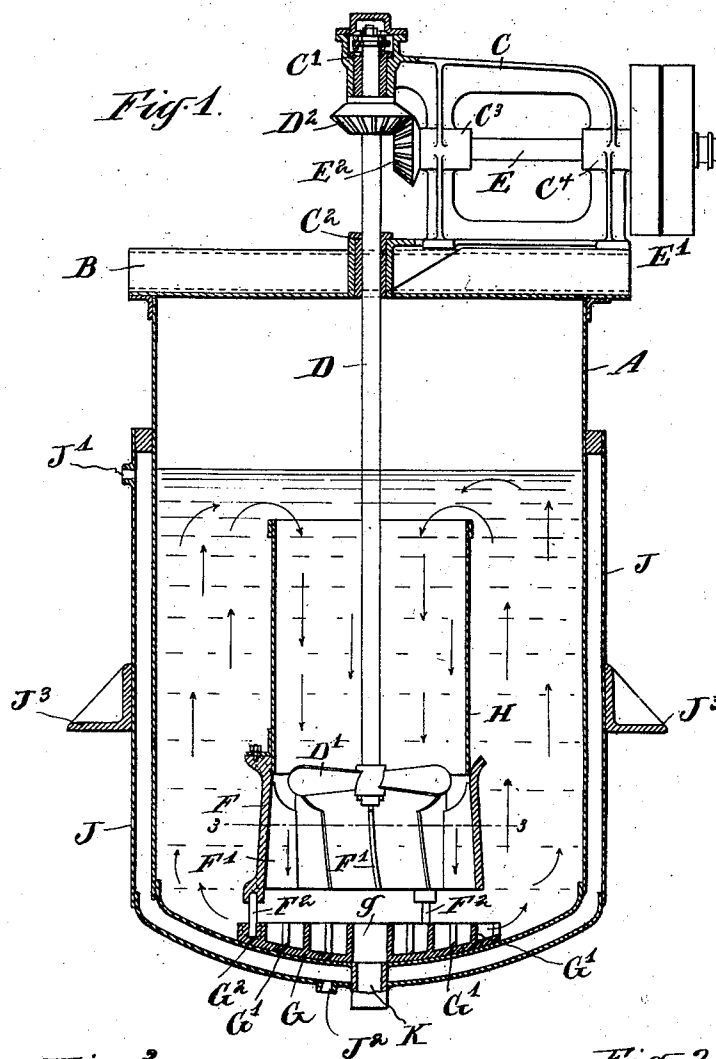
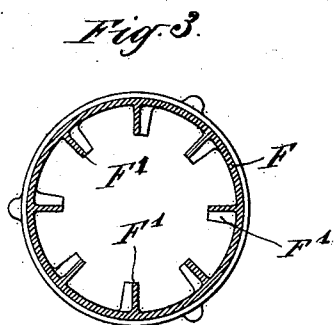
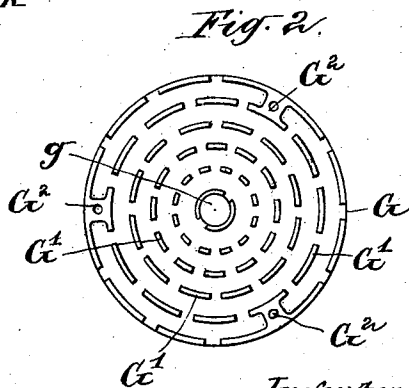


R. H. STEVENS.
EMULSIFIER.
APPLICATION FILED MAR. 11, 1920.

1,351,352.

Patented Aug. 31, 1920.



Inventor:
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UNITED STATES PATENT OFFICE.

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EMULSIFIER.

1,351,352.

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To all whom it may concern:

Be it known that I, ROBERT H. STEVENS, a citizen of the United States, residing at Larchmont, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Emulsifiers, of which the following is a specification.

The invention relates to apparatus for intimately mixing or combining various ingredients or materials in producing emulsions, and the object of the invention is to provide an apparatus of this character in which the operations of preparing the rough mixture, emulsifying, and cooling the emulsion, are all performed in the same vessel or container.

Another important object is to provide means for traversing and returning the mixture through the zone of agitating action and for mechanically breaking up the moving mixture into minute particles thereby insuring the production of a smooth stable emulsion.

The invention consists in certain novel features of construction and arrangement of parts, in conjunction with the method of operation, by which the above objects are attained, to be hereinafter described and claimed.

The accompanying drawings form a part of this specification and show an approved form of the apparatus.

Figure 1 is an axial vertical section of the improved apparatus, partly in elevation.

Fig. 2 is a plan view of a plate employed to promote the mingling of the mixed materials.

Fig. 3 is a horizontal section through a portion of the apparatus, taken on the line 3—3 in Fig. 1.

Similar letters of reference indicate the same parts in all the figures.

A is a cylindrical container having at the upper end transverse beams B, only one of which is shown, supporting a frame C in which are vertical bearings C¹ C². The upper bearing C¹ is arranged to suspend a vertical shaft D extending axially downward into the container and equipped at its lower end with an agitator D¹ preferably in the form of a screw propeller.

On the shaft D between the bearings C¹ C² is a beveled gear-wheel D² in mesh with a beveled gearwheel E² on a horizontal radi-

ally disposed shaft E mounted in bearings C³ C⁴ in the frame, and carrying on its outer overhung end tight and loose pulleys E¹ on which runs a belt, not shown, from a suitable motor, through which motion is communicated to the shaft D and the propeller D¹ is rotated.

The propeller or screw D¹ revolves in a shell F having an annularly arranged series of spiral vanes F¹ on its inner surface. The shell F is in the general form of a Venturi tube and is supported upon studs or legs F² received in suitable sockets G² in a circular plate G resting upon the bottom of the container.

From the upper contracted end of the shell F extends a cylindrical tube H forming a continuation of the shell.

Inclosing the lower portion of the container and extending nearly to the top thereof is a casing J closed at the upper end and joined to the container, forming a jacket for the latter and having inlet and outlet orifices J¹ J² through which a heating or a cooling medium may be circulated through the jacket to raise or lower the temperature of the contents of the container as required during the emulsifying process.

Brackets J³ J³ on the casing J provide means for mounting the whole upon beams or other supports, not shown.

The plate G is shaped to conform to the dished bottom of the container and carries a plurality of concentric series of lugs or interrupted vertical ribs G¹ having their upper edges in the same horizontal plane, forming a multiplicity of barriers or baffles with the lugs of one series opposite the spaces between the lugs of the succeeding series, and thus producing staggered paths from the center to the periphery. At the center is an opening *g* in communication with a centrally located pipe K extending downwardly across the space or jacket between the bottom of the container A and casing J, through which the contents of the container may be drawn off. A valve, not shown, controls the flow through this discharge pipe.

Hinged or removable covers of semicircular form, not shown, afford means for the admission of material to be treated and access to the interior for cleansing purposes.

The method of operation may be best illustrated by assuming the production of an emulsion, made for example, of 94½ parts of

water, $\frac{1}{2}$ parts of soap, and 5 parts of paraffin wax. The water is first supplied and heated by the admission of steam to the jacket until the temperature of the water is raised to between 20° and 30° C. above the melting point of the wax; agitation is then commenced by rotating the propeller, and the soap added and mixed with the water until dissolved therein; while still agitated, the wax is introduced in a molten condition and the agitation continued for a sufficient time, as from fifteen to thirty minutes. After such period of continuous agitation the temperature is lowered by the introduction of a cooling medium to the jacket until the temperature of the mass is reduced to about 5° C. below the melting point of the wax. The process is then complete and the emulsion discharged through the pipe K.

The propeller is turned in the direction to induce a rapid downward flow through the shell F, and the effect of the stationary vanes F¹ is to counteract the tendency of the stream of liquid passing through the shell, to rotate or swirl, the action being fully set forth in Letters Patent to Alfred H. Stevens, dated Feb. 12, 1918, No. 1,255,944, and by driving the propeller at the proper rate of speed the liquid mass is caused to strike upon the plate G in a direct column-like stream without eddies or rotary movement.

Upon striking the plate G the liquid mass escapes circumferentially in all directions through the space between the skirt of the shell and the plate, and is subdivided into a number of lateral streams which follow the devious paths between the concentrically arranged staggered lugs G¹, the effect of which is to break up the soap and wax into infinitesimal particles so small as to remain in fixed mechanical suspension in the water, and so coated or isolated as to preclude subsequent combination or coalescence.

The agitated mass rises in the annular space exterior to the shell, enters the tube H and is again driven downward in a stream against the plate G and the operation continued until the mixture is homogeneous and satisfactorily emulsified.

Modification may be made in the forms and proportions of the parts as may be found necessary or desirable in the treatment of various materials, without departing from the principle of the invention, and the structure of the plate G may be varied to conform to the action of agitators differing in type from the screw propeller D¹.

I claim:—

1. In an apparatus of the character set forth, a container, means to induce an axially directed stream in the contents of said container, and means located in the path of such stream whereby the latter is baffled against outward movement.

2. In an apparatus of the character set

forth, a container, means to agitate and induce an axially directed stream in the contents of said container, and means located in the path of such axially directed stream and at substantially right angles thereto, to baffle the outward movement of such stream.

3. In an apparatus of the character set forth, a container, means therein to agitate and induce an axially directed stream in the contents of said container, and baffles having openings for the passage of such stream and positioned to baffle the latter against outward movement.

4. In an apparatus of the character set forth, a container, agitating means therein adapted to induce a directed stream in the contents of said container, and a multiplicity of baffles located in the path of such stream and arranged in a plurality of concentric circles.

5. In an apparatus of the character set forth, a container, agitating means therein adapted to induce a directed stream in the contents of said container, and a plate located in the path of such stream, and having a multiplicity of lugs arranged in staggered relation to each other.

6. In an apparatus of the character set forth, a container, agitating means therein adapted to induce a directed stream in the contents of said container, and a plate located in the path of such stream, and having a multiplicity of lugs arranged in staggered relation to each other in a plurality of concentric series.

7. In an apparatus of the character set forth, a container, a shell therein, a screw propeller in said shell adapted to induce a stream through said shell in the contents of said container, and a plate located in the path of such stream at the mouth of said shell, and having a multiplicity of lugs arranged in staggered relation to each other.

8. In an apparatus of the character set forth, a container, a shell therein, a screw propeller in said shell adapted to induce a stream through said shell in the contents of said container, a plate located in the path of such stream at the mouth of said shell and having a multiplicity of lugs arranged in staggered relation to each other, and vanes in said shell adapted to counteract the rotation of such stream due to the action of said propeller.

9. In an apparatus of the character set forth, a container, a shell therein disposed vertically and axially thereof, a horizontally disposed screw propeller arranged axially within said shell, spirally disposed vanes on the interior of said shell, a plate separated from and below said shell and disposed at a right angle to the axial line of the latter, and a multiplicity of vertical lugs on said plate, arranged in staggered relation to each other in a plurality of concentric series.

10. The apparatus described comprising a container, a jacket inclosing said container and adapted to permit the circulation of mediums therethrough for heating or cooling the contents of said container, an axially located vertically disposed shell in said container, a horizontally disposed screw propeller arranged axially within said shell, spirally disposed vanes on the interior of said shell, a plate separated from and below said shell and disposed at a right angle to the axial line of the latter, and a multiplicity of vertical lugs on said plate arranged in staggered relation to each other in a plurality of concentric series.

11. The herein described method of emulsifying, consisting in agitating the mass to be emulsified by inducing a downwardly directed stream in such mass, counteracting the tendency of such downwardly directed

stream to swirl abruptly changing the direction of and subdividing such stream, and causing such subdivisions to follow devious and impeded paths.

12. In an emulsifier, a container, a vertically disposed hollow member within the same, a propeller in said member, a plurality of baffles beneath said member, and means between said baffles and propeller to counteract the tendency of the stream of liquid passing through said member to rotate or swirl.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

ROBERT H. STEVENS.

Witnesses:

LILLIE VREELAND,
CHARLES R. SEARLE.