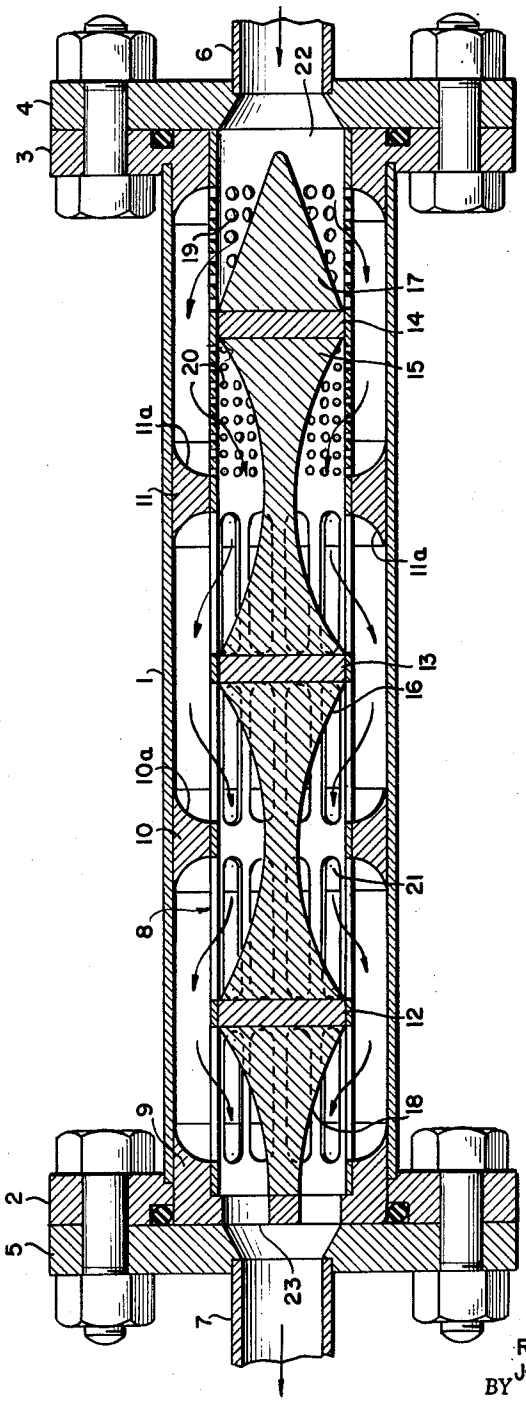
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HOMOGENIZING METHOD AND APPARATUS

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HOMOGENIZING METHOD AND APPARATUS

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This invention relates to homogenizing devices and methods, and, more particularly, to devices and methods for homogenizing margarine.

During the production of margarine, white specks sometimes appear. These are white or lighter colored spots or stripes which are sometimes visible on a plane of cutting when margarine is cut. The white specks are particles of margarine which have not been colored at all, or have been colored to a lesser degree than the surrounding margarine. They particularly occur in compositions comprising coconut oil or palm kernel oil. They appear to have the same composition as the surrounding margarine and are presumed to differ from the surrounding margarine only in their state of crystallization. These white specks can be eliminated by suitably homogenizing the margarine, for example, by passing it through wire screens, but if during this homogenization the margarine is worked too much, then the margarine becomes undesirably soft.

The present invention is concerned with providing an improved homogenizing device and method for eliminating, or substantially eliminating, the white specks in margarine.

According to the present invention there is provided a homogenizing device comprising an outer conduit, a central member, a perforated screen disposed inside the outer conduit and surrounding the central member, there being a passage between the outer member and the perforated screen and also a passage between the perforated screen and the central member, these passages being blocked alternately by spaced apart abutments, the arrangement being such that material to be homogenized, when passing through the device, follows a smoothly changing, "zig-zag" path which passes from one side of the perforated screen to the other between consecutive abutments.

Some or all of the abutments may be formed by annular baffles.

Some or all of the abutments in the passage between the outer conduit and the perforated screen may be formed by contact between the outer conduit and the perforated screen; similarly, some or all of the abutments in the passage between the perforated screen and the central member may be formed by contact between the perforated screen and the central member.

Advantageously, the central member commences with a cone-like shape adjacent an inlet port of the device and terminates with a cone-like shaped adjacent an outlet port of the device.

The cross-section of the path through the device is preferably an annulus, the mean diameter of this annulus increasing and decreasing alternately as the path passes consecutive abutments. This increasing and decreasing diameter is preferably arranged so that the material flows uniformly along the path. The area of the cross-section of the path can be substantially constant throughout the length of the path.

The perforations of the perforated screen in a first zone delimited by the inlet port and a first abutment that the path passes can be larger than the perforations of the perforated screen in a second zone delimited by the first abutment and the next abutment. The perforations of the remainder of the perforated screen are preferably larger than the perforations of the first zone. The total area of the perforations in the first zone and the total area of the perforations in each zone delimited by two consecutive abutments can each be larger than the area of the inlet port. The total area of the perforations in the first zone is preferably larger than the total area of those in the second zone but smaller than the total area of those in each subsequent zone delimited by two consecutive abutments.

Advantageously, some of the perforations may form slots to knead the margarine passing therethrough.

The invention also provides a method of homogenizing margarine by passing the margarine through a homogenizing device as specified above.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawing containing a single figure which shows a longitudinal section of a homogenizing device according to the invention.

A cylindrical tube 1, constituting an outer conduit, has flanges 2 and 3 secured to its ends, as, for example, by welding, and these flanges are bolted to flanges 4 and 5 of an inlet conduit 6 and an outlet conduit 7, respectively. A perforated cylindrical tube or screen 8 is disposed coaxially within the tube 1 with one end accommodated in a central bore of the flange 3 and with its other end in a recessed central bore of a spacing ring 9 which is accommodated in a central bore of the flange 2. The unit consisting of the cylinder 8 and the spacing ring 9 is confined in the axial direction by the flanges 4 and 5.

Arranged in the annular passage between the tube 1 and the screen 8 are two annular baffle plates or partitions 10 and 11 dividing the passage into three substantially equal compartments. The side faces 10*a* and 11*a* of these baffle plates are curved as shown. These baffle plates and the ring 9 constitute abutments between the outer conduit 1 and the screen 8. Inside the screen 8 is a central member which comprises solid parts 18, 16, 15, and 17 connected together by discs 12, 13, and 14. The part 17 is conical, and the parts 15 and 16 are solids of revolution of which the generating curve closely approximates a parabola. The part 18 is the same as a half of either of the parts 15 or 16, and also may be considered somewhat conical in shape. The discs 12, 13, and 14 contact the screen 8 to form abutments or partitions blocking the passage between the screen 8 and the central member. The abutments 14, 11, 13, 10, 12, and 9 are equally spaced apart along the axis of the device and, as shown, block alternately the passage between the screen 8 and the central member and the passage between the outer conduit 1 and the screen 8.

The perforations in the zone of the screen 8 between the flange 3 and the abutment 14 are larger than the perforations in the zone delimited by the abutments 14 and 11 but smaller than the perforations in each of the remaining zones between the abutments 11, 13, 10, 12, and

9. By way of example only, the perforations in the zone between the flange 3 and the abutment 14 can consist of round holes 19 each having a diameter of 1.5 millimeters; the perforations in the zone between abutments 14 and 11 can consist of round holes 20 each having a diameter of 1 millimeter; and the perforations in each of the remaining zones can be constituted by axial slots 21 having a length of 35 millimeters and a width of 8.5 millimeters. The holes 19 and 20 serve to sieve the margarine, while the slots 21 serve to knead the margarine. The exact sizes of the perforations are not of paramount importance, but are adapted to the requirements of the cooperating apparatus (not shown) with which the homogenizing device operates and to the product to be treated.

The number of perforations in each of the zones is such that the total area of the perforations in each zone is larger than the area of an inlet port 22 formed by the entrance to the screen 8. Also, the total area of the perforations in the zone between the flange 3 and the abutment 14 is larger than the total area of the perforations in the zone between the abutments 14 and 11 but smaller than the total area of the perforations in each of the zones between the other abutments. By way of example only, there may be twenty-three rows each of twenty holes 19, twenty-seven rows each of twenty-four holes 20, and ten slots 21 in each of the other zones.

In use, margarine to be homogenized is fed into the homogenizing device through the inlet conduit 6 and the inlet port 22. The abutments 14, 11, 13, 10, 12, and 9 cause the margarine to follow a zig-zag path which changes smoothly in direction and passes from one side of the screen 8 to the other between consecutive abutments, as indicated by the arrows. The cross-section of the path is always an annulus, and, as the path zig-zags, the mean diameter of this annulus alternately increases and decreases, the mean diameter being a maximum at the abutments 14, 13, and 12 and a minimum at the inlet port 22 and at the abutments 11, 10, and 9. At the same time, the cross-sectional area of the path remains substantially constant. The margarine then leaves the homogenizing device through an outlet port 23 and passes into the outlet conduit 7. The smoothly changing zig-zag flow of the margarine through the different apertures sieves and kneads the margarine sufficiently to remove the white specks therein, and the arrangement and shape of the central member and the baffle plates produces a uniform flow of the margarine through the homogenizing device.

If preferred, the parts 17, 14, 15, 13, 16, 12, and 18 of the central member can be made as one integral part to enable easier dismantling and cleaning.

From the description above, it is apparent that the invention is susceptible to modifications which do not depart from the spirit of the invention. Accordingly, such modifications should be deemed to be encompassed by the following claims which are set forth as follows to define the invention.

We claim:

1. A homogenizing device comprising a conduit member for receiving a fluid substance, a screen member contained within the conduit member, and means for deflecting the fluid substance to flow in a continually changing direction back and forth through the screen member without abrupt directional changes.

2. A homogenizing device comprising a conduit member for receiving a fluid substance, a screen member contained within the conduit member, means for shaping the flow of fluid substance through the conduit member so that it is substantially of the same area at any cross-section thereof, and means for deflecting the fluid substance to flow in a continually changing direction back and forth through the screen member without abrupt directional changes.

3. A homogenizing device comprising a conduit member for receiving a fluid substance, a screen member contained within the conduit member, means for shaping the flow of fluid substance through the conduit member so that it is substantially annular at any cross-section thereof, the mean diameter of the substantially annular cross-section alternately increasing and decreasing at successive positions within the conduit, and means for deflecting the fluid substance to flow in a continually changing direction back and forth through the screen member without abrupt directional changes.

4. A device for homogenizing a fluid substance comprising an outer conduit, a perforated inner conduit having an inlet for receiving a flowing fluid substance and an outlet for discharging the fluid substance, the inner conduit being positioned coaxially within the outer conduit, a central member positioned coaxially within the inner conduit and blocking the inner conduit at predetermined locations, and a plurality of baffle plates disposed between the inner and outer conduits each at a location between a different pair of adjacent predetermined locations, the central member and the baffle plates shaped to cause the flowing fluid substance to pass back and forth through the perforated conduit following a path whose direction smoothly changes.

5. A device as recited in claim 4 in which the central member has conically shaped ends and at least one central portion shaped as a solid of revolution of which the generating curve is a parabola.

6. A device as recited in claim 4 in which the perforated inner conduit is formed with openings substantially circular in shape for sieving the fluid substance and openings substantially slotted in shape for kneading the fluid substance.

7. A device for homogenizing a fluid substance comprising a first tube, a perforated tube disposed inside the first tube coaxially therewith leaving a closed space between the first and perforated tubes, one of the ends of the perforated tube serving as an inlet for the device and the other end as an outlet for the device, at least one partition disposed between the first and perforated tubes dividing the closed space into first and second sections adjacent the inlet and outlet, respectively, first and second partitions disposed inside the perforated tube and lying substantially adjacent the mid portions of the first and second sections, respectively, a first central member disposed coaxially within the perforated tube between the first and second partitions, the first central member being a solid of revolution of which the generating curve is substantially a parabola, and second and third substantially conically shaped central members disposed coaxially within the perforated tube and positioned adjacent the inlet and outlet, respectively.

8. A device as recited in claim 7 in which the perforated tube is formed with openings along the length thereof, and in which the total areas defined by the openings between two adjacent partitions, between the inlet and the first partition, and between the second partition and the outlet are each greater than the cross-sectional area of the inlet.

9. A device as recited in claim 7 in which the perforated tube is formed along a first length thereof with substantially circular openings of a first diameter, along a second length thereof with substantially circular openings of a second diameter smaller than the first diameter, and the total area defined by the openings of the first diameter are greater than the total area defined by the openings of the second diameter.

10. A device as recited in claim 9 in which the perforated tube is formed along a third length thereof with substantially slot-like openings thereby to knead the fluid substance passing therethrough.

11. A device as recited in claim 10 in which the total area defined by the slot-like openings between any two adjacent partitions is greater than the total area defined by the substantially circular openings of the first diameter.

12. The method of homogenizing a fluid substance

comprising the steps of passing the substance back and forth through a screen member, the direction of flow of the substance during its passage back and forth through the screen member smoothly changing without abrupt directional changes.

13. A device for homogenizing a fluid substance, comprising a first conduit for receiving the fluid substance, a perforated conduit positioned within the first conduit, a central member positioned within the perforated conduit and blocking the perforated conduit at predetermined locations, and a plurality of baffles disposed between the first and perforated conduits each at a location between a different pair of adjacent predetermined locations, the

central member and the baffles being formed with surfaces having substantially no abrupt discontinuities thus to cause the flowing fluid substance to pass back and forth through the perforated conduit following a path whose direction smoothly changes.

References Cited in the file of this patent

UNITED STATES PATENTS

2,652,234	Feldman	Sept. 15, 1953
2,740,616	Walden	Apr. 3, 1956
2,747,844	Slayter	May 29, 1956
2,777,467	Powell et al.	Jan. 15, 1957