DEVICE AND METHOD FOR FILLING PRODUCTS

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ABSTRACT
A method and the device used to fill a container with a product. The product includes a first liquid component and at least a second component. The product is fed to the container to be filled via at least one filling pipe and at least one filling valve. The filling pipe is divided between the receptacle and the filling valve into pipe sections by at least one throttle valve. The pipe section between the filling valve and a throttle valve arranged adjacent to the filling valve is dimensioned so that the internal volume of this part of the filling pipe essentially corresponds to a filling volume of a container to be filled.
DEVICE AND METHOD FOR FILLING PRODUCTS

[0001] The invention relates to a device comprising a receptacle for storing a product which consists of a first liquid component and at least a second component, wherein the receptacle is connected to at least one filling valve by at least one filling pipe.

[0002] The invention also relates to a method for filling a container with a product which is stored inside a receptacle, wherein the product consists of a first liquid component and at least a second component and in which the product is fed to the container to be filled via at least one filling pipe and at least one filling valve.

[0003] Such products can, for example, be foodstuffs. It is, for example, also possible that the second component is liquid too. Examples of products with such a component are emulsions, and in particular milk. According to another alternative, the second component is solid. This can, for example, be the case with a juice with fruit pieces. Other examples are milk with coconut flakes, milk with cereals, and soups and sauces with chunky ingredients. The chunky ingredients can, for example, be vegetables and/or meat.

[0004] When the second component is solid, the second component is typically in the form of particles, wherein an average diameter of these particles can lie within a range of 1 to 40 mm. In special cases, smaller or larger average diameters are also possible.

[0005] When it is planned to store products which consist of at least two products, the problem can arise that the second component is not homogeneously distributed indefinitely in the first component and separation phenomena can occur. Depending on the specific weight of the first and second components, it is possible that particles float, on the one hand, or settle, on the other.

[0006] The object of the present invention is therefore to construct a device of the type mentioned at the beginning in such a way that separation of the components is counteracted.

[0007] This object is achieved according to the invention by at least one throttle valve being arranged in the region of the filling pipe between the receptacle and the filling valve, and by the filling pipe between the filling valve and a throttle valve arranged adjacent to the filling valve being dimensioned in such a way that the internal volume of this part of the filling pipe essentially corresponds to a filling volume of a container to be filled.

[0008] Another object of the invention is to improve a method of the type mentioned at the beginning in such a way that separation of the components is counteracted.

[0009] This object is achieved according to the invention by filling the filling pipe between the receptacle and the filling valve being divided by at least one throttle valve into pipe sections, and by the pipe section between the filling valve and a throttle valve arranged adjacent to the filling valve being dimensioned in such a way that the internal volume of this part of the pipe section essentially corresponds to a filling volume of a container to be filled.

[0010] It has proved to be expedient for longer filling pipes that at least two throttle valves are arranged in the region of the filling pipe.

[0011] It is in particular proposed that the filling pipe is dimensioned between two adjacent throttle valves such a way that the internal volume of this part of the pipe section essentially corresponds to a filling volume of a container to be filled.

[0012] Gentle filling of product into containers is assisted by the filling pipe extending essentially perpendicularly beneath the receptacle.

[0013] It is in particular proposed that the receptacle is designed for performing a purely gravimetric filling. In addition, an internal pressure which deviates from ambient pressure can be generated inside the receptacle.

[0014] Separation of the product is counteracted by an internal diameter of the filling pipe being approximately 1.5 times an average particle size of solid constituents contained in the product.

[0015] Separation of the product can be prevented by the product being moved inside the receptacle by a conveying apparatus.

[0016] Exemplary embodiments of the invention are shown diagrammatically in the drawings, in which:

[0017] FIG. 1 shows a diagrammatic view of the device in vertical section, with a product with sinking particles,

[0018] FIG. 2 shows an embodiment that has been modified with respect to FIG. 1,

[0019] FIG. 3 shows a perspective view of a receptacle with attached filling pipes and filling valves, and

[0020] FIG. 4 shows a filling pipe with two throttle valves and a filling valve.

[0021] According to the exemplary embodiment in FIG. 1, a tubular guide element (3) is arranged in an internal space (1) of a receptacle (2). The guide element (3) extends essentially vertically with a longitudinal axis (4). In the exemplary embodiment shown, the receptacle (2) has a circular contour in a horizontal sectional plane and the guide element (3) is positioned essentially concentrically inside the receptacle (2).

[0022] The internal space (1) serves to receive a product (5) to be stored. Inside the receptacle (2), the product has a filling level (6). A sensor (7) connected to a filling level measuring device (8) serves to detect the filling level (6).

[0023] According to an exemplary embodiment, the guide element (3) can have a circular cross-sectional area in a horizontal sectional plane. Other rounded or angular cross-sectional areas are, however, feasible too. A lower end (9) of the guide element (3) is arranged with a spacing (10) from a base (11) of the receptacle (2). In the exemplary embodiment shown, a widening of the cross-section (12) is provided in the region of the lower end (9). FIG. 1 also shows that a widening of the cross-section (14) is made in the region of an upper end (13) of the guide element (3).

[0024] A feed pipe (15) for the product (5) opens out into the guide element (3). It is in particular proposed that the feed line (15) is fixed in the region of a wall (16) of the receptacle (2) and that the guide element (3) is held and positioned by the feed pipe (15).

[0025] A conveying apparatus (17) for the product (5) is arranged inside the guide element (3). The conveying apparatus (17) can take the form of a propeller which is coupled to a drive (19) by a shaft (18).

[0026] In the exemplary embodiment shown, the base (11) has a contour (20) such that a central region of the base (11) is arranged at a higher level than peripheral regions of the base (11). The base (11) is thereby curved towards the guide element (3).

[0027] In the embodiment in FIG. 2, a plurality of filling pipes (21) arranged in the region of the base (11) connect the receptacle (2) to associated filling devices. It can also be seen in FIG. 2 that at least one directing element (22) arranged in
the region of the guide element (3) suppresses the formation of rotary flows inside the guide element (3) and promotes the formation of flows in the direction of the longitudinal axis (4). For example, three directing elements (22) in the form of guide plates which are each arranged at 120° relative to one another at the circumference of the guide element (3) can, for example, be arranged in the region of the lower end (9) of the guide element (3).

[0028] FIG. 3 shows an embodiment in which a multiplicity of filling pipes (21) are connected to the receptacle (2). Connecting elements (26) which connect the filling pipes (21) to the receptacle (2) are preferably arranged equidistantly relative to one another along a circumference of the receptacle (2) and at least in sections extend with a radial directional component relative to a longitudinal axis of the receptacle (2).

[0029] In the exemplary embodiment shown, each of the filling pipes (21) is divided by a throttle valve (23). The filling pipes (21) connect the receptacle (2) to filling valves (24).

[0030] A pipe section (25) with an internal volume which corresponds to the envisaged filling volume for a container to be filled extends between the throttle valve (23) and the filling valve (24). In longer filling pipes (21) a plurality of throttle valves (23) can be used which can be positioned relative to one another in such a way that the pipe sections situated between the throttle valves (23) have an internal volume which in each case corresponds to the internal volume of the pipe section (25).

[0031] For the gentle filling of products into containers, it is in particular proposed that the filling process is conducted gravimetrically and that the filling valves (24) are arranged beneath the receptacle (2). A cross-sectional area of the filling pipes (21) is preferably approximately 1.3 times an average cross-sectional area of solid particles which are contained inside the product to be filled into containers.

[0032] The lengths of the filling pipes (21) are preferably minimized as much as possible in order to prevent separation of the components of the product. It is preferably also proposed that the possibility of shutting off the flow is provided in the region of the connecting elements (26).

[0033] The advantage of the above-explained dimensioning of the volume of the pipe section (25) consists in the fact that, when partial separation of the components takes place inside the pipe section (23), the components are nevertheless filled into the containers to be filled in the specified proportion and are remixed with each other intensively during the filling process.

[0034] Tube sections of the filling pipe (21) can be interconnected using flanges (26). For greater clarification, FIG. 4 shows a filling pipe (21) with two throttle valves (23) and a container (27) positioned beneath the filling valve (24).

1-15. (canceled)

16. A device for filling a container, comprising: a receptacle for storing a product which consists of a first liquid component and at least a second component; at least one filling valve; at least one filling pipe that connects the filling valve to the receptacle; and at least one throttle valve arranged in a region of the filling pipe between the receptacle and the filling valve, the filling pipe between the filling valve and the throttle valve arranged adjacent to the filling valve being dimensioned so that an internal volume of this part of the filling pipe substantially corresponds to a filling volume of the container to be filled.

17. The device according to claim 16, wherein at least two throttle valves are arranged in the region of the filling pipe.

18. The device according to claim 17, wherein the filling pipe between two adjacent throttle valves is dimensioned so that the internal volume of this part of the filling pipe substantially corresponds to the filling volume of the container to be filled.

19. The device according to claim 16, wherein the filling pipe extends between the throttle valve and the filling valve with a vertical directional component.

20. The device according to claim 16, wherein the filling pipe extends substantially perpendicularly beneath the receptacle.

21. The device according to claim 16, wherein the receptacle is designed for a purely gravimetric filling.

22. The device according to claim 16, wherein the filling pipe has an internal diameter about 1.3 times an average particle size of solid constituents contained in the product.

23. A method for filling a container with a product stored inside a receptacle, wherein the product consists of a first liquid component and at least a second component, the method comprising the steps of: feeding the product to the container to be filled via at least one filling pipe and at least one filling valve; dividing the filling pipe between the receptacle and the filling valve into pipe sections by at least one throttle valve; and dimensioning the pipe section between the filling valve and the throttle valve arranged adjacent to the filling valve so that an internal volume of this part of the filling pipe substantially corresponds to a filling volume of the container to be filled.

24. The method according to claim 23, including dividing the filling pipe into pipe sections by at least two throttle valves.

25. The method according to claim 24, including dimensioning the filling pipe between two adjacent throttle valves so that the internal volume of this part of the filling pipe substantially corresponds to the filling volume of the container to be filled.

26. The method according to claim 23, wherein the filling pipe extends between the throttle valve and the filling valve with a vertical directional component.

27. The method according to claim 23, wherein the filling pipe extends substantially perpendicularly beneath the receptacle.

28. The method according to claim 23, wherein the receptacle is designed for performing a purely gravimetric filling.

29. The method according to claim 23, wherein the filling pipe has an internal diameter about 1.3 times an average particle size of solid constituents contained in the product.

30. The method according to claim 23, including moving the product inside the receptacle by a conveying apparatus.

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