

Claims

1. A portable apparatus (1) for dispensing of a product, including:
 - a product container (5) which contains a product (P) that is to be foamed by and dispensed from the apparatus;
 - a gas container (7), at least containing a gas, for example a single gas or a gas mixture, wherein the gas substantially does not contain any greenhouse gases such as N₂O;
 - a dispersion device (10), having a product entrance that is connectable to the product container (5) for receiving product (P), the dispersion device (10) further being connectable to the gas container (7) for supplying the gas to the product (P) during product discharge;
 - a processing device (12) downstream of the dispersion device (10) for performing a mixing treatment and/or pressure reduction on the product provided with the gas; and
 - a product dispensing head (20), being part of a top section (19) of the apparatus (1) and being arranged downstream of the processing device (12), the dispensing head (20) defining a product receiving space (21) to receive the product (P) from the processing device (12), a distal part of the dispensing head (20) preferably having product shaping projections (22), wherein the apparatus (1) is configured to be used at least in a substantially upside-down orientation during product discharge.
2. The apparatus according to claim 1, wherein the apparatus has a portable housing (H), provided with a bottom (B) facing away from the product dispensing head (20), the product dispensing head (20) in particular being mounted or mountable to a top section of the apparatus.
3. The apparatus according to claim 2, wherein the housing is shaped to be lifted single-handed by a user, for example a housing having an

elongated shape and/or having a maximum width of 10 cm at a gripping position.

4. The apparatus according to any of claims 2-3, wherein the product container (5) is integrated in the housing (H).

5 5. The apparatus according to claim 4, wherein the housing (H) and respective product container have a disposable construction.

6. The apparatus according to any of the preceding claims, wherein the top section (19) of the apparatus includes the dispersion device (10).

7. The apparatus according to claim 6 in combination with any of
10 claims 2-5, wherein the top section (19) of the apparatus is removably connected to the housing, (H)

8. The apparatus according to any of the preceding claims, including a pressurized gas supply means (7; 187; 207) containing pressurized gas, for inducing gas flow and/or product flow during operation, wherein an initial
15 pressure in the pressurized gas supply means is higher than 15 bar, in particularly higher than 50 bar, for example higher than 100 bar.

9. The apparatus according to claim 8, wherein the gas container provides the pressurized gas supply means (7; 207).

10. The apparatus according to claim 8, wherein the pressurized gas
20 supply means (187) is separate from the gas container.

11. The apparatus according to any of claims 8-10, wherein the pressurized gas supply means are integrated in the top section (19) of the apparatus.

12. The apparatus according to any of claims 8-10, wherein the
25 pressurized gas supply means include a disposable gas cartridge, preferably being configured to withstand an internal gas pressure of at least 50 bar, e.g. at least 200 bar, and preferably made of steel and preferably having a maximum internal volume of 200 ml, for a maximum example internal volume of 20 ml (14 ml).

13. The apparatus according to any of claims 8-11, including control means for controlling gas flow and product flow, such that a supply of gas from the gas container (7) to the dispersion device is started before supply of product thereto, in particular upon actuation of an operation means.
- 5 14. The apparatus according to any of the claims 8-12, wherein an outlet of the pressurized gas supply means (7; 187) is sealed by a closed sealing structure, wherein the apparatus includes an opening mechanism for opening the sealing structure prior to an initial use of the gas supply means (7; 187).
- 10 15. The apparatus (1) according to any of the preceding claims, wherein the dispersion device (10) comprises a chamber and a gas dispersion tube, wherein the gas dispersion tube is preferably placed substantially spaced-apart, e.g. centrally, from an inner side of the chamber.
16. The apparatus (1) according to any of the preceding claims,
15 including a plurality of dispersion devices, arranged for operating simultaneously.
17. The apparatus (1) according to any of the preceding claims, wherein the dispersion device is a microfiltration or an ultrafiltration-type dispersion device, for example a dispersion device that is provided with a
20 wall (15a) with gas transmissive pores having a pore size in the range of 0.1 – 200 microns, in particular a pore size of at least 0.1 micron and less than 5 microns.
18. The apparatus (1) according to any one of the preceding claims, further comprising a pressure regulation means, configured to regulate the
25 pressure and/or ratio of product and/or gas fed to the dispersion device (10).
19. The apparatus (1) according to any one of the previous claims, wherein the processing device (12) comprises an elongated expansion channel (path), for example extending along a spiral or helix trajectory.

20. The apparatus (1) according to claim 19, wherein the expansion tube is longer than 1 cm, for example longer than 10 cm, in particular at least being 15 cm in length.
21. The apparatus (1) according to any one of the previous claims,
5 wherein the gas container contains substantially pure nitrogen or air or a mixture thereof.
22. The apparatus (1) according to any one of the previous claims, wherein the product (P) is a foodproduct, for example containing milk or dairy cream.
- 10 23. The apparatus according to any of the preceding claims, wherein the product container is a flexible bag, for example a bag to be compressed by external gas pressure during operation.
24. The apparatus according to any of the preceding claims, wherein the product container (5) is integrated in a housing (H), the housing having
15 a top that includes a discharge valve for discharging the product, the top of the housing further including a gas inlet for feeding gas into the housing, wherein the apparatus also includes a top section that is fitted to the top of the housing (H), the top section including a pressurized gas supply means (7; 187) containing pressurized gas, for inducing gas flow and product flow
20 during operation, wherein an outlet of the pressurized gas supply means is connectable to the gas inlet of the housing.
25. The apparatus according to any of the preceding claims, wherein the apparatus is configured to cooperate with a high pressure external gas reservoir, for example an external compressor, for charging or recharging
25 the gas container.
26. The apparatus according to any of the preceding claims, wherein the apparatus includes an internal compressor, for charging or recharging the gas container.
27. A portable apparatus (1) for dispensing of a product, for example
30 an apparatus according to any of the preceding claims, including:

- a product container (5) which contains a product (P) that is to be foamed by and dispensed from the apparatus;
 - a gas container (7), at least containing a gas, for example a single gas or a gas mixture, wherein the gas substantially does not contain any greenhouse gases such as N_2O ;
 - a dispersion device (10), having a product entrance that is connectable to the product container (5) for receiving product (P), the dispersion device (10) further being connectable to the gas container (7) for supplying the gas to the product (P) during product discharge;
 - a processing device (12) downstream of the dispersion device (10) for performing a mixing treatment and/or pressure reduction on the product provided with the gas; and
 - a product dispensing head (20), and being arranged downstream of the processing device (12), the dispensing head (20) defining a product receiving space (21) to receive the product (P) from the processing device (12), a distal part of the dispensing head (20) preferably having product shaping projections (22),
- wherein the product container (5) is integrated in a housing (H), the housing having a top that includes a discharge valve for discharging the product, the top of the housing further including a gas inlet for feeding propellant gas into the housing, wherein the apparatus also includes a top section that is fitted to the top of the housing (H), the top section including a pressurized gas supply means (7; 187) containing pressurized gas, for inducing gas flow and product flow during operation, wherein an outlet of the pressurized gas supply means is connectable to the gas inlet of the housing.
28. Apparatus according to claim 26, wherein the product discharge valve of the housing includes a product discharge channel and a gas discharge channel, the gas discharge channel for example extending in parallel with respect to the product discharge channel.

29. A portable apparatus (1) for dispensing of a product, for example an apparatus according to any of the preceding claims, including:

- a product container (5) which contains a product (P) that is to be foamed by and dispensed from the apparatus;
 - 5 - a gas container (7), at least containing a gas, for example a single gas or a gas mixture, wherein the gas substantially does not contain any greenhouse gases such as N₂O;
 - at least two dispersion devices (10), each having a product entrance that is connectable to the product container (5) for receiving product (P), the at
 - 10 least two dispersion devices (10) further being connectable to the gas container (7) for supplying the gas to the product (P) during product discharge;
 - a processing device (12) downstream of the dispersion devices (10) for performing a mixing treatment and/or pressure reduction on the product
 - 15 provided with the gas; and
 - a product dispensing head (20), and being arranged downstream of the processing device (12), the dispensing head (20) defining a product receiving space (21) to receive the product (P) from the processing device (12), a distal part of the dispensing head (20) preferably having product shaping
 - 20 projections (22),
- wherein the dispersion devices are arranged for operating simultaneously.

30. A portable apparatus (1) for dispensing of a product, for example an apparatus according to any of the preceding claims, including:

- a product container (5) which contains a product (P) that is to be foamed by
- 25 and dispensed from the apparatus;
- a gas container (7), at least containing a gas, for example a single gas or a gas mixture, wherein the gas substantially does not contain any greenhouse gases such as N₂O;
- a dispersion device (10), having a product entrance that is connectable to
- 30 the product container (5) for receiving product (P), the dispersion device (10)

further being connectable to the gas container (7) for supplying the gas to the product (P) during product discharge;

-a processing device (12) downstream of the dispersion device (10) for performing a mixing treatment and/or pressure reduction on the product

5 provided with the gas; and

-a product dispensing head (20), being arranged downstream of the processing device (12), the dispensing head (20) defining a product receiving space (21) to receive the product (P) from the processing device (12), a distal part of the dispensing head (20) preferably having product shaping

10 projections (22),

the apparatus including a pressurized gas supply means (7; 187) containing pressurized gas, for inducing gas flow and/or product flow during operation, wherein an initial pressure in the pressurized gas supply means is higher than 15 bar, in particularly higher than 50 bar, for example higher than 100

15 bar.

31. Apparatus according to claim 30, wherein the pressurized gas supply means (7; 187) include a gas cartridge, being configured to withstand an internal gas pressure of at least 50 bar, e.g. at least 100 bar, more particularly at least 200 bar, and preferably made of steel and preferably

20 having a maximum internal volume of 200 ml, for a maximum example internal volume of 20 ml (14 ml).

32. Method for foaming and dispensing a product, for example using an apparatus according to any of the preceding claims, including: supplying product (P) to a dispersion device (10) and supplying a gas to the

25 dispersion device, wherein the gas preferably does not contain any greenhouse gases such as N₂O, wherein the product (P) follows a first path through the dispersion device (10) and receives the gas via the dispersion device, wherein the product undergoes a controlled pressure reduction downstream of the dispersion device, wherein the product follows a second

path during the controlled pressure reduction that substantially deviates from the first path.

33. Method for foaming and dispensing a product, for example a method according to claim 32, including:

- 5 supplying product (P) to a dispersion device (10) and supplying a first gas to the dispersion device, wherein the first gas preferably does not contain any greenhouse gases such as N_2O , wherein the product receives the first gas via the dispersion device, wherein the product undergoes a controlled pressure reduction downstream of the dispersion device,
- 10 wherein a second gas is used for inducing both the product flow and the flow of the first gas, the second gas being kept separate from the first gas.