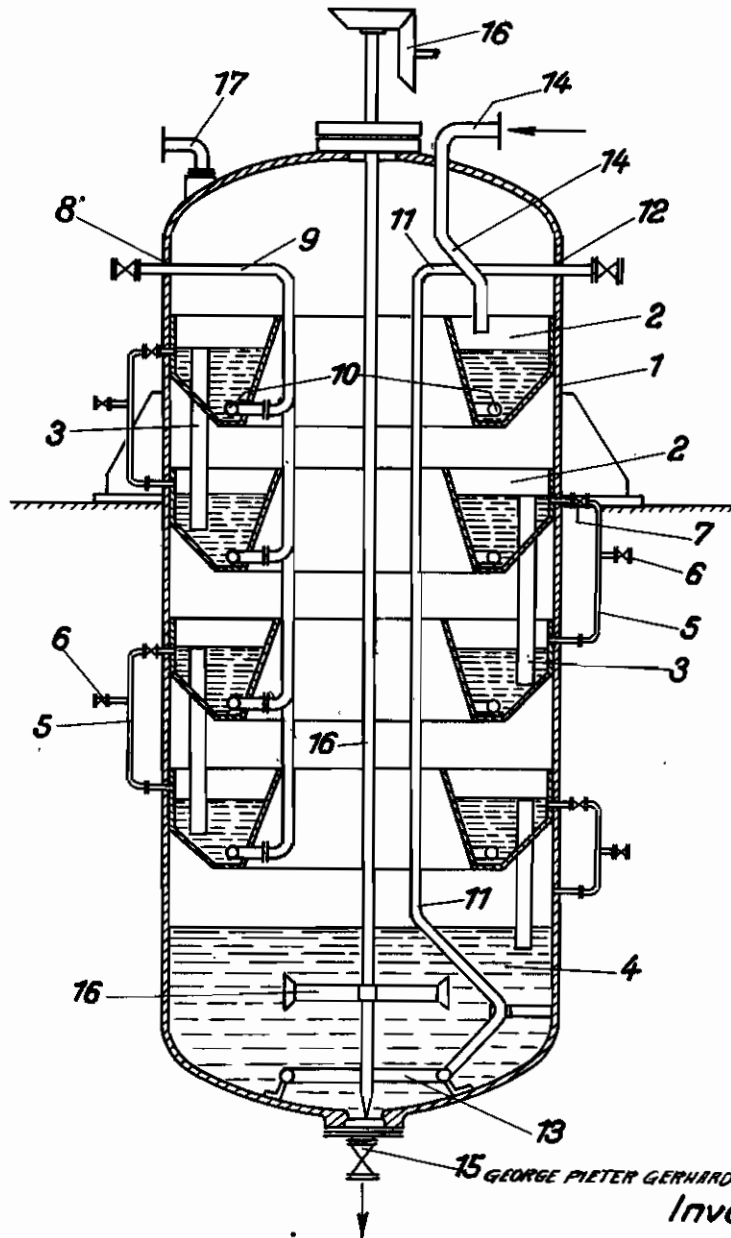


PUBLISHED
APRIL 27, 1943.
BY A. P. C.

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DEVICE FOR THE CONTINUOUS CLEAVAGE OF
FATS, OILS AND SIMILAR SUBSTANCES
Filed June 13, 1941

Serial No.
397,992



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DEVICE FOR THE CONTINUOUS CLEAVAGE OF FATS, OILS AND SIMILAR SUBSTANCES

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Application filed June 13, 1941

This invention relates to a device for the continuous cleavage of fats, oils and similar substances comprising a vertical pressure vessel containing a series of superposed interconnected chambers.

In a known device of this species a horizontally arranged pressure vessel is provided with an agitator comprising a plurality of blades disposed in spaced relation to one another on a shaft passing through the longitudinal axis of the vessel. During rotation of the agitator the blades thereof are supposed to subdivide the vessel into chamberlike compartments while moving large amounts of liquid radially toward the outside in a circulating manner so as to prevent parts of the introduced liquid from passing more or less directly to the outlet of the vessel.

This known device is open to the objection that no absolutely separated reaction mixture spaces can be obtained by the action of the blade wheels within the pressure vessel and consequently a good control of the course of the reaction is not possible, since necessarily neutral oils of higher cleavage degrees will always mix with those of lower degree. Furthermore, some oils during the cleavage with water with the aid of such agitators tend to form emulsions, which are difficult to separate after cleavage. Still another disadvantage is the undesirably large space occupied by a device of this type due to the horizontal arrangement of the pressure vessel made necessary by the use of the agitator.

In another known apparatus for the saponification of fats and waxes of alkalies a vertical pressure vessel is subdivided into several nonindependent chambers by a number of downwardly directed inclined walls which resemble funnels with superposed outlets. Through the outlets of these funnel-shaped bottoms a central steam pipe having openings for the passage of steam to the various chambers is running having annular spaces between it and the outlets of the funnel. The material to be saponified is introduced from above into the first chamber and flows along the steam pipe in downward direction from one chamber into the other. An apparatus of this kind is neither intended nor adapted for a continuous cleavage of fats, because there remains in the various chambers no definite amount of the reaction mixture for a definite period during which the steam could act upon the reaction mixture.

It is the object of the invention to eliminate these defects of the known devices by providing a device equipped with a vertical pressure vessel

containing superposed communicating chambers which according to the invention comprises a plurality of annular, superposed and independent containers which communicate with one another through outlets or other suitable means and can be filled with definite amounts of the substance to be cleaved and are fitted with steam sprays or other suitable means.

The invention is illustrated by way of example in the accompanying drawing showing a longitudinal section of the device.

Inside a vertical, preferably cylindrical, receptacle 1 constructed in the form of an autoclave for the cleavage of fat and oils annular containers or vessels 2 are arranged which in the embodiment shown number four and which may of course also be differently constructed than illustrated, provided they are independent units of annular form and subjected to equal pressure conditions within the receptacle 1. Instead of four annular boxes 2 a greater number thereof may be provided to suit operating requirements. The annular boxes 2 communicate with one another through overflow pipes 3 as shown, the overflow pipe of the lowermost box 2 leading into the bottom part of the receptacle 1. The boxes 2 may communicate also with one another through direct conduits or siphons, not shown. On the outside of the receptacle 1 pipings 5 with test cocks 6 are disposed through which one annular box 2 is connected with the next one. 7 are shut-off valves in the pipings 5. At 8 a steam piping 9 opens into the receptacle 1 and branches out into steam sprays 10 in the bottom part of the annular boxes 2. Depending on the intended use, nozzles or other circulation promoting means may be employed instead of the steam sprays 10. A second steam piping 11 opens at 12 into the receptacle 1 and leads to a steam spray 13 at the bottom of the receptacle. 14 is an inlet pipe through which the uppermost annular box 2 is charged, and 15 is a discharge valve. 16 denotes an agitator of known type. A connection 17 serves for displacing the air out off the receptacle 1.

The mode of operation of the device, for instance for the cleavage of fats and oils, is as follows: The reaction mixture of oil and water entering through the pipe 14 fills at first the uppermost annular box 2 up to the overflow 3, flows over and fills the next box 2 up to the overflow thereof, and this process is continued until all boxes 2 are filled and in the bottom part 4 a certain level of oil and water is maintained. The inlet pipe 14 is then closed and the

receptacle subjected to steam pressure by the opening of the steam pipings 9, 11, whereby the cleavage process is initiated. When it has been ascertained by sampling that in the pit 4 of the receptacle 1 the desired degree of cleavage has been attained, the valve of the inlet pipe 14 and the outlet valve 15 are opened to an extent insuring continuous operation at the desired degree of cleavage at which the supply and the discharge of the reaction mixture balance each other. The time of stay of the reaction mixture can be shortened or prolonged by opening or closing the inlet and outlet valves still more, so that practically any desired degree of cleavage can be obtained. The samples taken from the pipings 5 make it possible to ascertain the degree of cleavage attained in every annular box 2 and thus permit accurate checking of the entire course of the reaction within the receptacle 1.

The overflows in the various boxes 2 are preferably arranged so as to provide for the longest stay of the material to be treated in the boxes 2. This can be done in the manner shown and described or by separating for instance the overflows from one another in each box 2 by a wall, not shown, so that the material to be treated is positively caused to circulate in order to flow over into the next box.

A device according to the invention affords several considerable advantages: The reaction mixture remains the shortest possible time in the reaction space and is therefore carefully treated.

The constant and accurate watching of the course of the reaction permits operation of the device at a considerable saving in steam, since the autoclave need not be emptied. It, therefore affords over all a high output. The device can, moreover, be installed in existing pressure vessels without difficulty and without involving larger structural changes to transform discontinuously operating plants into continuously operating ones at slight cost.

The invention is applicable not only to the cleavage of oils and fats in the device described but also to carrying out a number of chemical and physical reactions. For example, it may be applied to distilling off low-boiling substances to remove for instance odorous substances from refined oils, fatty acids from neutral oils, any low-boiling substances dissolved in difficultly boiling substances, etc. Chemical reactions that can be performed with the aid of the invention include for instance saponifying reactions, as the continuous production of soaps from alkalies and fatty acids, the hydrogenation of vegetable, animal and mineral oils as well as the oxidation of vegetable and mineral oils containing double bonds, and of hydrocarbons, particularly paraffin. With the aid of a device according to the invention other chemical reactions, as sulfonation, halogenation, hydration and dehydration, polymerization and depolymerization, and esterification, may be carried out also.

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