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(54) **MACHINE FOR FILLING CONTAINERS WITH DIFFERENT TYPES OF PRODUCTS**

(57) The present invention relates to a weight filling machine suitable for filling containers with two or more products of different type.

In particular, the invention relates to a weight filling machine (1), comprising a filling unit (2) and a supply unit (3) for one or more products (P) of different final composition for the filling of containers (C), where said one or more products (P) comprise the same base composition

for all the products (P) and one or more additives, which are different for each different final composition, **characterized in that** the supply unit (3) comprises a tank (12) for the base composition and a plurality of mixing units (13, 13', 13'', 13'''), one for each different product (P), each of the mixing units (13, 13', 13'', 13''') being connected by means of respective supply lines (11, 11', 11'', 11''') to the filling unit (2).

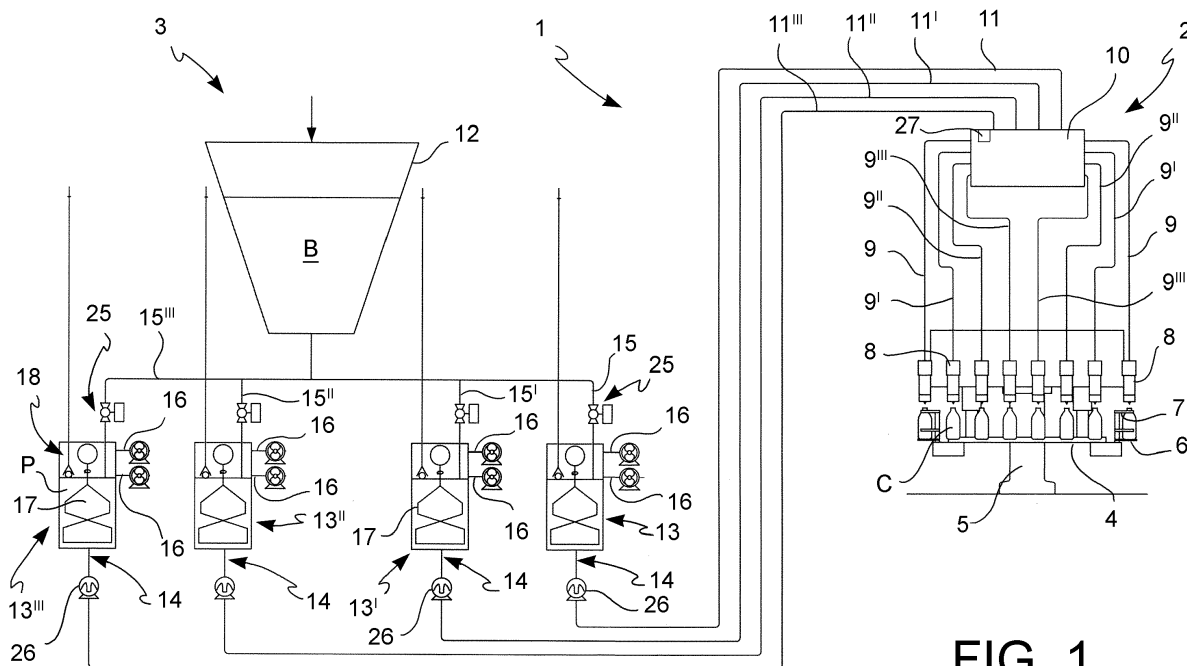


FIG. 1

Description

[0001] The present invention relates to a weight filling machine suitable for filling containers with two or more products of different type.

[0002] A particularly felt problem in the field of filling machines, in particular of weight filling machines, is the one of filling containers with products of different type to form a composition. A typical example occurs for household products such as detergents for home hygiene, for washing clothes and similar products. It is indeed known that such products comprise a base composition, which typically amounts to about 99% of the weight of the product, and fragrances and/or dyes which are added to the base composition to give the product a range of different organoleptic features so as to please different user tastes. For example, a detergent may be introduced to the market with a pink color and a rose scent, or have the color and scent of lavender, and so on.

[0003] The production of these diversified products requires first preparing the different mixtures of substances and then filling the containers with such mixtures, by operating for example by successive lots, each with a different product. This requires interrupting the filling process between one lot and the other to wash the equipment.

[0004] Alternatively, machines exist which are capable of simultaneously filling containers with mixtures of different products, by drawing from diversified tanks, one for each product, but managing the filling procedure is complex and the bulk of the equipment is significant.

[0005] The problem addressed by the present invention therefore is to provide a filling machine, in particular a weight filling machine, which allows optimally managing the simultaneous filling operation of containers with diversified products and which has a reduced bulk.

[0006] Such a problem is solved by a filling machine as outlined in the appended claims, the definitions of which form an integral part of the present description.

[0007] In particular, the invention relates to a weight filling machine comprising a filling unit and a supply unit for one or more products of different final composition for filling containers, where said one or more products comprise the same base composition for all the products and one or more additives, different for each different final composition, where the supply unit comprises a tank for the base composition and a plurality of mixing units, one for each different product, each of the mixing units being connected by means of respective supply lines to the filling unit.

[0008] Further features and advantages of the present invention will become more apparent from the description of certain embodiments thereof, given below only by way of non-limiting, indicative examples, with reference to the following figures:

Figure 1 depicts a view of a block diagram of the machine according to the invention;

Figure 2 depicts a diagrammatic view of a detail of

the machine in figure 1;

Figure 3 depicts a diagrammatic view of the detail in figure 2, according to a different embodiment.

[0009] With reference to figure 1, the filling machine according to the invention, indicated as a whole with numeral 1, comprises a filling unit 2 and a supply unit 3 for the various products P for filling containers.

[0010] The filling unit 2 comprises a rotating table 4 hinged on a shaft 5 moved by the drive of the machine. The rotating table 4 comprises a plurality of plates 6 for supporting containers C. The containers C may be held on the plates 6 in a conventional manner, for example held at the neck by suitable grippers 7.

[0011] There is positioned, above each plate 6, a filling valve 8, also of the conventional type, selected according to the type of filling liquid (for example, for foaming products, or for high density products, etc.).

[0012] The filling unit 2 in preferred embodiments is a weight filling unit, hence it will be provided with suitable devices, also of the conventional type, which allow this type of filling. In particular, the plates 6 or gripper 7 (if container C is suspended to gripper 7) are connected to a suitable loading cell which in turn is operatively connected with a command and control unit (not shown) of machine 1 so as to interrupt the filling of each individual container C once the predetermined weight is reached.

[0013] Each filling valve 8 is connected with a distribution line 9, 9', 9'', 9''' of a product P with different final composition. For example, in the case of detergents, a first distribution line 9 may supply a rose-scented detergent, a second line 9'' may supply a lavender-scented detergent, and so on. Each of such products P will therefore be defined by a recipe which provides mixing a base composition B with suitable additives, which are different from one recipe to the next.

[0014] Figure 1 depicts four different distribution lines 9, 9', 9'', 9''', but it is apparent that there may be fewer or more of them. Moreover, the various distribution lines 9, 9', 9'', 9''' in the drawings are arranged in alternate order, but nothing prevents them from being grouped so as to fill, in order, a first series of containers C with a same product, a second series with a different product, and so on.

[0015] The plurality of distribution lines 9, 9', 9'', 9''' is connected to a distribution manifold 10 which provides to distribute the different products between the different filling valves 8 according to the predetermined order. The construction details of the distribution manifold 10 are known to those skilled in the art because such a manifold is used on conventional filling machines which allow a multi-product type of filling.

[0016] The distribution manifold 10 comprises a pressure sensor 27 for each product supplied, the function of which will be apparent later in the description.

[0017] The distribution manifold 10 is connected to the supply unit 3 for the products P by means of respective supply lines 11, 11', 11'', 11''', one for each different prod-

uct P.

[0018] The supply unit 3 comprises a tank 12 containing the base composition for making product P, which will be equal for all the various products P dispensed by means of the supply lines 11, 11', 11", 11"', and a plurality of mixing units 13, 13', 13", 13'''. Each of the mixing units 13, 13', 13", 13''' is connected to a supply line 11, 11', 11", 11''' of product P to the distribution manifold 10.

[0019] With reference to figure 2, each of the mixing units 13, 13', 13", 13''' comprises a receptacle 19 which comprises an outlet opening 14 connected to one of said supply lines 11, 11', 11", 11''' for dispensing the final composition of a product P obtained according to one of the aforesaid recipes.

[0020] Receptacle 19 further comprises an inlet opening 20, connected to a connection line 15, 15', 15", 15''' with tank 12 of the base composition, and one or more delivery lines 16 of one or more additives (in the drawing, two delivery lines 16 for a dye and for a fragrance are shown by way of example).

[0021] A mixing member 17, for example a blade mixer, put in rotation by an actuator 21, is arranged inside receptacle 19.

[0022] The receptacle preferably has a small volume, for example 3 to 6 liters.

[0023] The mixing unit 13, 13', 13", 13''' comprises a device 18 for adjusting the level of product P inside receptacle 19.

[0024] In certain embodiments, the level adjustment device 18 comprises a float valve 22 connected to a duct 23 for venting the air above the product P head inside receptacle 19. Thereby, when, in the initial filling phase (starting phase of the machine described later), the level of product P reaches the level desired dictated by the float valve 22, the latter closes thus preventing the air to exit, and the pressure of the air (or other gaseous fluid, for example an inner gas in the case of care-sensitive products) in the free space of receptacle 19 blocks the introduction by gravity of further base composition and therefore the raising of the level.

[0025] The float valve 22 typically is an air vent valve with a straight float. Such a valve may consist of a cup with cavity facing downwards which branches off from the lower end of the vent duct 23, in which cup a float is accommodated, for example a ball-float, which is free to move between an open position and a closed position of the duct.

[0026] The delivery lines 16 of the additive (s) are intercepted by pumping means 24. In preferred embodiments, the pumping means 24 are peristaltic pumps.

[0027] Each of the connection lines 15, 15', 15", 15''' is intercepted by valve means 25, in particular by an on-off valve, while each of the supply lines 11, 11', 11", 11''' is intercepted by a displacement pump 26.

[0028] It is important for the inlet flow rate in each of the mixing units 13, 13', 13", 13''' through the respective connection lines 15, 15', 15", 15''' always to be greater than the flow rate of product P delivered by the aforesaid

mixing units 13, 13', 13", 13''' along the supply lines 11, 11', 11", 11'''.

[0029] As mentioned, the filling machine 1 comprises a command and control unit which manages the operating conditions of the machine, with particular reference to the supply unit 3.

[0030] The command and control unit controls the following functions:

(a) During the starting phase of machine 1,

i) opening the valve means 25 while keeping the displacement pump 26 still until reaching a pre-determined filling volume as determined by the level adjustment device 18,

ii) activating the mixing member 17 and the pumping means 24 for the additives, where the quantity of additives introduced by the pumping means 24 is a function of said filling volume and of the final composition of product P;

(b) During the operational phase of machine 1,

iii) activating the displacement pump 26, while keeping the valve means 25 open, where the delivery pressure of the displacement pump 26 is a function of the difference between the pressure read by sensor 27 in the distribution manifold 10 and a pre-set pressure value,

iv) adjusting the volume of additives introduced by the pumping means 24 as a function of the final composition volume taken from receptacle 19 by the displacement pump 26.

[0031] The operation of the level adjustment device 18 was described above.

[0032] A typical final composition of a cleansing liquid may comprise, by way of example, about 99% in volume of the base composition, about 0.3% in volume of a dye and about 0.7% in volume of a fragrance. The pumping means 24 are then operated according to such predetermined volume ratios.

[0033] In alternative embodiments, as shown in figure 3, the valve means 25 are replaced by pumping means 28 for loading the base composition into receptacle 19.

[0034] Valve means 29, typically a pressure limiter, are arranged along the connection line 15, 15', 15", 15''' between such pumping means 28 and the inlet opening 20 of receptacle 19, the valve means being connected with a recirculation duct 30 that reconnects to the connection line 15, 15', 15", 15''' upstream of the pumping means 28.

[0035] In this embodiment, when the level adjustment device 18 closes the air vent, the pressure of the head volume of receptacle 19 induces a closing of the pressure limiter 29 at the connection line 15, 15', 15", 15''' downstream and the selection of the recirculation duct 30. Thus, the introduction of further base composition into receptacle 19, and therefore, the raising of the liquid level,

is avoided.

[0036] In this embodiment, the command and control unit controls the following functions:

(a) During the starting phase of machine 1,

- i) activating the pumping means 28 along the connection line 15, 15', 15", 15''' with tank 12, while keeping the displacement pump 26 still until reaching a predetermined filling volume as determined by the level adjustment device 18,
- ii) activating the mixing member 17 and the pumping means 24 for the additives, where the quantity of additives introduced by the pumping means 24 is a function of said filling volume and of the final composition of product P;

(b) During the operational phase of machine 1,

- iii) activating the displacement pump 26, while keeping the pumping means 28 active, where the delivery pressure of the displacement pump 26 is a function of the difference between the pressure read by sensor 27 in the distribution manifold 10 and a pre-set pressure value,
- iv) adjusting the volume of additives introduced by the pumping means 24 as a function of the final composition volume taken from receptacle 19 by the displacement pump 26.

[0037] From the above, it is apparent that the invention achieves the preset objects.

[0038] In particular, there will be one large tank alone for the base composition and a plurality of limited-volume mixing units, for example 3 to 6 liter mixing units. Thereby, the bulk of the apparatus is limited and the operation may be controlled in a much more efficient manner.

[0039] It is apparent that only certain particular embodiments of the present invention have been described, to which those skilled in the art can make all those modifications required for the adaptation thereof to particular applications without however departing from the scope of protection of the present invention.

Claims

1. Weight filling machine (1), comprising a filling unit (2) and a supply unit (3) for one or more products (P) of different final composition for the filling of containers (C), wherein said one or more products (P) comprise the same base composition for all the products (P) and one or more additives, different for each different final composition, **characterized in that** the supply unit (3) comprises a tank (12) for the base composition and a plurality of mixing units (13, 13', 13", 13'''), one for each different product (P), each of the mixing units (13, 13', 13", 13''') being connect-

ed by means of respective supply lines (11, 11', 11", 11''') to the filling unit (2).

2. Weight filling machine (1) according to claim 1, wherein each of the mixing units (13, 13', 13", 13''') comprises a receptacle (19) which comprises an outlet opening (14) connected to a respective supply line (11, 11', 11", 11'''), an inlet opening (20), connected to a connection line (15, 15', 15", 15''') with the tank (12) of the base composition, and one or more delivery lines (16) for one or more additives, and wherein the receptacle (19) comprises a mixing member (17).
3. Weight filling machine (1) according to claim 2, wherein each mixing unit (13, 13', 13", 13''') comprises a device (18) for adjusting the level of the product (P) inside the receptacle (19).
4. Weight filling machine (1) according to claim 3, wherein the level adjustment device (18) comprises a float valve (22) connected to a duct (23) for venting the air above the product (P) head inside the receptacle (19).
5. Weight filling machine (1) according to any one of claims from 2 to 4, wherein the delivery lines (16) of the additive(s) are intercepted by pumping means (24).
6. Weight filling machine (1) according to claim 5, wherein said pumping means (24) are peristaltic pumps.
7. Weight filling machine (1) according to any one of the claims from 1 to 6, wherein the filling unit (2) comprises a rotating table (4) that moves the containers (C) and a plurality of filling valves (8), wherein each filling valve (8) is connected to a distribution line (9, 9', 9", 9''') of a product (P) and the distribution lines (9, 9', 9", 9''') are connected to a distribution manifold (10) that provides for the distribution of the products of different final composition to the filling valves (8) in a predetermined order.
8. Weight filling machine (1) according to claim 7, wherein the distribution manifold (10) is connected to the supply unit (3) of the products (P) by means of said respective supply lines (11, 11', 11", 11''') and wherein the distribution manifold (10) comprises a pressure sensor (27).
9. Weight filling machine (1) according to any one of claims from 2 to 8, wherein each of the connection lines (15, 15', 15", 15''') is intercepted by valve means (25) and each of the supply lines (11, 11', 11", 11''') is intercepted by a displacement pump (26).

10. Weight filling machine (1) according to claim 9, wherein the valve means (25) are an on-off valve.
11. Weight filling machine (1) according to any one of claims from 2 to 8, wherein each of the connection lines (15, 15', 15'', 15''') is intercepted by pumping means (28) and each of the supply lines (11, 11', 11'', 11''') is intercepted by a displacement pump (26), and wherein, along the connection line (15, 15', 15'', 15'''), between such pumping means (28) and the inlet opening (20) of the receptacle (19), valve means (29), or a pressure limiter, are placed, connected with a recirculation duct (30) that reconnects to the connection line (15, 15', 15'', 15''') upstream of the pumping means (28).
12. Weight filling machine (1) according to claim 9 or 10, comprising a command and control unit, which controls the following functions:
- (a) During the starting phase of the machine (1),
- i) opening the valve means (25) along the connection lines (15, 15', 15'', 15'''), keeping the displacement pump (26) still until reaching a predetermined filling volume as determined by the level adjustment device (18),
- ii) activating the mixing member (17) and the pumping means (24) for the additives, wherein the quantity of additives introduced by the pumping means (24) is a function of said filling volume and of the final composition of the product (P);
- (b) During the operational phase of the machine (1),
- iii) activating the displacement pump (26), keeping the valve means (25) open, wherein the delivery pressure of the displacement pump (26) is a function of the difference between the pressure read by the sensor (27) in the distribution manifold (10) and a preset pressure value,
- iv) Adjusting the volume of additives introduced by the pumping means (24) as a function of the final composition volume taken from the receptacle (19) by the displacement pump (26).
13. Weight filling machine (1) according to claim 11, comprising a command and control unit, which controls the following functions:
- (a) During the starting phase of the machine (1),
- i) activating the pumping means (28) along the connection line (15, 15', 15'', 15''') with

the tank (12), keeping the displacement pump (26) still until reaching a predetermined filling volume as determined by the level adjustment device (18),

ii) Activating the mixing member (17) and the pumping means (24) for the additives, wherein the quantity of additives introduced by the pumping means (24) is a function of said filling volume and of the final composition of the product (P);

(b) During the operational phase of the machine (1),

iii) Activating the displacement pump (26), keeping the pumping means (28) active, wherein the delivery pressure of the displacement pump (26) is a function of the difference between the pressure read by the sensor (27) in the distribution manifold (10) and a preset pressure value,

iv) Adjusting the volume of additives introduced by the pumping means (24) as a function of the final composition volume taken from the receptacle (19) by the displacement pump (26).

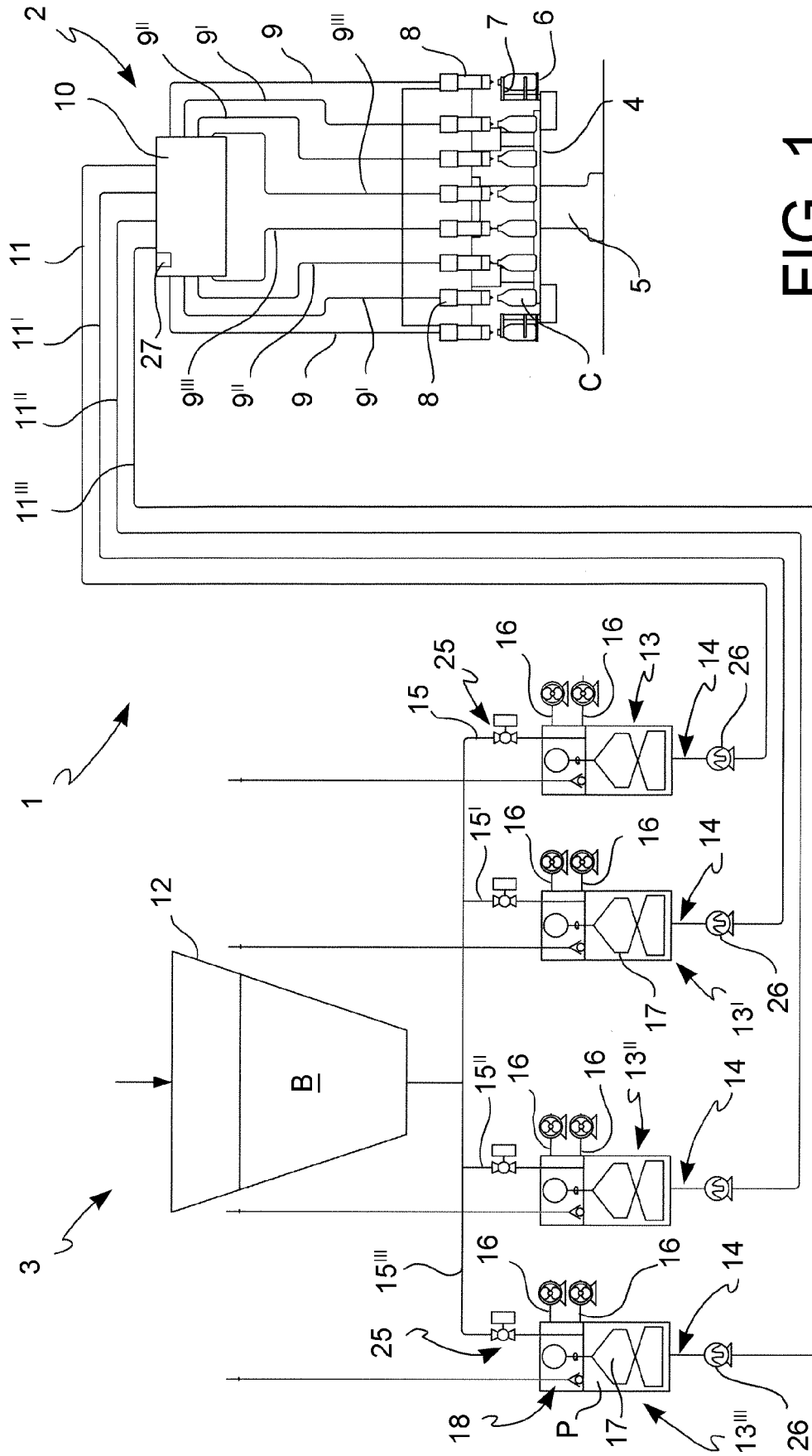


FIG. 1

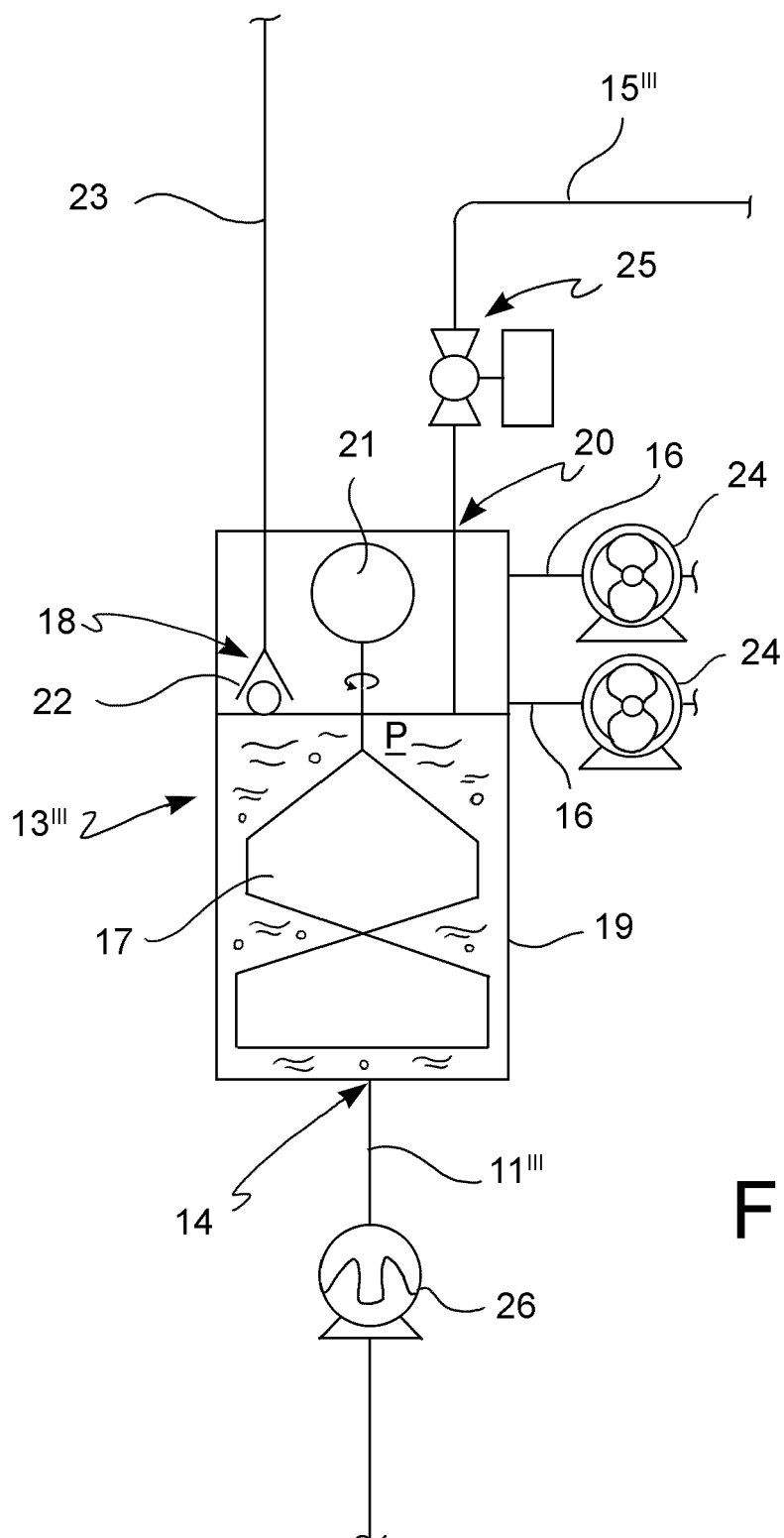


FIG. 2

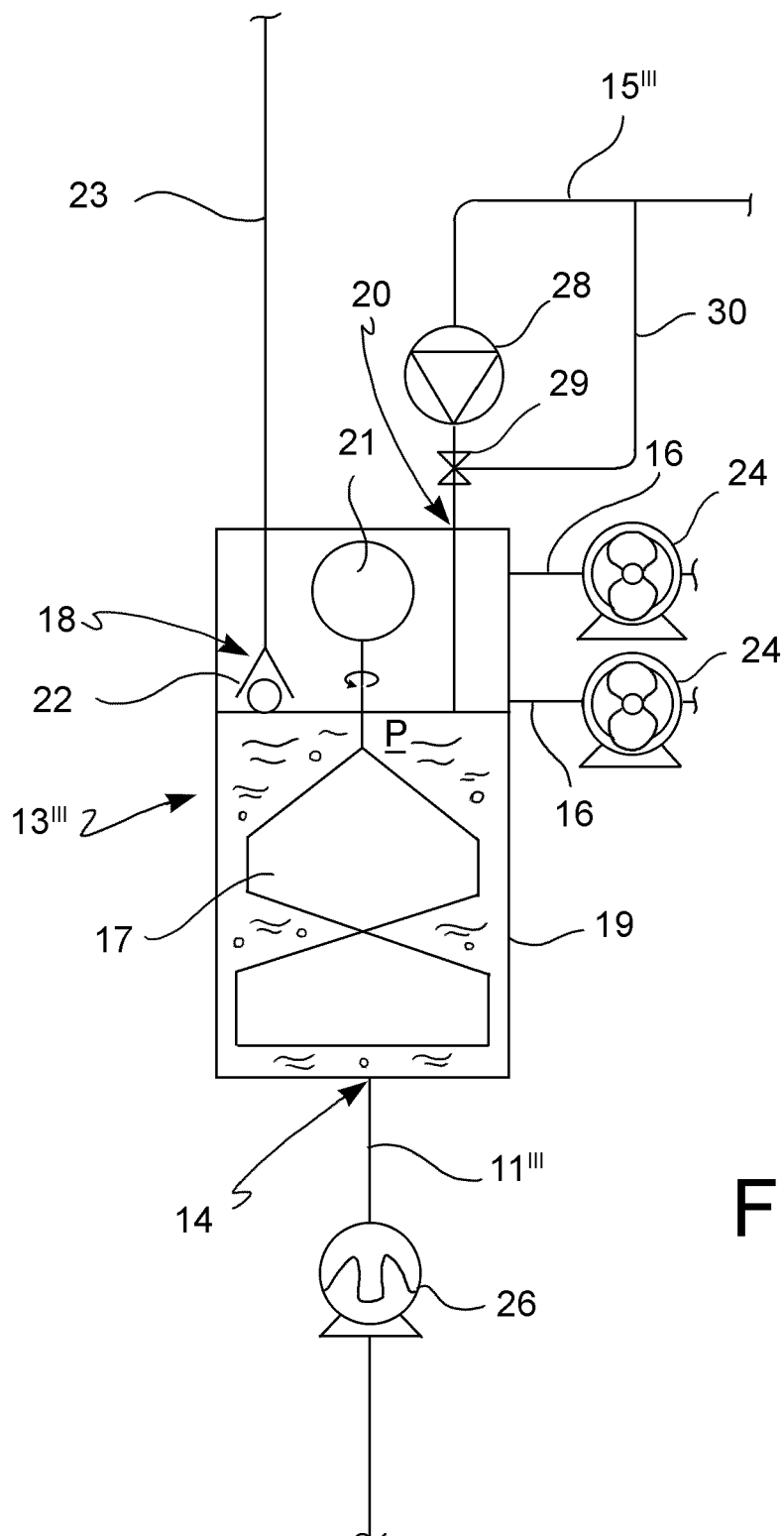


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 9212

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	----- WO 03/095080 A2 (ECOLAB INC [US]) 20 November 2003 (2003-11-20) * figure 13 *	5,6	
A	----- US 2007/036024 A1 (KUBALA RONALD W [US] ET AL) 15 February 2007 (2007-02-15) * figure 3 *	1-6,9-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			B01F B67C B65B
1 The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		10 July 2017	Vassoille, Philippe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 17 16 9212

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-6, 9-11

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 17 16 9212

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6, 9-11

relates to mixing of a base composition with additives.

2. claims: 7, 8, 12, 13

relates to distributing and filling of several products.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-07-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82