



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 084 745 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.03.2001 Bulletin 2001/12

(51) Int Cl.7: **B01F 3/08**, B01F 5/06,
B01F 7/10

(21) Application number: **00870177.3**

(22) Date of filing: **11.08.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

• **Concept, Techniek en Vakmanschap**
9120 Beveren (BE)

(30) Priority: **13.08.1999 BE 9900550**

(72) Inventor: **Vleminckx, Yves**
3020 Herent (BE)

(71) Applicants:
• **Quomak**
3001 Leuven (BE)

(74) Representative: **Luys, Marie-José A.H. et al**
Gevers & Vander Haeghen,
Livornostraat 7
1060 Brussel (BE)

(54) Device for emulsifying liquids

(57) The invention concerns a device for emulsifying liquids, comprising an emulsifying head with a cylindrical package (1), the cylindrical package comprising an inlet (2) to feed the liquids to be emulsified to the package and an outlet (3) to drain off the emulsified liquids from the package, at least three perforated radial discs (4,5,5') being mounted parallel to each other in axial di-

rection of the package between the inlet (2) and the outlet (3) to form a series of narrow passages for the liquids to be emulsified, a first disc (5') mounted in the vicinity of the inlet (2) and a third disc (5) mounted in the vicinity of the outlet (3) being connected to the cylindrical package (1) and a second disc (4) being mounted rotatably in the package, between the first (5') and third discs (5).

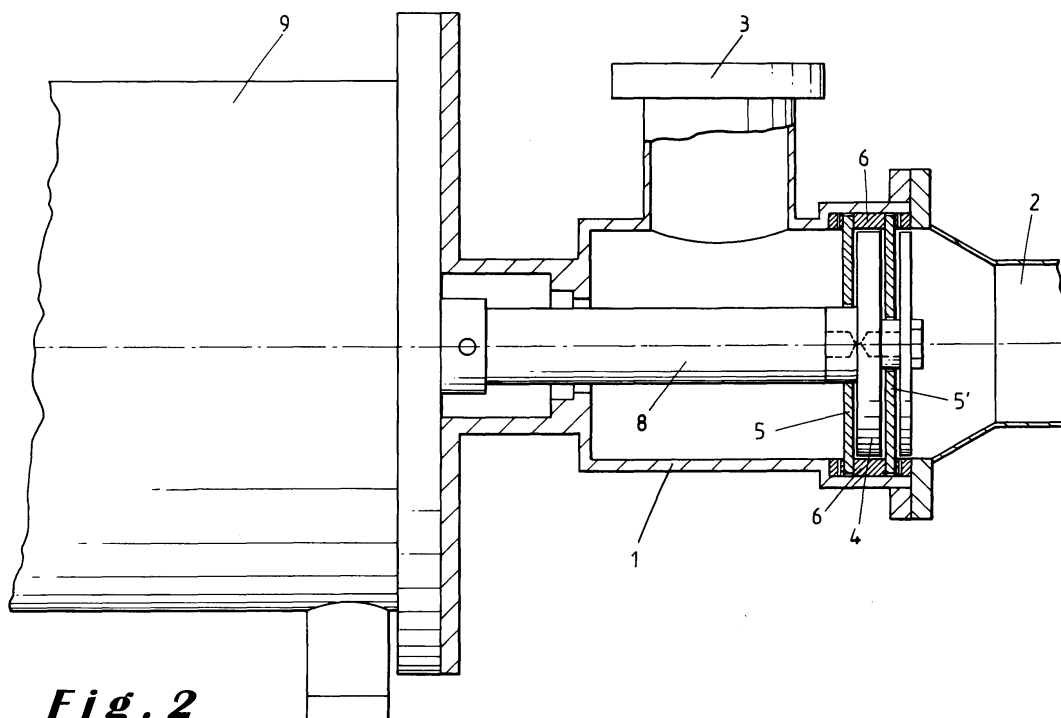


Fig. 2

EP 1 084 745 A2

Description

[0001] This invention concerns a device for emulsifying one or more liquids, as described in the preamble of the first claim.

[0002] It is the aim of the invention to provide a device having a simplified construction, so that the device may be installed in a simplified way and maintenance is facilitated.

[0003] This aim is achieved according to the invention with the technical features summarised in the characterising part of the first claim.

[0004] The device of this invention comprises an emulsifying head with a cylindrical package. The cylindrical package comprises an inlet to feed the liquids to be emulsified to the package and an outlet to discharge the emulsified liquids from the package. In axial direction of the package, between the inlet and the outlet, at least three perforated discs extending mainly parallel to each other, are installed. A first disc, mounted in the vicinity of the inlet, and a third disc, mounted in the vicinity of the outlet, fit against the inner partition of the cylindrical package. A second disc, located between the first and third disc, also fits against the inner partition of the package and is rotatably mounted in the package.

[0005] The device of this invention is particularly suited for the preparation of an emulsion of two or more liquids, for example mayonnaise, whipped cream, margarine, spread pastes, etc. According to this invention, the term liquids refers to substances having a liquid state of aggregation. The term liquids also includes viscous substances having a high viscosity.

[0006] The mutual distance between the discs, measured in axial direction of the package, preferably amounts to 1.5-2.5 mm. It was found that at this distance, an optimal mixing of the liquids, and thus an optimal emulsion may be obtained. The mutual distance between the discs is chosen by the man skilled in the art, depending on the nature of the substances that have to be emulsified.

[0007] Moreover, each disc is preferably provided with openings having a diameter between 4 and 10 mm. It was found that at these dimensions, an optimal emulsion may be obtained. The diameter of the openings is chosen by the man skilled in the art, depending on the nature of the substances that have to be emulsified.

[0008] The invention also concerns a process for emulsifying liquids. According to the process of this invention, one or more liquids that have to be emulsified, are fed to a package and moved under pressure through openings in a first perforated disc mounted in the package, and subsequently through a second perforated disc which is rotated with a rotational speed of 2500-3500 revolutions per minute, and finally through a third perforated disc mounted in the package, upon which the emulsified mixture leaves the device.

[0009] The invention is further elucidated by means of the following description and description of the fig-

ures.

[0010] Figure 1 shows a perspective view on the emulsifying device of this invention.

[0011] Figure 2 shows a longitudinal section of the emulsifying device of this invention.

[0012] Figure 3 shows a view on the perforated discs of the emulsifying device of this invention.

[0013] The preferred embodiment of the device of this invention shown in Figure 1 comprises an emulsifying head with a cylindrical package 1 for emulsifying a mixture of liquids. The package 1 has an inner partition 10 and an inlet 2 to feed the liquids that have to be emulsified to the package 1 and an outlet 3 to drain off the emulsified liquid. The liquids to be emulsified may be fed to the emulsifying device as a homogeneous or an inhomogeneous mixture. If desirable, additives may be added to one or more of the liquids to be emulsified, such as, for example, flavours, spices, etc.

[0014] In axial direction of the package 1, parallel to each other, at least three perforated discs 4, 5, 5' are provided. The discs 4, 5, 5' extend in radial direction of the package 1. Each disc 4, 5, 5' has a circumferential edge which is in contact with the inner partition 10 of the package, thus allowing to obtain a leak-tight connection of the discs 4, 5, 5' with the inner partition 10. A first disc 5' is located in the vicinity of the inlet 2 of the package 1; a third disc 5 is located in the vicinity of the outlet 3 of the package 1. The first and third discs 5, 5' are preferably solidly fixed to the package 1. The first and third discs 5, 5' have a circumferential edge against which a sealing 6 is provided to prevent a liquid that is being sent under pressure through the package 1 from ending up between the discs 5 and 5' and the inner partition 10 of the package 1. This could result in an inhomogeneous emulsification of the liquid mixture.

[0015] Between the first 5' and third disc 5 is a second disc 4, which is preferably mounted rotatably in the package 1. Therefor, the second disc 4 is preferably mounted on a rotatable axle 8 which is driven by a motor 9. However, it is also possible to drive the axle manually or in any other way known to the man skilled in the art. The rotational speed of the motor 9 is preferably 2000-4000 revolutions per minute, in order to allow the preparation of a very high-quality emulsion, i.e. an emulsion with a drop size between 2 and 4 mm.

[0016] The discs 4, 5, 5' are mounted at a distance from each other, which in axial direction of the package preferably varies from about 1.5 to about 2.5 mm. Preferably a mutual distance of nearly 2 mm is provided. Although the device described here only comprises three discs, it is also possible to apply several fixed and rotating discs, for example 5 or 7 or more. Amongst others, this will be of importance when it is difficult to obtain a homogeneous emulsion of the liquids.

[0017] Preferably, the openings 7 provided in the perforated discs 4, 5 and 5' are substantially round. The diameter of the openings 7 preferably varies from 4 to 10 mm. However, depending on the nature of the liquids

that are to be emulsified, the selected diameter of the openings 7 may be larger or smaller. Generally, the man skilled in the art will adjust the diameter and number of the openings 7 in each individual disc 4, 5, 5' to the nature of the liquids that have to be emulsified, in order to allow to obtain an emulsion as homogeneous as possible when the liquids are moved through the emulsifying device.

[0018] The openings of the discs 4, 5, 5' may all show the same diameter. Preferably, the openings 7 in the various discs have different diameters, in order to obtain an optimal emulsification. The openings 7 within a same disc 4, 5, 5' may have substantially the same diameter, however, preferably at least one of the discs 4, 5 or 5' comprises openings having different diameters, as shown in Figure 3. Preferably, the first 5' and second disc 4 comprise openings having different diameters. It is also possible to provide the third disc 5 with openings 7 having different diameters.

[0019] As is shown in Figure 2, all the discs 4, 5, 5' are mounted around the axle 8 driven by the motor 9. The first and third discs 5, 5' are preferably fixed solidly in the package 1 around the axle 8. The second disc 4 is preferably mounted onto the axle 8, so that it is rotatable within the package 1. Between the circumferential edge of the second disc 4 and the inner partition 10 of the package, preferably a sealing 6 is provided.

[0020] In this way an extremely simple construction may be obtained, which has a very favourable effect on both the installation and maintenance of the device.

[0021] The operation of the device of this invention may be described as follows. A mixture of liquids, homogeneous or inhomogeneous, that have to be emulsified, is introduced into the package through the inlet 2 and successively moved under pressure through the openings in the first disc 5', the openings in the second disc 4 and the openings in the third disc 5, in the direction of the outlet 3. Because the openings in the successive discs 4, 5, 5' have different diameters, and because the second disc 4 is rotated during the movement of the liquids, a mixture, a circulation and associated emulsification of the liquids is realised. The speed at which the mixture is moved through the package depends on the pressure exerted on the liquids. The pressure to be exerted on the mixture to obtain a smooth emulsion may be experimentally determined by the man skilled in the art. Usually, this pressure will vary with the composition of the mixture to be emulsified.

[0022] The device of this invention is suitable for emulsifying widely divergent liquids and/or semi-liquid materials used for the production of mayonnaise, whipped cream, margarine, spread pastes, etc. The device is suitable for the emulsification of two, three, four or more liquids.

Claims

1. Device for emulsifying liquids, characterised in that the device comprises an emulsifying head with a cylindrical package, the cylindrical package comprising an inlet to feed the liquids to be emulsified to the package and an outlet to drain off the emulsified liquids from the package, at least three perforated discs being mounted parallel to each other, in axial direction of the package, between the inlet and the outlet, to form a series of narrow passages for the liquids to be emulsified, a first disc mounted in the vicinity of the inlet and a third disc mounted in the vicinity of the outlet being connected to the cylindrical package and a second disc being mounted rotatably in the package, between the first and third discs.
2. Device according to claim 1, characterised in that the middle disc is driven by a motor.
3. Device according to claim 1 or 2, characterised in that the discs are located at a distance of 1.5-2.5 mm from each other.
4. Device according to any one of claims 1 to 3, characterised in that the openings of the perforated discs are substantially circular and have diameters between 4 and 10 mm.
5. Device according to any one of claims 1-4, characterised in that the first and second discs have a circumference against which a sealing is applied to provide a tight connection with the inner partition of the package.
6. Device according to any one of claims 1-5, characterised in that the discs are mounted removably in the package.
7. Process for emulsifying liquids, characterised in that one or more liquids that have to be emulsified, are fed to a package and moved under pressure through openings in a first perforated disc mounted in the package, subsequently through a second perforated disc which is rotated at a rotational speed of 2500-3500 revolutions per minute, and finally through a third perforated disc, upon which the emulsified mixture leaves the device.

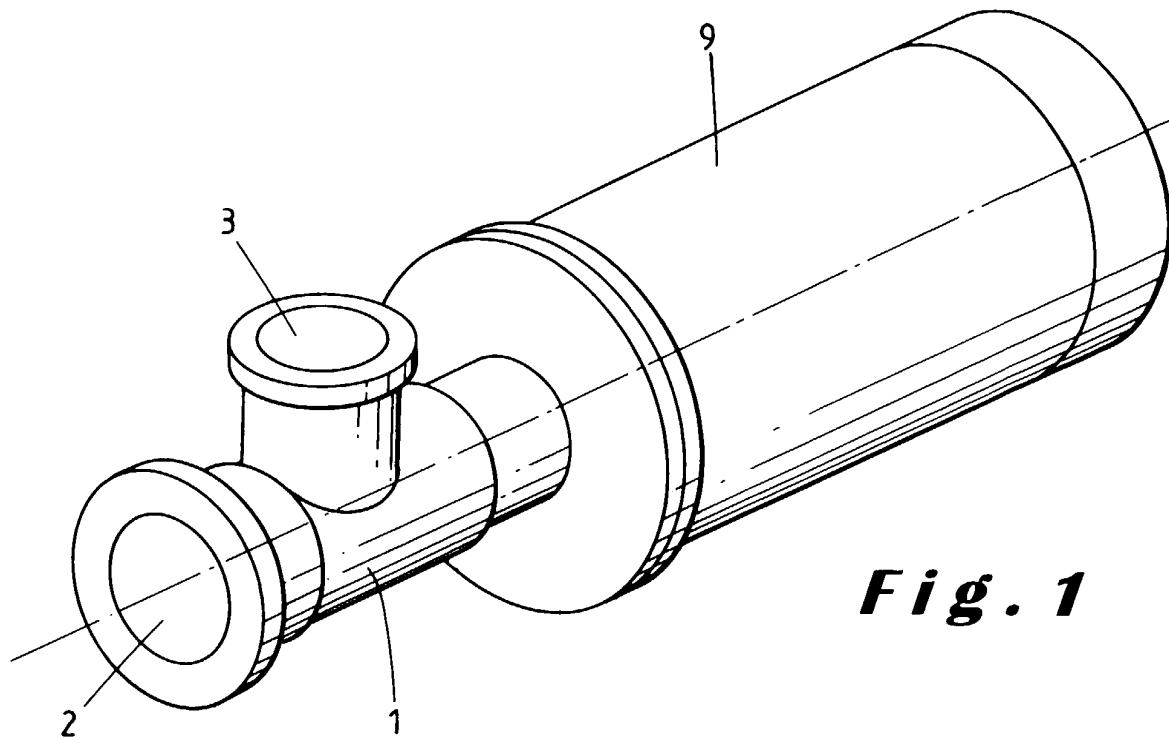


Fig. 1

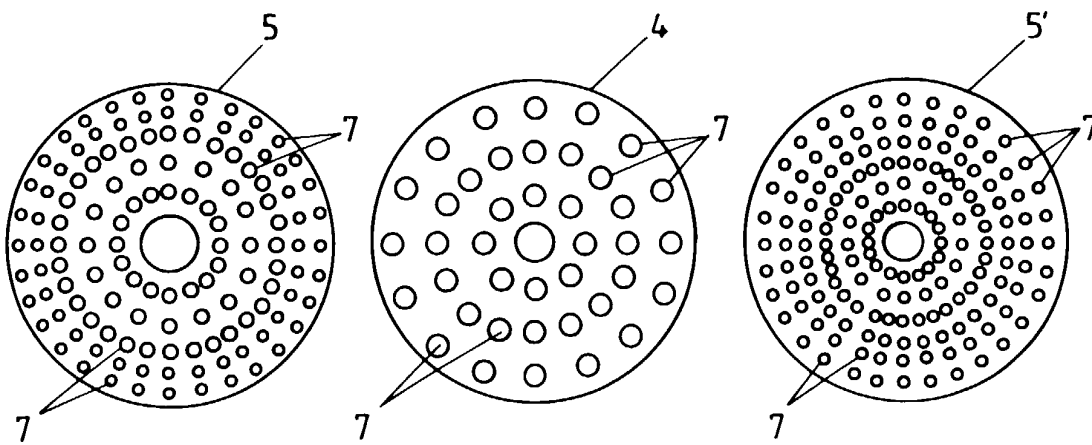


Fig. 3

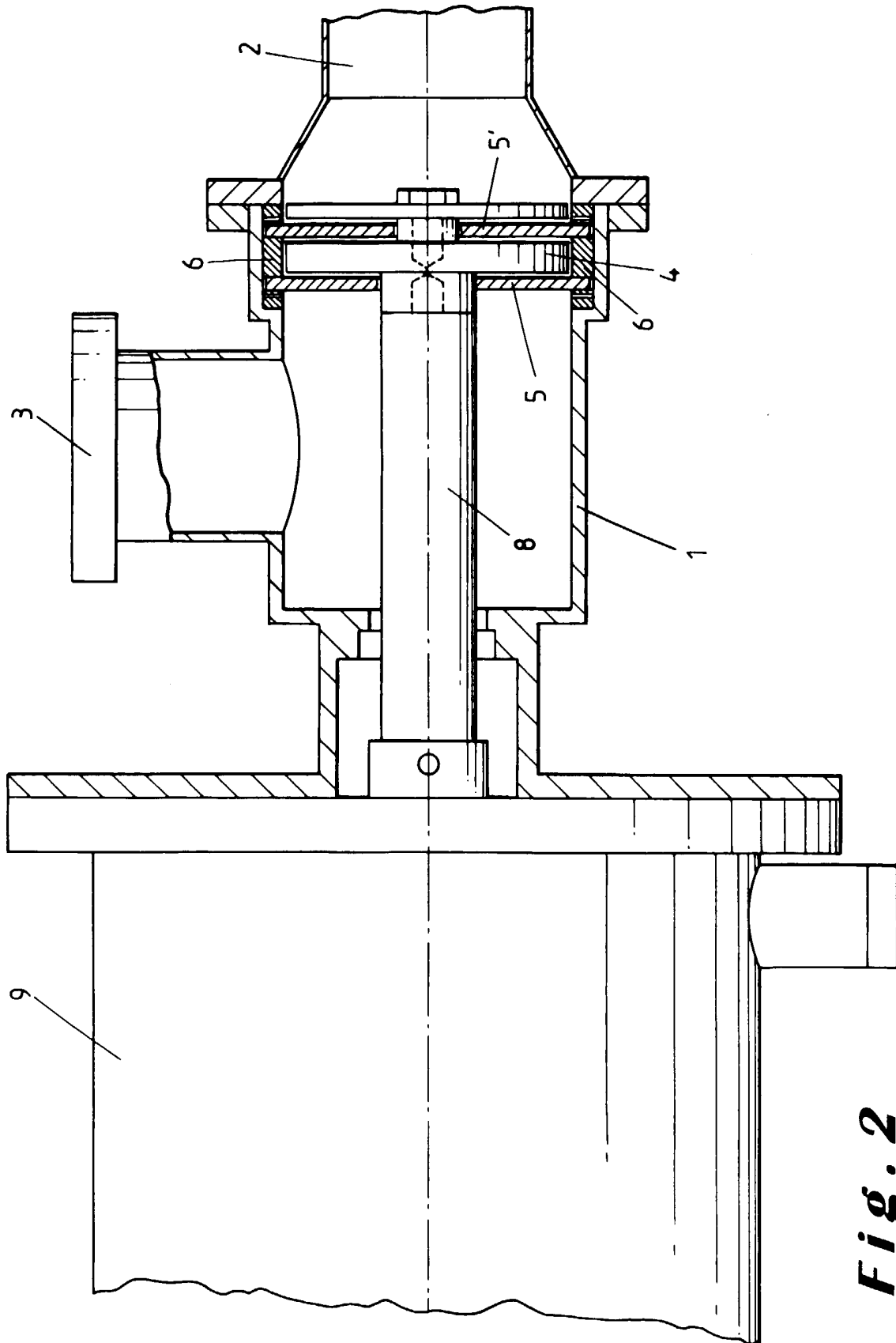


Fig. 2