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(71) Applicants:
- **PPG Industries Ohio, Inc.**
  Cleveland, OH 44111 (US)
- **EMM International BV**
  8028SB Zwolle (NL)

(72) Inventors:
- **Roig Ferrer-Dalmau, Ignasi**
  1273 Arzier-Le Muids (CH)
- **d´Epenoux, Alban**
  1134 Chigny (CH)
- **Gerrits, Peter Petrus Hendrik Johannes**
  4841 VN Prinsenbeek (NL)
- **Essex, Mark William**
  Banbury, Oxon, OX169TG (GB)
- **van Driel, Gerrit Jan**
  8014HH Zwolle (NL)
- **Bijlsma, Menno**
  8017LS Zwolle (NL)

(74) Representative: **f & e patent**
Braunsberger Feld 29
51429 Bergisch Gladbach (DE)

(54) **PAINT MIXING CONTAINER AND DEVICE**

(57) The present disclosure relates to a paint mixing container comprising a cup comprising a base portion and a sidewall portion and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion. The sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim. The present disclosure also relates to a paint mixing device comprising at least one port configured to accommodate a paint mixing container, at least one guide element, wherein the at least one port is movably connected to the at least one guide element to allow for a translational movement of the accommodated paint mixing container, at least one drive unit operationally coupled to the port, wherein the drive unit is configured to (i) rotate the port or the paint mixing container accommodated therein and (ii) move the port in a translational movement along at least a portion of the at least one guide element. The present disclosure further relates to a mold for forming said container by injection-molding, a method of forming said container by injection-molding, and a method for mixing paint.

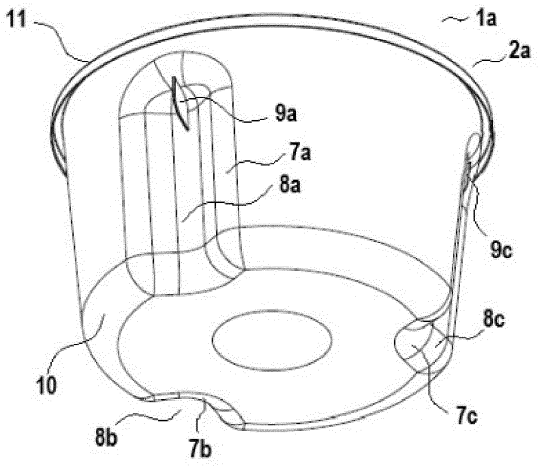

Fig. 4

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Description

Technical field

[0001] The present disclosure relates to a container for mixing paint, particularly for use with a spray gun in any kind of paint operations. It also concerns a mold for forming said container and a process for forming said container, a paint mixing device and a process for mixing paint making use of the paint mixing container.

Background

[0002] Paints are frequently mixed from multiple components in order to obtain a desired color or other optical property (e.g., sparkling or other special effect) and/or certain application or curing characteristics. For example, in refinish applications such as in bodyshops for vehicle repair a paint has to be provided, which accurately matches the color and visual appearance of an object such as a vehicle undergoing repair and is subsequently applied to the same. For this purpose, paint mixing containers with cylindrical or conical cup-like shape, often having a volume up to about 1 liter and a removable cap with an outlet that can be coupled to a spray gun to apply the mixed paint to a workpiece to be painted, find wide-spread use. Frequently, the dispensed paint components are mixed or blended manually in the paint mixing cup, typically by using a mixing stick or manual stirrer. Such manual paint mixing however requires valuable working time of the painter and causes wastes and a contamination of the workspace by splashing during mixing and/or drops from the used mixing stick or stirrer. The paint losses and associated contamination upon manual mixing can affect the product quality and/or color accuracy and create an unsightly workspace, which is not attractive to work in or show to potential customers. Although mechanical mixing solutions including automated mechanical stirrers are known in the art, such devices do not overcome the problems of paint loss and work space contamination.

[0003] In order to avoid the afore-mentioned drawbacks associated with manual paint mixing automatic dispensing machines and mixers have been developed. Such devices are however relatively expensive and typically not affordable to for example small bodyshops. Frequently, shakers of the tumbling mixer type such as for example the Collomix Rotogen 1000 are nowadays employed to mix the paint components dispensed to a paint mixing container. Tumbling mixers contain an oblique drive shaft. The paint components are thus hurled relatively far upwards during mixing such that there is a risk that they can splash from the paint mixing cup, if filled to a high level. In order to avoid such spillage, the paint cup can be closed with a cap. However, there is then the risk that a portion of the paint components sticks to parts of the cap and/or returns only incompletely through a filter frequently integrated into the cap such that the paint components cannot be entirely homogenized thereby affecting the properties of the obtained mixture such as its color tone.

[0004] Commonly known mixing techniques, such as the use of mechanically agitated mixing blades, can further provide non-satisfactory mixing results, particularly when the paint to be mixed contains solid particles, such as "effect pigments". Mechanical agitation using mixing blades is for example described in as for example disclosed in US Patent No. 5,094,543, which is incorporated by reference herein. This patent further describes a paint mixing container having indentations, which are used for securing the container in mixing devices known in the art. This is due to commonly known techniques result in rotational speed gradients or even "calm areas" in the mixing container, where the paint is barely agitated at all. This can result in, for example solid particles, such as effect pigments, accumulating or settling down, or certain other ingredients of the paint accumulate without being properly distributed throughout the entire fluid. Thereby, the mixed paint can contain an inhomogeneous distribution of some ingredients or the formation of undesired color or viscosity gradients can occur.

[0005] It would therefore be desirable to provide a simple, inexpensive easy-to-use solution that alleviates or avoids at least some of the afore-mentioned problems of the prior art. Thus, the present disclosure aims in particular to provide inexpensive and easy-to-use means that allow for an efficient homogeneous automatic mixing of paint components without spillage issues and contamination of the workspace, improved homogenization of the mixed paints and enable straightforward application of the obtained mixture to a substrate to be painted.

Summary of the invention

[0006] The present disclosure relates to a container for mixing paint comprising a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion. As a solution to the afore-mentioned objective, the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, wherein the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

[0007] The present disclosure is further related to a mold configured for forming the before-mentioned cup.

[0008] The present disclosure is also related to a process for forming said cup comprising injection-molding. Preferably, the process utilizes the before-mentioned mold.

[0009] It also concerns a paint mixing device comprising:

at least one port configured to accommodate a paint

mixing container,
at least one guide element, wherein the at least one port is movably connected to the at least one guide element to allow for a translational movement of the accommodated paint mixing container,
at least one drive unit operationally coupled to the port,
wherein the drive unit is configured to (i) rotate the port or the paint mixing container accommodated therein and (ii) move the port in a translational movement along at least a portion of the at least one guide element.

[0010] It is to be understood that in the context of the present disclosure the term "paint" as used herein refers to any kind of fluid or fluidizable, such as sprayable, material that can be used to paint or coat a substrate. Thus, the term "paint" as used herein encompasses for example paints, varnishes, lacquers and coating compositions for any kind of application. This includes for example industrial, architectural, optical, automotive and aerospace coatings and paints, including primers, basecoats, and topcoats, for manufacturing as well as refinish purposes, e.g., in bodyshops for vehicle repair. "Paints" according to the present disclosure can impart color to a substrate such in the case of colored paints or color coats, or be clear such as in case of clearcoats. "Paints" according to the present disclosure can further comprise solid particles, such as pigments. Such pigments can have a median diameter of up to 100 μm, such as up to 50 μm, or up to 10 μm. The "paints" are typically water-borne or solvent-borne.

[0011] The paint mixing containers according to the present disclosure with integrated mixing means enable an efficient, homogenous automatic mixing by an external paint mixing device without spillage or leakage of the paint and contamination of the surrounding workspace and thereby achieve excellent homogenization of the paint's ingredients. The paint mixing containers according to the present disclosure are easy to use avoiding contact of the painter with the paint or the generation of auxiliary paint-laden waste items such as manual stirring sticks or mixing blades and thus help to keep the workspace clean and tidy. No additional dedicated means for preventing spillage such as an intermediate lid are needed. The paint mixing containers of the present disclosure can be produced in an economic manner from low-cost materials, such as plastics or postconsumer recycled plastic or postindustrial recycled plastic or recycled plastics - partly or fully, complying with the requirements of mass production, and be configured to allow for straightforward use with common applicators such as spray guns, for example in a so-called upside-down configuration, wherein the paint mixture is supplied under the action of gravity from the container to the applicator. The materials used can be transparent, to enable the user to easily inspect the mixing progress, or non-transparent, to allow for mixing of light-sensitive materials. After use, the paint mixing containers of the present disclosure can be disposed with any remaining paint safely enclosed therein.

[0012] The present disclosure will be described in further detail in the following discussing also additional optional aspects, features and benefits.

Detailed description

[0013] As set forth above, the present disclosure relates to a container for mixing paint. The container comprises a cup, which comprises a base portion and a sidewall portion enclosing a receptacle volume. The cup further has an opening opposite to the base portion, wherein the opening is surrounded by a rim formed by the end of the sidewall portion distal from the base portion. The sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, wherein the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

[0014] The paint mixing container according to the present disclosure further comprises as a characteristic element at least one elongate indentation extending through and from the base portion towards the rim, wherein the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume. The inventors have surprisingly found that said indentation is sufficient to create chaotic turbulence in the paint components to be mixed. Such chaotic turbulence results in improved mixing of any kinds of paint ingredients, regardless of the components being solid, viscous or fluid.

[0015] While one elongate indentation has been found to be sufficient to achieve the desired effect, the paint mixing container can comprise at least two, such as at least three, of the elongate indentations. The presence of additional elongate indentations can further improve the mixing results. In case the cup comprises more than cone elongate indentation, it is preferred that, if present, the more than one elongate indentations are arranged symmetrically around the central longitudinal axis of the cup. The at least one elongate indentation can extend from the base portion of the cup to at least half, i.e., 50 percent, of the height of the cup, such as at least three quarters, i.e., 75 percent, of the height of the cup. The at least one elongate indentation can further extend up to 95 percent of the height of the cup, such as 100 percent of the height of the cup. A skilled person will appreciate that the height of the cup is understood as the distance between the base portion and the rim of the cup. The at least one elongate indentation can protrude into the receptable volume by a depth of protrusion of at least 5 mm, such as in a range from 5 mm to 10 mm, or 7 mm to 9 mm. Alternatively, or additionally, the at least one elongate indentation can have a width of 5 mm to 10 mm. The at least one elongate indentation can have a curved cross-

sectional shape, such as a half-sinusoidal cross-sectional shape. A skilled person will acknowledge that a half-sinusoidal cross-sectional shape only resembles one half of the repeating unit of a sinus curve. The at least one elongate indentation can also have a mixed or non-uniform cross-sectional chape, such as half curved and half straight, or half curved and half squared. This means that 50 percent of the breadth of the cross-section of the indentation may have the before-mentioned partial sinusoidal shape, while the other 50 percent of the breadth of the cross-section of the indentation may have a straight shape or a squared shape. The cross-sectional shape of the at least one indentation can ensure that no "calm areas" are created within the immediate perimeter of the indentation during mixing, where paint components can settle down, separate or precipitate, which would lead to inferior mixing results. The at least one indentation can protrude linearly from the base portion towards the rim. The at least one indentation can therefore be not curved or "S-shaped". The linear protrusion of the at least one elongate indentation can also contribute to avoiding the formation of "calm areas".

[0016] In order to avoid creating a "calm area" in the area where the sidewall portions and the base portions are joined together, the base portion and the sidewall portions can be joined by a rounded edge. In particular, said rounded edge can have a curvature radius in a range of 5 mm to 15 mm, such as 7 mm to 12 mm.

[0017] The precise shape and form of the paint cup is not particularly limited. Preferably, the paint cup has though a rotation symmetrical shape. For example, it can have cylindrical, tubular or truncated conical or tubular basic shape. Thereby, the tubular or truncated tubular basic shape can have a polygonal cross-section with four or more sides. A truncated conical shape for instance can allow for nesting multiple paint cups within each other, which can be advantageous in terms of space-saving storage and shipping. The paint cup usually rests on its base portion, when it is used to dispense or mix the paint components therein. The base portion can accordingly be configured to provide for a safe standing. For example, the base portion or parts thereof can be configured to form a flat plane at its bottom end. Thus, the base portion can be flat at its bottom surface (i.e., the surface facing the outside of the paint cup, away from the receptacle volume), for example having a circular flat bottom surface. The base portion can further comprise at least one secondary indentation which protrudes into the receptable volume. The at least one secondary indentation can be located at a central point of the base portion distal from the sidewall portions. Therefore, the central point of the base portion can be where the central longitudinal axis of the paint cup meets the base portion. The at least one secondary indentation can have any shape known in the art, such as, for example, round-shaped, cross-shaped, rod-shaped, square-shaped, or triangle-shaped. In case more than one secondary indentation is present, these secondary indentations can be arranged in a rotation symmetrical manner around the central point of the base portion without necessarily being located exactly at the central point. The at least one secondary indentation can have a generally round or pointed cross-sectional shape. The at least one secondary indentation can usually have a limited extension, such that its maximum extension can be from 5 % to 50 %, such as from 7.5 % to 35 %, such as from 10 % to 30 %, of the outer diameter of the base portion of the paint cup. A skilled person will acknowledge that the maximum extension can be the length, the width or the diameter of the at least one secondary indentation, depending on the actual shape of the at least one secondary indentation. In case more than one secondary indentation is present, this value relates to one of these indentations. Furthermore, the at least one secondary indentation is preferably not in direct contact with the at least one elongate indentation present on the sidewall portions of the paint cup, or with the sidewall portions themselves. The base portion can, independently of the at least one secondary indentation, further fully or partially bulge into the receptable volume, so that the paint cup rests on a circumferential outer area of the base portion. A bulged base portion is therefore not to be construed with the at least one secondary indentation described before. This means that the at least one secondary indentation described before, if present, can also protrude into the receptable volume from a bulged base portion. A bulged base portion can also be flat proximal to the longitudinal axis of the cup. It is also possible that the paint cup comprises a supporting element that protrudes outwards from the base portion that defines together with the sidewall portions the receptacle volume. The protruding element can then provide a platform on which the paint cup can rest. In this optional embodiment, the at least one elongate indentation can extend through the base portion and along the full length of the protruding element. Thereby, a corresponding hollow space can also be formed through the base portion and along the full length of the protruding element. For example, the paint cup can comprise a rim at its bottom, which protrudes down from the base portion. The rim can be continuous or discontinuous and can keep the base portion suspended over ground. The rim can thus surround a recess volume at the bottom of the base portion.

[0018] The base portion and the sidewall portions of the paint cup can usually be relatively thin-walled, for example having a thickness of 0.5 mm or less such as 0.2 mm or less, and can allow for some elastic deformation. One or more scale(s) can be provided on the sidewall portions of the paint cup to assist the user in providing defined amounts of certain respective paint components in the receptacle volume. The size and dimensions of the paint cup can vary and can be chosen according to practical needs. Thus, the paint cup can typically have a receptacle volume in the range from 0.1 L to 2.0 L, such as from 0.2 L to 1.5 L, or 0.3 L to 1.0 L, like for example about 0.3 L, 0.5 L, 0.6 L or 0.9 L. Ranges between any of

the recited values are likewise covered by the present disclosure. Receptacle volumes below 0.1 L are too small for most practical applications as the amounts of required paint material are usually greater. Receptacle volumes above 2.0 L can have disadvantages in terms of handleability, for example when the paint mixing container shall be coupled to and used with a hand-held applicator, such as a spray gun.

[0019] The paint mixing container can be a single part or can comprise multiple parts, such as in case of a support-liner assembly. For example, the paint mixing container can comprise a cup exhibiting at least the obligate features as indicated above, acting as an outer support cup, in combination with a removably insertable flexible liner, which has a corresponding shape when expanded. The flexible liner can be insertable into the cup to conform to the inner surface of the cup and can have a support lip to engage with the rim of the cup. For instance, both the (support) cup and the liner (when expanded) can have a truncated conical shape with a flat circular base portion and sidewall portions extending therefrom to define an interior volume. According to this variant, the liner forms the actual receptacle volume wherein the paint is mixed. A skilled person will appreciate that once the paint or paint components is/are inserted into the liner, the liner is expanded and pushed against the sidewall portions of the cup by the weight of the paint, thereby resembling the shape of the sidewall portions facing the receptable volume, including the at least one elongate indentation protruding into said receptable volume. The receptacle volume can be as indicated above. The liner has slightly smaller dimensions than the support cup such that it can be inserted into the support cup, thereby forming a nested configuration. The support cup serves as a rigid support to contain the liner. The liner can for example have a circumferential flange at its open end, which rests on an upper rim of the support cup in the nested configuration. The support cup can typically be used recurrently as it does not come into contact with the paint components. The liner is on the other hand typically disposable. It can in particular be made of a flexible material, for example an elastic plastic material.

[0020] The paint mixing container according to the present disclosure can comprise a lid that can detachably be connected to the paint cup to close the opening of the paint cup. In being detachable from the paint cup, the lid can be removed from the cup for introducing the paint components into the receptacle volume and the opening of the cup can be closed thereafter for mixing the provided components in order to avoid spillage of the contents of the cup and a contamination from the environment.

[0021] Various connection means known per se from the art can be used to realize the detachable connection. For example, the sidewall portions can be provided adjacent to the opening of the paint cup with an external thread, and the lid be provided with an internal thread that matches with the external thread on the paint cup to allow for making a screw connection. As an alternative to screw connections, for example snap fit or pressure lock mechanisms can be used. Typically, a sealant member is used to render the connection leak tight. For example, the lid can comprise a member, which upon installation of the lid on the paint cup acts as a seal, e.g., by elastic deformation.

[0022] The shape and size of the lid can vary in a wide range, and is generally adapted to the paint cup whose opening it shall cover. For example, the lid can have a hemispherical, cylindrical or truncated conical base shape or a complex shape comprising portions of such or other kinds of geometry. Its height is typically a fraction of the height of the paint cup such as half or less, or a third or less, of the height of the paint cup. Optionally, the lid can comprise an outlet for the paint. The outlet can in particular be configured to allow for coupling to a paint applicator device, such as a spray gun. For example, the lid can comprise a hollow tube segment through which paint can flow or be withdrawn from the closed paint container. The hollow tube segment can for example be disposed in the center of the lid and/or form its top end.

[0023] Coupling to an applicator device can be made by any suitable means. For example, the applicator device can directly be connected to the outlet of the lid by a suitable connection such as a screw or snap fit connection or an adapter can be used to make a fluid connection between the outlet of the paint cup and the applicator device. The outlet such as the afore-mentioned hollow tube segment can for example comprise a thread at its free end, which allows making a screw connection to an applicator device or appropriate adapter equipped with a matching thread.

[0024] The lid can furthermore comprise one or more filter(s) to avoid the undesirable passage of coarse particulate material. Suitable filters comprise for example sieves of an appropriate mesh size. The filter can in particular be made of a plastic material. It can be disposed on the inside of the lid, for example held in a respective groove.

[0025] The paint-mixing container according to the present disclosure is particularly suitable as so-called upside-down paint cup for spray guns. Herein, the paint cup that contains the mixed paint ready for application is closed with a lid having an outlet as described above and is coupled to the spray gun in a configuration wherein the lid with the outlet faces downwards such that the contained paint mixture flows to the inlet of the spray gun by means of gravity. Nevertheless, the scope of the present disclosure is not limited to such upside-down paint cups, but encompasses also paint mixing containers from which the paint can be delivered to a suitable application device by any means known such as for example by suction, hydraulic means, pneumatic means or transfer to a separate paint reservoir of the application device.

[0026] The paint mixing container according to the present disclosure can optionally further comprise

means for ventilation. The means for ventilation can be of any kind known per se from the art and can for example comprise a ventilation aperture, which can be closed by a valve. The means for ventilation can also comprise a hollow tube extending outwards from the cup. This variant is particularly useful in case the paint mixing container comprises a rigid support cup and a flexible liner. The ventilation mechanism enables a pressure equalization and can prevent generation of a vacuum inside the closed container when withdrawing paint therefrom, which could adversely affect application properties such as spray characteristics. The valve of the ventilation mechanism is typically closed when the paint cup is filled with the paint components and upon mixing of the same for avoiding undesired material leakage and it is opened when applying paint from the container via an applicator device such as a spray gun on a substrate to be coated. The ventilation means can for example be provided in the base portion of the paint cup, such as in the above-mentioned bulge or the above-mentioned recess surrounded by a rim at the bottom of the base portion. The ventilation mechanism, if present, can be disposed in the center of the base portion or in a peripheral area of the base portion. The latter arrangement can be preferable when a central configuration of the coupling means for driving the rotatable mixing element at the base portion is desired. Alternatively, the ventilation means can for example be provided in the lid of the paint cup, such as for example at a distance from its center. A hollow tube can optionally be connected to the ventilation valve and extend into the receptacle volume of the paint cup. The position, material and length of the tube can be selected such that it does not interfere with the at least one elongate indentation protruding into the receptacle volume and that its free end is above typical fill levels when the container is used in an upside-down orientation. Thus, an efficient pressure equilibration without the risk of paint leakage can be achieved when the container is used in an upside-down configuration.

[0027] The paint mixing container can be stackable with itself (identical paint mixing containers) in order to save space during production, shipping and storage. To support this feature, and to provide a feature which enables easy separation of stacked cups, the cup can comprise a plurality of, such as at least two, or at least three, spacers disposed on the outer surface of the cup. Additionally, or alternatively, the at least one elongate indentation can define a corresponding hollow space on the outer surface of the cup. Said hollow space can be adapted to fit the at least one elongate indentation of a second cup, when one cup is inserted into another. The plurality of spacers can be located in corresponding hollow spaces formed by the at least one elongate indentation on the outer space of the cup. The plurality of spacers can be located at or proximate to the end of the at least one indentation that is distal from the base portion. The at least one spacer can be a protrusion, such as a fin, extending from the outer surface of the cup. Each spacer of the plurality of spacers can individually have a length from 5 mm to 25 mm, such as 10 mm to 20 mm, while preferably each spacer of the plurality of spacers has the same length.

[0028] The materials of the paint mixing containers of the present disclosure and the above-mentioned components thereof should be compatible with solvent-borne and waterborne paint systems and comply with relevant official regulations, such as the ATEX Directive of the European Union. Preferably, the paint mixing containers of the present disclosure and/or components thereof are made of recyclable or biodegradable material(s). Suitable materials include in particular plastic materials such as, without being limited thereto, polyolefins such as polyethylene (for example high density polyethylene or low density polyethylene), polypropylene, copolymers of two or more olefins such as ethylene, propylene and higher alkylenes, polystyrene and copolymers of styrene and other unsaturated monomers such as acrylonitrile butadiene styrene (ABS), polyesters like polyethylene terephthalate, polylactic acid and polyhydroxyalkanoates such as poly-3-hydroxybutyrate, polyhydroxyvalerate and polyhydroxyhexanoate, polycaprolactone, polycarbonates, cellulose esters, halogen-containing polymers such as polyvinylchloride, polyamides or a combination of any of the foregoing. Materials are preferably selected from polyethylene, polypropylene, and mixtures thereof. Preferably, the material of the paint mixing container is at least partially selected from recycled plastic material(s). It is accordingly preferred that the material of the paint mixing container comprises 25 % to 100 %, more preferred 40% to 100% recycled materials. The paint mixing container and the components thereof can be made of a clear or an opaque or colored material. The various components of the paint mixing container can be made of the same material or of different materials and/or have the same physical properties such as color or different ones. The paint mixing containers of the present disclosure and components thereof can be produced by processes such as injection molding. The paint mixing containers of the present disclosure can therefore be provided in an economic manner based on low-cost materials and existing production technology complying with the requirements of mass production. They can thus be produced at a cost level that is competitive with paint mixing containers presently available in the market.

[0029] Accordingly, the present disclosure relates to a mold configured for forming a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion, wherein the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume. Said mold can be made out of metal, for

example steel or aluminium. It can comprise an internal mold volume resembling the shape of the cup as described above. It can further comprise a closable injection port, through which a molten composition can be injected, and cooling means, such as coolant channels distributed throughout the mold, allowing to cool the injected composition. The mold can also comprise several parts which tightly fit together. This enables a leak-free connection when injecting a composition into the mold, but also allows easy removal of the molded cup from the mold by separating the parts of the mold.

[0030] Furthermore, the present disclosure relates to a method for manufacturing a container for mixing paint as described above, comprising injection molding of at least one component of the container, particularly the cup. The previously described mold can be particularly useful for carrying out said method of manufacturing the container. The method can comprise the steps of (a) separately providing a mold and a composition, (b) melting the composition, (c) injecting the molten composition into the mold, (d) cooling the mold to solidify the composition, and (e) removing the molded container from the mold.

[0031] The containers of the present disclosure as described above can be used to mix and provide therein any kind of paint such as paints, varnishes, lacquers and coating compositions, including primers, basecoats, and topcoats, color coats and clear coats, for industrial, architectural, optical and automotive applications, including original manufacturing as well as refinish purposes, e.g., in bodyshops for vehicle repair. The prepared paints can be water-borne or solvent-borne liquids, and can be generally sprayable.

[0032] The containers according to the present disclosure can be configured to be compatible by themselves or with an appropriate adapter with all kinds of available applicator devices such as spray guns, including for instance gravity fed systems, for applying the prepared paint to a substrate to be coated.

[0033] The at least one elongate indentation of the paint mixing container of the present disclosure allows for an efficient mixing of paint components provided in the paint cup by means of an automatic external device without the need for manual mixing.

[0034] As previously mentioned, the present disclosure relates also to a paint mixing device. The device comprises at least one port configured to accommodate a paint mixing container, at least one guide element and at least one drive unit operationally coupled to the port. The at least one port is movably connected to the at least one guide element to allow for a translational movement of the accommodated paint mixing container. Further, the drive unit is configured to (i) rotate the port or the paint mixing container accommodated therein and (ii) move the port in a translational movement along at least a portion of the at least one guide element.

[0035] The at least one drive unit can comprise one or more drives or actuators. The drive unit can comprise a first drive coupled to the port, configured to rotate the port or the paint mixing container accommodated therein, and a second drive configured to move the port along at least a portion of the length of the guide element. Any one of the drive(s) or actuator(s) can in particular comprise an electrical or pneumatic drive. The torque that can be generated by the drive is sufficient to achieve a proper mixing of the targeted paint materials. Preferably, the drive or actuator is configured to allow a user to select and adjust the speed of rotation and/or the duration of the mixing process. For the sake of a safe operation the device can be configured such that the drive or actuator is only operable when a paint mixing container is correctly mounted to the respective port. This can be controlled, for example, by means of at least one sensor.

[0036] The drive or actuator can moreover comprise a connecting part arranged at the portion of the port that faces either the base portion or the opening of the paint cup that can be closed by the lid, depending on where the coupling means are disposed on the paint mixing container. The connecting part of the actuator is configured to releasably engage the coupling means of the paint mixing container and thereby operatively connect the actuator and the rotatable mixing element to rotate the later when the drive is operated.

[0037] The drive or actuator can for example comprise a drive shaft. The drive shaft can be driven by the electrical or pneumatic drive to rotate around its long axis and have a connecting part configured to releasably engage the coupling means of the paint mixing container as set forth above at its free end. The drive shaft can be arranged substantially vertical with respect to flat ground, or set at an angle. The term "substantially vertical" means in this context that any deviation, if present, from the ideal perpendicular (90°) arrangement of the long axis of the drive shaft with respect to a flat plane of the ground the paint mixing device rests on is less than 5 degrees, such as less than 2.5 degrees. Accordingly, an efficient mixing is possible with the paint mixing device in a basically upright orientation of the paint cup.

[0038] The port and the drive(s) or actuator(s) can be arranged in such that both the rotational and/or the translational movement can be performed when the paint mixing container accommodated in the port is held at an angle. This configuration can further support the generation of chaotic turbulence during mixing. The paint mixing container can be held at said angle in a direction substantially parallel or substantially perpendicular to the long axis of the guide element or drive member. Therefore, at least the port and at least a part of the drive unit, such as the first drive or actuator, can be arranged to be tilted at an angle. The maximum tilt angle can range from 5° to 20°, such as 7.5° to 15°, relative to the vertical long axis of the port. Accordingly, at least the port and at least a part of the drive unit, such as the first drive or actuator, can be held at an angle ranging from 0° to 20°, such as from 0° to 15°, such as 0° to 7.5°, such as 0° to 5°, relative to the vertical long axis of the port, wherein a 0° angle can mean that the long axis of the port is in a vertical orientation with

respect to flat ground. To enable the tilting, at least the port and at least a part of the drive unit can be arranged to be connected to angle adjustment means, such as a rotary bearing, which can be adjusted to provide the desired tilt angle. The tilt can be performed parallel or perpendicular to the long axis of the guide element or drive member. The angle adjustment can be performed manually or automatically using a dedicated drive for adjusting the tilt angle, which can be independent of the drive unit described above. The device can also comprise a locking mechanism to lock the angle of the port and the at least one part of the drive unit to avoid uncontrolled angular movement when the device is in operation. The device can also comprise means, such as one or more sensors, to not allow operation of the device when the tilt angle is not locked by the locking mechanism. In case of automatic adjustment, adjustment of the tilt angle can also be controlled and/or visualized using an external input device connected to a central control unit.

[0039] For ease of use, the paint mixing container can be set at said angle manually or automatically after the container has been secured within the port. The accommodated container can be reset to a vertical position in the same way once mixing is completed. Manual setting of the angle can be achieved, for example, via a lever or member for setting predetermined angles. Automatic setting can be achieved, for example, by a setting drive or motor, according to external input parameters.

[0040] Translational movement can also be driven by the same drive or actuator as described above, or by a second drive or actuator. The drive or actuator responsible or the translational movement can for example comprise a drive wheel which can engage the guide element as previously described. The device can comprise additional guide elements, such as rails or members, to which the port and/or the drive unit can be movably or slidably coupled, to improve stability of the port and the accommodated paint mixing container during movement. Such additional guide elements can have the sole purpose of providing stability, in which case a stabilizing member can movably engage the additional guide element, or can be movably engaged by one or more drives. The device can also comprise one or more additional stabilizing member(s) for the sole purpose of increasing stability of the whole construction of the device. Such additional stabilizing member(s) can therefore be not connected to any part of the drive mechanism.

[0041] In case a second drive or actuator is used, the second drive or actuator may comprise a drive wheel connected to a drive belt. The drive belt can engage the port, so that when the drive belt is moved by the drive wheel connected to the second drive or actuator, the linear translational movement is of the port is conducted. The drive belt can further be connected to a second wheel, which may be unpowered or powered. In the latter case, the second drive or actuator can comprise two drives or actuators, each configured to apply the same force to the drive belt.

[0042] The drive unit can be controlled by an optionally present central control unit. This central control unit can receive input data from an external input device, encode a signal and send it to the drive unit, for example by means of internal wiring. Said external input device can be for example an input panel positioned on the outside of the device or an external input device, such as a computer, smartphone or tablet device. Input data can be received from the external input device via a wired connection or a wireless connection, such as WIFI or Bluetooth®. Input data can be transferred to the device using a software application installed on the external input device. Said application can both comprise predefined mixing programs as well as give the user the opportunity to define mixing conditions by himself. The paint mixing device can accordingly comprise a WIFI or Bluetooth® antenna and/or at least one data input socket, such as a female USB connector or a female RJ-45 connector. An external input panel positioned on the outside of the device can be of any design and technology known in the art, such as a touch screen display.

[0043] As previously described, the device is configured to move the port in a translational movement along at least a portion of the at least one guide element. The guide element or drive member is preferably linear and can, for example, comprise at least one guide rail.

[0044] The before-mentioned port can further comprise a holder into which the before-described paint mixing container is insertable. In order to simplify the operation of the device while keeping maximum flexibility, the port is preferably configured to accommodate different sizes of the paint mixing container, namely the possible sizes of the paint mixing container as described above. In combination with or independent from this configuration of the port, the port can be configured to not allow the accommodation of paint mixing containers according to the present disclosure. This can be beneficial in order to ensure that no paint mixing containers, which are incompatible with the device according to the present disclosure are used, in order to avoid unsatisfactory mixing results for the consumer. This can, for example, achieved by providing the holder of the port with at least one retention element. The retention element can comprise a resilient member that is configured to engage a matching structural element on the outer surface of the paint mixing container that preferably matches the at least one hollow space on the outside of the paint cup described above. The resilient member can accordingly be an elongate indentation matching the at least one hollow space on the outside of the paint cup described above This has the beneficial effect of improving force transmission from the port to the cup, which enables both efficient and safe acceleration and deceleration of the paint mixing container during mixing. The port, including the holder, can have a height of at least 10 cm, such as at least 15 cm, at least 18 cm, or at least 20 cm, wherein the height is measured from the opening of the holder to the bottom portion of the port where the port is connected to

the drive shaft.

[0045] The holder can comprise a base portion and sidewall portions enclosing an interior holder volume, into which the elongate retention element protrudes. The holder can further comprise an opening at its top end, through which a paint cup, preferably the paint cup as described above, can be inserted into the interior volume of the holder. The sidewall portions of the holder can further comprise at least one hole to enable the user to visually inspect both the safe fitting of the cup inside the interior volume of the holder and the mixing results. Said hole(s) can be of any shape, such as round or rectangular. The holder can comprise more than one hole, such as two or three holes, which can be arranged in a symmetrical manner around the sidewall portions of the holder.

[0046] The device can optionally comprise a connecting member, to which at least a part of the drive unit and the port can be mounted. The central control unit can also be mounted to the connecting member. This connecting member can further be movably connected to at least one guide rail. In case the drive unit comprises one drive or actuator, the drive unit can be mounted to the connecting member, in which case the drive unit can comprise at least one drive wheel engaging at least one guide rail. Alternatively, in case the drive unit comprises a first drive or actuator responsible for powering the rotational movement and a second drive or actuator responsible for powering the translational movement, only the first drive or actuator can be mounted to the connecting member. In this variant of the present disclosure, the connecting member can for example engage a drive belt, which is moved by the second drive or actuator by means of a drive wheel. The connecting member, having the central control unit, the port and the first drive or actuator mounted to it, can then be accelerated and decelerated along at least a part of the length a path, which is for example defined by a guide rail. An exemplary variant of the present disclosure related to the paint mixing device comprising a connecting member is illustrated in Fig. 7B.

[0047] The at least one drive or actuator can be configured to invert the direction of rotation and/or translational movement, and/or their respective speeds, at predetermined time intervals. Such time intervals can be part of at least one mixing program, which can be selectable by the user via an external input. For example, in case the drive unit comprises a first and a second drive, the first drive can be configured to invert the direction of the rotation and/or adjust speed of rotation according to a predefined rotation program; and/or the second drive can be configured to invert direction and/or adjust speed of the movement of the port along at least a portion of the length of the guide element according to a predefined translational program. This can also comprise a variation of the length of the translational movement.

[0048] The paint mixing device according to the present disclosure can further comprise a housing. The housing preferably encloses the port, the drive unit, the guide element and a space which is sufficient to accommodate a paint mixing container, when it is correctly inserted into the holder of the port. The housing can comprise a transparent viewing portion to enable the user to check on the progress of the mixing by optical inspection. The housing is preferably configured to comprise a closable opening or a detachable part, in order to provide sufficient access to the port to secure the paint mixing container with the port. For the sake of safe operation, the housing can, in addition to the above-indicated safety feature of the port, be configured such that the device is only operable when the housing is fully closed, thus preventing access to the paint mixing container while it is rotated and/or moved. The paint mixing device can independently have a width from 25 cm to 70 cm, preferably from 30 cm to 50 cm; a depth from 15 cm to 50 cm, preferably from 20 cm to 40 cm; and/or a height of 20 cm to 50 cm, preferably from 25 cm to 40 cm. These values can optionally be related to the device comprising the housing.

[0049] As previously mentioned, a process for mixing paint making use of the paint mixing containers of the present disclosure is also within the scope of present disclosure. For this purpose, a paint mixing container of the present disclosure as described above is provided and one or more paint components to be mixed are introduced into the paint cup in desired amounts. A single component can for example be used in case of a pre-formulated paint, which shall be homogenized prior to use. Typically, the process however involves adding two or more paint components in predetermined amounts or ratios to the paint cup in order to prepare a targeted paint according to a selected formula. After dosing of all required components, the opening of the paint cup is preferably closed with a matching lid as described previously. The paint components contained in the paint cup are then mixed by subjecting the paint mixing container to (i) rotational movement and (ii) a translational movement in at least one spatial direction. The at least one spatial direction can be substantially perpendicular with respect to the central axis of the rotational movement. The term "substantially perpendicular" means in this context that any deviation, if present, from the ideal perpendicular (90°) arrangement of the long axis of the port and the direction of the translational movement is less than 5 degrees, such as less than 2.5 degrees. The paint mixing container accommodated in the port can also be held at a fixed angle during the mixing step of the process. The maximum angle can be from 5° to 20°, such as 7.5° to 15°, relative to the vertical long axis of the port. Accordingly, the paint mixing container accommodated in the port can be held at a fixed angle ranging from 0° to 20°, such as from 0° to 15°, or from 0° to 7.5°, or from 0° to 5°, relative to the vertical long axis of the port, wherein 0° can mean that the long axis of the port is vertical orientation with respect to flat ground.

[0050] This mixing can in particular be carried out automatically by an external paint mixing device as de-

scribed above to which the paint mixing container is mounted. The obtained mixed paint can then be used according to its intended application, for example by feeding it to an application device for performing a paint operation. The feeding can be performed directly from the container according to the present application as it can be connected to the application device as set forth above. Alternatively, the paint can be transferred from the container to any other vessel, reservoir or container of an application device for use in a paint operation.

[0051] The rotational movement can preferably comprise rotating the paint mixing container around its central longitudinal axis. The before-mentioned step of mixing the paint components can further comprise subjecting the paint mixing container to simultaneous rotational and translational movement. In a preferred embodiment, the translational movement can comprise a linear translational movement. More preferred, the linear translational movement can comprise moving the paint mixing container in a back-and-forth manner on a linear path. The length of the linear path can have a length in a range from 5 cm to 20 cm, such as from 10 cm to 15 cm. During the mixing step, the direction of the rotation is preferably inverted at least one time. The inversion of the direction of rotation can induce additional chaotic turbulences within the paint components to be mixed, thereby further supporting an efficient mixing of the paint components. During the paint mixing process, the length of the linear translational movement can vary. Therefore, the linear translational movement can comprise moving the paint mixing container in a back-and-forth manner along a part of the before-mentioned length of the linear path, or along the full length of the linear path. The linear translational back-and-forth movement can be continuous or discontinuous. This means, that the linear translational movement can be disabled at predetermined time points and for predetermined time intervals during the mixing process.

[0052] The rotational maximum speed can be from 500 rpm to 2000 rpm, such as 800 rpm to 1600 rpm, while, additionally or alternatively, the maximum speed of the translational movement can be from 50.000 mm/min to 100.000 mm/min, such as 60.000 m/min to 80.000 mm/min. The acceleration of the rotational movement can be from 40 rotations/s^2 to 150 rotations/s^2, such as 55 rotations/s^2 to 100 rotations/s^2, while the acceleration of the translational movement can be from 20.000 mm/s^2 to 300.000 mm/s^2, such as 50.000 mm/s^2 to 150.000 mm/s^2. Typically, an appropriately mixed paint can be obtained within a relatively short mixing time from 30 seconds to 5 minutes, such as 45 seconds to 4 minutes, or 1 minute to 3 minutes. The rotational movement and the translational movement can occur at least partly overlapping in time, or independent of each other.

[0053] The described method and the described optional additional steps can be carried out by using the paint mixing device as described above. Furthermore, the paint mixing container can be the paint mixing container as described above. The paint mixing device and the paint mixing process according to the present disclosure can further be distinguished from conventional laboratory shakers known in the art by the type of movement used. While laboratory shakers normally use orbital movement, the device and the process according to the present disclosure use the disclosed combination of rotational and translational movement. Orbital movement is instead known by the skilled person to be a movement pattern following an elliptic path without rotation.

[0054] The present disclosure will be further illustrated in the following by reference to the appended drawings, wherein:

Fig. 1 represents a schematic bottom-up view of a paint mixing cup having one elongate indentation; forming a corresponding hollow space on the outside of the cup;

Fig. 2 represents cross-sectional schematic view of a paint mixing cup having one elongate indentation;

Fig. 3 represents a schematic bottom-up view of a paint mixing cup having three elongate indentations; forming three corresponding hollow spaces on the outside of the cup;

Fig. 4 represents a schematic sideways bottom-up view of a paint mixing cup having three elongate indentations; which form corresponding hollow spaces on the outside of the cup, and spacers located in each hollow space;

Fig. 5A represents a schematic cross-sectional view of a lid for a paint mixing container, comprising an external thread for securing the lid to the cup via a screw;

Fig. 5B represents a schematic cross-sectional view of a lid for a paint mixing container, comprising a filter, a valve for pressure equalization and a snap connection for connecting the lid to the cup;

Fig. 6 represents a schematic cross-sectional view of a paint mixing container comprising a support cup having one elongate indentation, and a flexible liner;

Fig. 7A represents a schematic side view of the paint mixing device according to the present disclosure, including the port.

Fig. 7B represents a schematic top-down view of the paint mixing device according to the present disclosure, including the port.

Fig. 8 represents a schematic illustration of the principle of operation of the paint mixing device.

[0055] These drawings are for the purpose of illustrating the present disclosure only and therefore do not limit the present disclosure in any way.

[0056] The paint mixing container **1** shown in Figs. 1 and 2 comprises a paint cup **2** with a truncated conical shape, which is symmetric with respect to the depicted central rotation axis **R.** The paint cup **2** has a circular base portion **3** and sidewall portions **4** extending therefrom to define a receptacle volume **5** in the interior of the cup **2.** The receptacle volume **5** can for example have a volume in the range of .1 L to 2.0 L, such as from 0.2 L to 1.5 L, or 0.3 L to 1.0 L. The cup **2** is open at its top, *i.e.*, opposite to the base portion, having a respective opening **6** through which the paint components to be mixed can be introduced into the receptacle volume **5.** The opening is being surrounded by a rim **11** formed by the end of the sidewall portion distal from the base portion. The cup comprises one elongate indentation **7** forming a corresponding hollow space **8** on the outside of the cup. Elongate indentation **7** extends linearly from the base portion **3** towards the opening **6** for a length of about 90 percent of the height of the cup, and has a half-sinusoidal shape. The sidewall portions **4** and the bottom portion **3** are joined by a rounded edge **10** having a radius from 5 mm to 15 mm. Fig. 2 further illustrates that the paint cup can rest on the rounded edge **10** formed in the region where the base portion **3** and the sidewall portions **4** are joined together. Extending from the rounded edge **10,** the base portion **3** bulges into the receptable volume, but has a flat shape proximal to the longitudinal axis **R** of the cup.

[0057] The exemplary paint mixing container **1a** shown in Figs. 3 and 4 differs from the container **1** shown in Figs. 1 and 2 in that the cup **2a** comprises three elongate indentations **7b,7b,7c.** The indentations have similar shape and height to those shown in Figs. 1 and 2 and are arranged in a symmetrical manner around the sidewall portions **4** and form corresponding hollow spaces **8a,8b,8c** on the outside of the cup. Further shown in Fig. 4 are spacers **9a,9c** positioned within the respective hollow spaces on the outside of the cup.

[0058] The container **1,1a** can comprise moreover a lid **20** for closing the opening **6** of the paint cup **2,2a.** The lid **20** is shown in Figs. 5A and 5B. The lid **20** has for this purpose at its lower end a ring-shaped portion **21,** which is provided on its internal surface with a snap connection **22a** or a thread **22b** that matches an external thread (not shown) on the upper end of the sidewalls **4** of the cup **2,2a** and can be engaged therewith. At the ring-shaped portion **21** furthermore a sealing lip **23** is formed, which engages with the interior surface of the sidewalls **4** of the cup **2,2a** when the lid **20** is installed thereon to seal it. The lid **20** furthermore comprises a conical wall portion **24,** which tapers from the ring-shaped portion **21** to a tubular outlet **25.** The tubular outlet **25** may be provided with a thread **26,** for example as shown on its external surface, to allow for coupling to a paint application device (not shown), either directly or indirectly via an appropriate adapter. A filter **28,** for example in the form of a circular plastic sieve, can be fixed inside the lid **20,** for example by being mounted or press fixed to an annular groove or matching receiving portion **29** in the conical wall portion **25.** In the embodiment shown in Figs. 5A and 5B the lid **20** is likewise symmetric with respect to the central rotation axis **R.** The lid can further comprise a tubular opening **30** positioned, in which a valve **31** can be fitted to provide ventilation when the cup **2,2a** is emptied during it being closed with the lid. The opening **30** can comprise an external thread **32** for detachably connecting other appliances or a screw cap to protect the valve during shipping and storage using the lid.

[0059] The paint mixing containers **1,1a** and the components thereof such as the cup **2,2a** as shown in Figs. 1-4, the lid **20** as shown in Fig. 5, and the coupling means **29** can in particular be made from a plastic material, preferably a recycled plastic material, such as any of the materials mentioned previously, for example by injection molding. The illustrated exemplary paint mixing containers may in particular be disposable.

[0060] Fig. 6 represents a cross-sectional schematic view of another exemplary embodiment of a paint mixing container **1** according to the present disclosure, wherein the paint cup **2,2a** comprises an outer support cup **40** and an interior liner **50.** Both the support cup **40** and the liner **50** have a truncated conical shape, which is symmetric with respect to the depicted central rotation axis **R,** and have a flat circular base portion **3,** and sidewall portions **4** extending therefrom to define an interior volume **5.** The end opposite to the base portion is open. The liner **50** has slightly smaller dimensions than the support cup **40** such that it can be inserted into the support cup **40,** forming a nested configuration. The liner **50** has a circumferential flange **51** at its open end **6,** which rests on the upper rim **41** of the support cup **40** in the nested configuration. The lid **20** has a shape and dimensions such that it fits on the liner **30** to close its opening **6.** For example, the bottom end of the lid **20** can have a ring-shaped portion **21** having a basically L-shaped cross-section which rests on the flange **51** when the lid is installed on the liner **50.** A leak-tight connection of the assembly of the lid **20,** the liner **50** and the support cup **40** can be achieved by means of a sleeve nut-like connector **33,** having a ring shape with a basically L-shaped cross-section, provided with an internal thread 34, which matches with an external thread 42 provided on the outside of the rim 41 of the support cup 40. By tightening the connector 52 via the thread connection on the support cup 40 a compressive force is exerted by which the ring-shaped portion **21** of the lid **20,** the flange **41** of the liner **50** and the rim **41** of the support cup are pressed together to form a leak tight connection. In the embodiment according to Fig. 6 the interior volume of the liner **50** forms the receptacle volume **5** wherein the paint components to be mixed are received. The receptacle volume **5** can for example have a volume in the range of .1 L to 2.0 L, such as from 0.2 L to 1.5 L, or 0.3 L to 1.0 L.

[0061] Fig. 7A shows a schematic side view of a variant

of the paint mixing device **100** according to the present disclosure. Fig. 7B shows a schematic top-down view of a variant of the paint mixing device **100** according to the present disclosure. For the purpose of clarity, the optional housing around the central control unit and the drive unit, as well as the optional housing around the whole device are omitted from these figures. The device **100** comprises a base plate **116,** a central control unit **101,** a drive unit **103** and a port **104.** In the variants of the device **100** illustrated in Figs. 7A and 7B, the drive unit **103** comprises one drive or actuator **103a** for driving the rotational movement of the port **104** and one drive or actuator **103b** for driving the linear translational movement of the port. The port **104** is rotatably connected to the drive or actuator **103a** by means of a rotation shaft **105.** The port **104** comprises a holder **117** having sidewall portions **112,** which enclose an internal space **113** of the holder **117** and at least one retention element in form of elongate indentation **106** protruding into the internal space **113** of the holder **117.** The at least one elongate indentation **106** has a half-sinusoidal shape. With respect to the number of the retention elements, Fig. 7A illustrates a variant of the present disclosure in which the holder **117** comprises one retention element in form of elongate indentation **106,** and Fig. 7B illustrates a variant of the present disclosure in which the holder **117** comprises three retention elements in form of elongate indentations **106a,106b,106c** are arranged in a symmetrical manner. The shape of the indentation(s) **106,106a,106b,106c** match(es) the corresponding hollow space(s) **8,8a,8b,8c** on the outside of the paint cup **2,2a.** This enables the paint mixing container **1,1a** of the present disclosure to be inserted into the holder **117** through an opening **107** on the upper side of the holder **117,** which is positioned distal from the drive or actuator **103a.** The elongate indentation(s) **106,106a,106b,106c** of the port is/are adapted to closely fit the corresponding hollow space(s) **8,8a,8b,8c** of the paint cup **2,2a** (not shown in Figs. 7A and 7B) to enable efficient transmission of rotational force from the port **104** to the container **1,1a** when the port **104** is rotated by the drive or actuator **103a.** The port **104** including the holder **117,** the drive shaft **105** and the drive or actuator **103a** are shown in Fig. 7A an angle of 0°, relative to the vertical long axis **X** of the port **104** with respect to flat ground. The holder **117** according to according to the variant illustrated in Fig. 7A further comprises one opening **111** on its sidewall portions **112.** As shown in Fig. 7B, the holder **117** according to this variant comprises three one openings **111a,111b,111c,** which are positioned in a symmetrical manner around the sidewall portions **112.** Further shown is drive or actuator **103b** for driving the linear translational movement of the port. The drive or actuator **103b** comprises a drive wheel **108,** which is connected to a drive belt **109.** The drive belt **109** is further connected to an unpowered wheel **113** and the port **104** to enable the translational movement of the port along a linear path **L.** The linear movement is further supported by guide rail **110,** to which the port is slidably connected. Above the guide rail, support member **114** (shown in Fig. 7A only) is positioned to provide additional stability to the construction of the device. The device according to the variant as shown in Fig. 7B **100** further comprises a connecting member **115.** The connecting member **115** is adapted to support the central control unit **101,** the drive or actuator **103a** and the port **104.** The connecting member **115** further provides a connection between the drive belt **109** and the port **104.**

[0062] Fig. 8 shows a schematic illustration of the working principle of the paint mixing device **100** according to the present disclosure. The central control unit **101** receives input from an input device **102.** Said input device can be for example an input panel positioned on the outside of the device or an external input device, such as a computer, smartphone or tablet device. Input data can be received from the external input device via a wired connection or a wireless connection, such as WIFI or Bluetooth®. The central control unit then encodes a signal for the drive unit **103.** In the variant illustrated in Fig. 8, the drive unit comprises one drive or actuator **103a** for driving the rotational movement of the port **104** and one drive or actuator **103b** for driving the linear translational movement of the port. The driving of the linear translational movement can, for example, be achieved using at least one drive wheel movably engaging the guide element, which can be a guide rail.

[0063] Although exemplary specific variants may have been described in the present disclosure above for illustrative purposes, it is to be understood that the present disclosure is to be construed over the entire scope of the appended claims including any variations thereof under the doctrine of equivalents.

[0064] The present disclosure is further directed to the following aspects:

1. A container for mixing paint comprising:
a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion, characterized in that the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, wherein the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

2. The container according to aspect 1, wherein the cup comprises at least two, preferably at least three, of the elongate indentations, wherein the elongate indentations are preferably arranged symmetrically around the central longitudinal axis of the cup.

3. The container according to any one of the preceding aspects, wherein the at least one elongate indentation extends from the base portion to at least

half of the height of the cup, for example extending up to 100 percent of the height of the cup.

4. The container according to any one of the preceding aspects, wherein the cup has a cylindrical, tubular or truncated conical or tubular basic shape, wherein the tubular or truncated tubular basic shape can have a polygonal cross-section with four or more sides.

5. The container according to any one of the preceding aspects, wherein the rim is circular or polygonal with four or more sides, preferably circular.

6. The container according to any one of the preceding aspects, wherein the at least one elongate indentation protrudes into the receptacle volume by a depth of protrusion of at least 5 mm, such as in a range from 5 mm to 10 mm, and/or has a width of 5 mm to 10 mm.

7. The container according to any one of the preceding aspects, wherein the at least one elongate indentation has a half-sinusoidal cross-sectional shape.

8. The container according to any one of the preceding aspects, wherein the at least one elongate indentation extends linearly from the base portion towards the rim.

9. The container according to any one of the preceding aspects, wherein the at least one elongate indentation defines a corresponding hollow space on the outer surface of the cup.

10. The container according to any one of the preceding aspects, wherein the cup comprises a plurality of, preferably at least two, spacers disposed on the outer surface of the cup.

11. The container according to aspect 10, wherein the plurality of spacers is located in corresponding hollow spaces formed by one or more of the elongate indentations on the outer surface of the cup, preferably at or proximate to the end of the indentations that is distal from the base portion.

12. The container according to aspect 10 or 11, wherein the at least one spacer is a protrusion, such as a fin, extending from the outer surface of the cup.

13. The container according to any one of the preceding aspects, wherein the base portion and the sidewall portion are joined by a rounded edge.

14. The container according to aspect 13, wherein the rounded edge has curvature with a radius in a range of 5 mm to 15 mm.

15. The container according to any one of the preceding aspects, wherein the receptacle volume is in a range from 0.1 L to 2.0 L, such as from 0.2 L to 1.5 L or in the range from 0.3 L to 1.0 L.

16. The container according to any one of the preceding aspects further comprising a flexible liner insertable into the cup to conform to the inner surface of the cup and having a support lip to engage with the rim of the cup.

17. The container according to any one of aspects 1 to 15, wherein the rim of the cup comprises a support lip.

18. The container according to any one of aspects 16 or 17, wherein the cup is a rigid support container into which the liner is insertable with its support lip detachably connected to the rigid support container.

19. The container according to any one of the preceding aspects, further comprising a lid detachably connected to the rim of the cup to close the opening of the container.

20. The container according to aspect 19, wherein the lid comprises an outlet for the paint configured to allow for coupling to a paint applicator device.

21. The container according to any one of aspects 19 or 20, wherein a filter is installed inside the lid.

22. The container according to any one of the preceding aspects, wherein at least one component of the container comprises means for pressure equalization.

23. The container according to any one of the preceding aspects, wherein the container or at least one component thereof is disposable and/or is made of a plastic material, preferably a thermoplastic material, more preferably polypropylene.

24. The container according to aspect 23, wherein the container or at least one component thereof is made of a plastic material that comprises 25 % to 100 %, preferably 40 % to 100 %, recycled plastic material.

25. The container according to any one of the preceding aspects, wherein the base portion of the paint cup comprises a central point located distal from the sidewall portions, and the paint cup further comprises at least one secondary indentation protruding into the receptable volume, wherein the least one secondary indentation is located at the central point

of the base portion, wherein optionally the base portion further bulges into the receptable volume.

26. A mold configured for forming a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion, wherein the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

27. A method for manufacturing a container for mixing paint according to any one of aspects 1 to 25, comprising injection molding of at least one component of the container, particularly the cup, preferably using a mold as defined in aspect 26.

28. A paint mixing device comprising:

at least one port configured to accommodate a paint mixing container,
at least one guide element, wherein the at least one port is movably connected to the at least one guide element to allow for a translational movement of the accommodated paint mixing container,
at least one drive unit operationally coupled to the port,
wherein the drive unit is configured to (i) rotate the port or the paint mixing container accommodated therein and (ii) move the port in a translational movement along at least a portion of the at least one guide element.

29. The paint mixing device according to aspect 28, wherein the port comprises a holder into which is insertable a paint mixing container according to any one of aspects 1 to 25, wherein the holder is preferably configured to accommodate different sizes of the paint mixing container and/or to not allow accommodation of paint mixing containers other than those according to any one of aspects 1 to 25.

30. The paint mixing device according to any one of aspects 28 or 29, wherein the port comprises at least one retention element for securing the paint mixing container in the port.

31. The paint mixing device according to aspect 30, wherein the at least one retention element comprises a resilient member that is configured to engage a matching structural element on the outer surface of the paint mixing container, wherein the matching structural element preferably comprises a hollow space on the outer surface of a cup of the paint mixing container, the hollow space corresponding to an elongate indentation on the sidewall portion of the cup.

32. The paint mixing device according to any one of aspects 28 to 31, wherein the guide element is a linear guide element, and/or the device is configured to rotate the paint mixing container accommodated in the port around the central longitudinal axis of the paint mixing container.

33. The paint mixing device according to any one of aspects 28 to 32, wherein the travel length of the port movably connected to the at least one guide element is from 5 cm to 20 cm, such as from 10 cm to 15 cm.

34. The paint mixing device according to any one of aspects 28 to 33, wherein the drive unit comprises a first drive coupled to the port, configured to rotate the port or the paint mixing container accommodated therein, and a second drive configured to move the port along at least a portion of the length of the guide element.

35. The paint mixing device according to aspect 34, wherein the first drive is configured to invert the direction of the rotation and/or adjust speed of rotation according to a predefined rotation program and/or wherein the second drive is configured to invert the direction and/or adjust the speed of the movement and/or adjust the length of the movement of the port along at least a portion of the length of the guide element according to a predefined translational program.

36. The paint mixing device according to any one of aspects 28 to 35, further comprising a housing, which contains the at least one port, at least one guide element and the at least one drive unit.

37. The paint mixing device according to aspect 36, wherein the housing comprises a transparent viewing portion.

38. The paint mixing device according to aspect 36 or 37, wherein the housing comprises a reversibly openable or detachable portion for accessing the port.

39. The paint mixing device according to any one of aspects 28 to 38, further comprising at least one sensor for detecting a paint mixing container mounted in the port and/or for detecting closure or proper installation of the reversibly openable or detachable portion of the housing.

40. The paint mixing device according to any one of aspects 28 to 39, wherein the paint mixing device comprises means for affixing the device to a tabletop and/or wall.

41. The paint mixing device according to any one of aspects 28 to 40 having

a width from 25 cm to 70 cm, preferably from 30 cm to 50 cm;
a depth from 15 cm to 50 cm, preferably from 20 cm to 40 cm; and
a height of 20 cm to 50 cm, preferably from 25 cm to 40 cm.

42. The paint mixing device according to any one of aspects 28 to 41 further comprising a control unit for controlling operation of the drive unit.

43. The paint mixing device according to any one of aspects 28 to 42, further comprising user control means and/or an interface for communication with external electronic devices, such as an interface for wired communication and/or an interface for wireless communication.

44. A process for mixing paint comprising:

providing one or more paint components to be mixed into a paint mixing container, preferably a paint mixing container as defined in any one of aspects 1 to 25, in desired amounts,
optionally closing the paint mixing container with a lid, and
subjecting the paint mixing container to (i) a rotational movement and (ii) a translational movement in at least one spatial direction for mixing the paint components, preferably using a paint mixing device according to any one of aspects 28 to 43.

45. The process according to aspect 44, wherein the rotational movement and the translational movement occur at least partly overlapping in time.

46. The process according to any one of aspects 44 or 45, wherein the paint mixing container is subjected simultaneously to the rotational movement and the translational movement during the mixing of the paint components.

47. The process according to any one of aspects 44 to 46, wherein the rotational movement comprises rotating the paint mixing container around its central longitudinal axis.

48. The process according to any one of aspects 44 to 47, wherein the translational movement comprises a linear translational movement, wherein the linear translational movement preferably comprises repeatedly moving the paint mixing container in a back-and-forth manner on a linear path and/ or wherein the length of the linear path preferably has a length in a range from 5 cm to 20 cm, such as from 10 cm to 15 cm.

49. The process according to any one of aspects 44 to 48, wherein during the mixing step the direction of the rotation is inverted at least one time.

50. The process according to any one of aspects 44 to 49, wherein the maximum speed of the rotational movement is from 500 rpm to 2000 rpm and/or the maximum speed of the translational movement is from 50.000 mm/min to 100.000 mm/min and/or the rotational acceleration is from 40 rotations/s^2 to 150 rotations/s^2 and/or the translational acceleration is from 40 rotations/s^2 to 150 rotations/s.

51. The process according to any one of aspects 44 to 50, wherein the mixing is performed for a duration from 30 s to 5 min.

Claims

1. A container for mixing paint comprising:
a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion, **characterized in that** the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, wherein the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

2. The container according to claim 1, wherein

- the cup comprises at least two, preferably at least three, of the elongate indentations, wherein the elongate indentations are preferably arranged symmetrically around the central longitudinal axis of the cup, and/or
- the at least one elongate indentation extends from the base portion to at least half of the height of the cup, for example extending up to 100 percent of the height of the cup; and/or
- the cup has a cylindrical, tubular or truncated conical or tubular basic shape, preferably wherein the tubular or truncated tubular basic shape has a polygonal cross-section with four or more sides.

3. The container according to any one of the preceding claims, wherein

- the rim is circular or polygonal with four or more sides, preferably circular; and/or
- the at least one elongate indentation protrudes into the receptacle volume by a depth of protrusion of at least 5 mm, such as in a range from 5 mm to 10 mm, and/or has a width of 5 mm to 10 mm, and/or
- the at least one elongate indentation has a half-sinusoidal cross-sectional shape, wherein the at least one elongate indentation extends linearly from the base portion towards the rim, and/or
- the at least one elongate indentation extends linearly from the base portion towards the rim; and/or
- the at least one elongate indentation defines a corresponding hollow space on the outer surface of the cup.

4. The container according to any one of the preceding claims, wherein

- the cup comprises a plurality of, preferably at least two, spacers disposed on the outer surface of the cup, preferably wherein the plurality of spacers is located in corresponding hollow spaces formed by one or more of the elongate indentations on the outer surface of the cup, preferably at or proximate to the end of the indentations that is distal from the base portion, more preferably wherein the at least one spacer is a protrusion, such as a fin, extending from the outer surface of the cup, and/or
- the base portion and the sidewall portion are joined by a rounded edge, preferably wherein the rounded edge has curvature with a radius in a range of 5 mm to 15 mm; and/or
- the receptacle volume is in a range from 0.1 L to 2.0 L, such as from 0.2 L to 1.5 L or in the range from 0.3 L to 1.0 L.

5. The container according to any one of the preceding claims, wherein the container comprises a flexible liner insertable into the cup to conform to the inner surface of the cup and having a support lip to engage with the rim of the cup; and/or wherein the rim of the cup comprises a support lip, preferably wherein the cup is a rigid support container into which the liner is insertable with its support lip detachably connected to the rigid support container.

6. The container according to any one of the preceding claims, further comprising a lid detachably connected to the rim of the cup to close the opening of the container, preferably wherein the lid comprises an outlet for the paint configured to allow for coupling to a paint applicator device, and/or wherein a filter is installed inside the lid.

7. The container according to any one of the preceding claims, wherein

- at least one component of the container comprises means for pressure equalization; and/or
- the container or at least one component thereof is disposable and/or is made of a plastic material, preferably a thermoplastic material, more preferably polypropylene, more preferably wherein the container or at least one component thereof is made of a plastic material that comprises 25 % to 100 %, more preferably 40 % to 100 %, recycled plastic material; and/or
- the base portion of the paint cup comprises a central point located distal from the sidewall portions, and the paint cup further comprises at least one secondary indentation protruding into the receptable volume, wherein the least one secondary indentation is located at the central point of the base portion, wherein optionally the base portion further bulges into the receptable volume.

8. A mold configured for forming a cup comprising a base portion and a sidewall portion enclosing a receptacle volume and having an opening opposite to the base portion, the opening being surrounded by a rim formed by the end of the sidewall portion distal from the base portion, wherein the sidewall portion comprises at least one elongate indentation extending through and from the base portion towards the rim, the at least one elongate indentation has a curved cross-section and protrudes from adjacent parts of the sidewall portion into the receptacle volume.

9. A method for manufacturing a container for mixing paint according to any one of claims 1 to 7, comprising injection molding of at least one component of the container, particularly the cup, preferably using a mold as defined in claim 8.

10. A paint mixing device comprising:

at least one port configured to accommodate a paint mixing container,
at least one guide element, wherein the at least one port is movably connected to the at least one guide element to allow for a translational movement of the accommodated paint mixing container,
at least one drive unit operationally coupled to the port,
wherein the drive unit is configured to (i) rotate the port or the paint mixing container accommo-

dated therein and (ii) move the port in a translational movement along at least a portion of the at least one guide element.

11. The paint mixing device according to claim 10, wherein

- the port comprises a holder into which is insertable a paint mixing container according to any one of claims 1 to 7, wherein the holder is preferably configured to accommodate different sizes of the paint mixing container and/or to not allow accommodation of paint mixing containers other than those according to any one of claims 1 to 7; and/or
- the port comprises at least one retention element for securing the paint mixing container in the port, preferably wherein the at least one retention element comprises a resilient member that is configured to engage a matching structural element on the outer surface of the paint mixing container, wherein the matching structural element preferably comprises a hollow space on the outer surface of a cup of the paint mixing container, the hollow space corresponding to an elongate indentation on the sidewall portion of the cup.

12. The paint mixing device according to any one of claims 10 to 11, wherein

- the guide element is a linear guide element; and/or
- the device is configured to rotate the paint mixing container accommodated in the port around the central longitudinal axis of the paint mixing container; and/or
- the travel length of the port movably connected to the at least one guide element is from 5 cm to 20 cm, preferably from 10 cm to 15 cm; and/or
- the drive unit comprises a first drive coupled to the port, configured to rotate the port or the paint mixing container accommodated therein, and a second drive configured to move the port along at least a portion of the length of the guide element, preferably wherein the first drive is configured to invert the direction of the rotation and/or adjust speed of rotation according to a predefined rotation program and/or wherein the second drive is configured to invert the direction and/or adjust the speed of the movement and/or adjust the length of the movement of the port along at least a portion of the length of the guide element according to a predefined translational program.

13. The paint mixing device according to any one of claims 10 to 12, wherein the paint mixing device

- comprises a housing, which contains the at least one port, at least one guide element and the at least one drive unit, preferably wherein the housing comprises a transparent viewing portion and/or a reversibly openable or detachable portion for accessing the port; and/or
- comprises least one sensor for detecting a paint mixing container mounted in the port and/or for detecting closure or proper installation of the reversibly openable or detachable portion of the housing; and/or
- comprises means for affixing the device to a tabletop and/or wall; and/or
- has a width from 25 cm to 70 cm, preferably from 30 cm to 50 cm; and/or
- has a depth from 15 cm to 50 cm, preferably from 20 cm to 40 cm; and/or
- has a height of 20 cm to 50 cm, preferably from 25 cm to 40 cm; and/or
- comprises a control unit for controlling operation of the drive unit; and/or
- comprises user control means and/or an interface for communication with external electronic devices, such as an interface for wired communication and/or an interface for wireless communication.

14. A process for mixing paint comprising:

providing one or more paint components to be mixed into a paint mixing container, preferably a paint mixing container as defined in any one of claims 1 to 7, in desired amounts,
optionally closing the paint mixing container with a lid, and
subjecting the paint mixing container to (i) a rotational movement and (ii) a translational movement in at least one spatial direction for mixing the paint components, preferably using a paint mixing device according to any one of claims 10 to 13.

15. The process according to claim 14, wherein

- the rotational movement and the translational movement occur at least partly overlapping in time; and/or
- the paint mixing container is subjected simultaneously to the rotational movement and the translational movement during the mixing of the paint components; and/or
- the rotational movement comprises rotating the paint mixing container around its central longitudinal axis; and/or
- the translational movement comprises a linear translational movement, wherein the linear translational movement preferably comprises repeatedly moving the paint mixing container

in a back-and-forth manner on a linear path; and/or

- the length of the linear path preferably has a length in a range from 5 cm to 20 cm, such as from 10 cm to 15 cm; and/or
- during the mixing step the direction of the rotation is inverted at least one time; and/or
- the maximum speed of the rotational movement is from 500 rpm to 2000 rpm, the maximum speed of the translational movement is from 50.000 mm/min to 100.000 mm/min, the rotational acceleration is from 40 rotations/s^2 to 150 rotations/s^2 and/or the translational acceleration is from 40 rotations/s^2 to 150 rotations/s; and/or
- the mixing is performed for a duration from 30 s to 5 min.

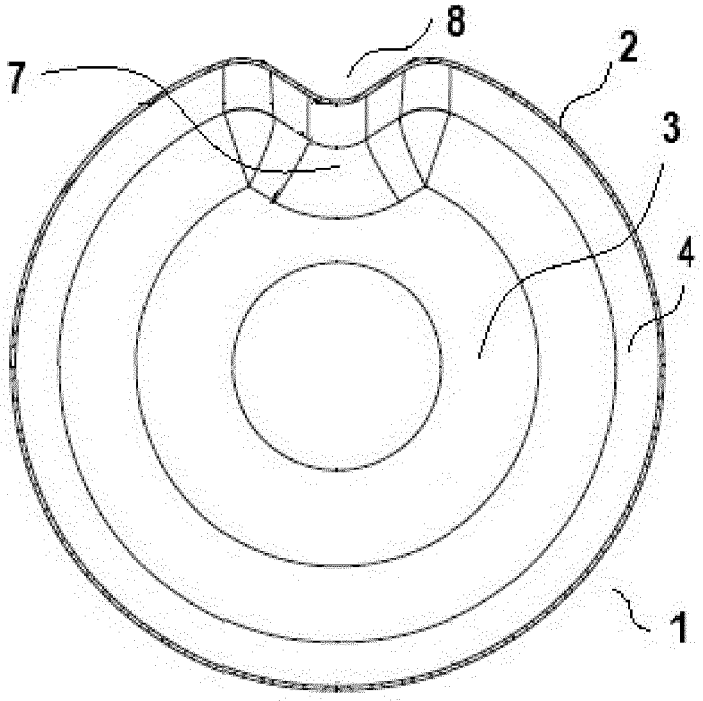

Fig. 1

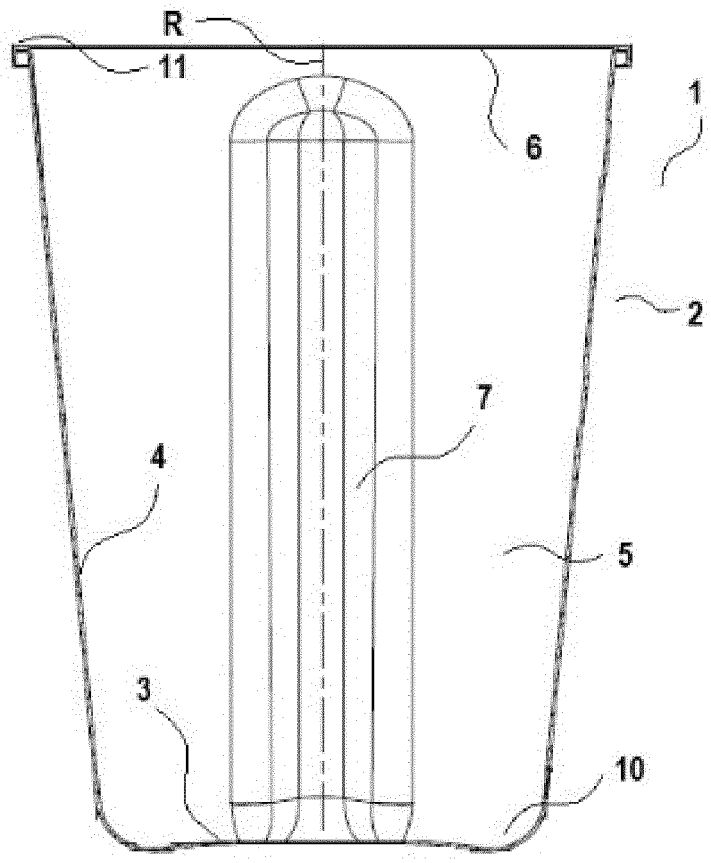

Fig. 2

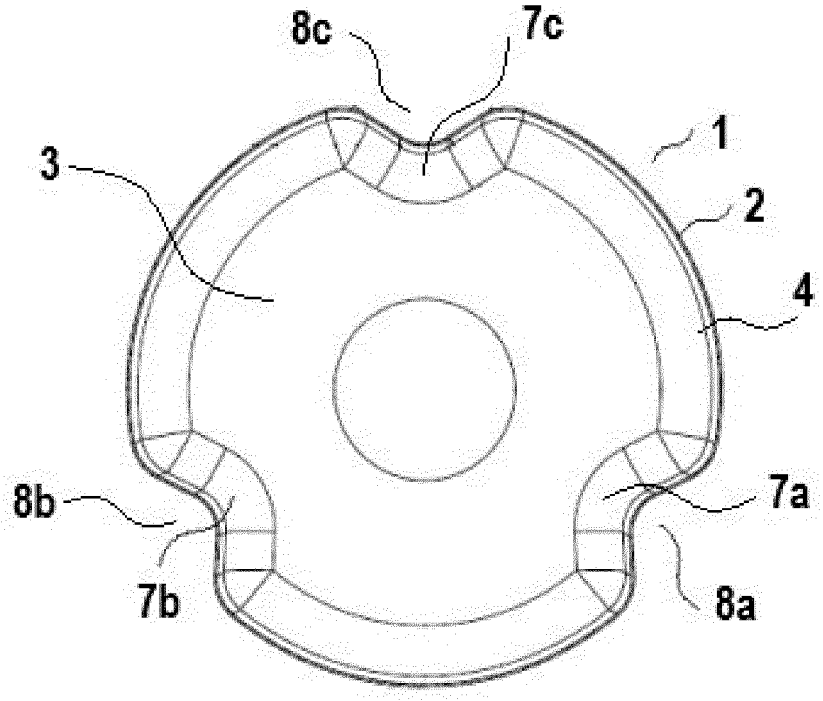

Fig. 3

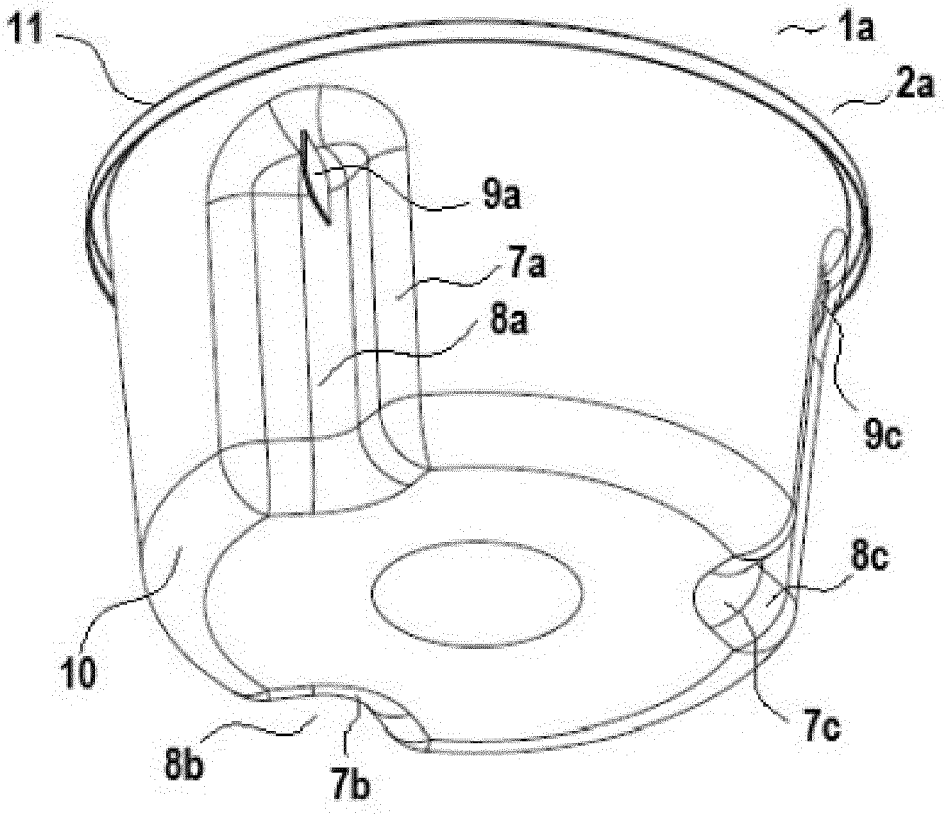

Fig. 4

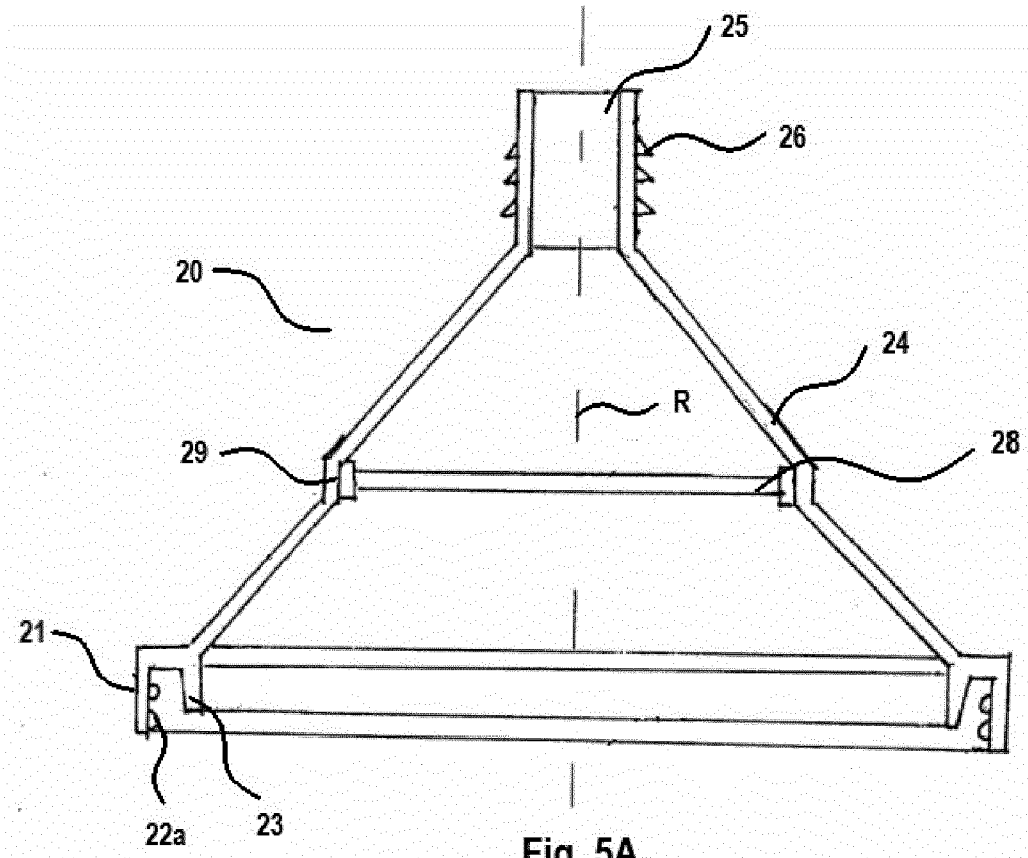

Fig. 5A

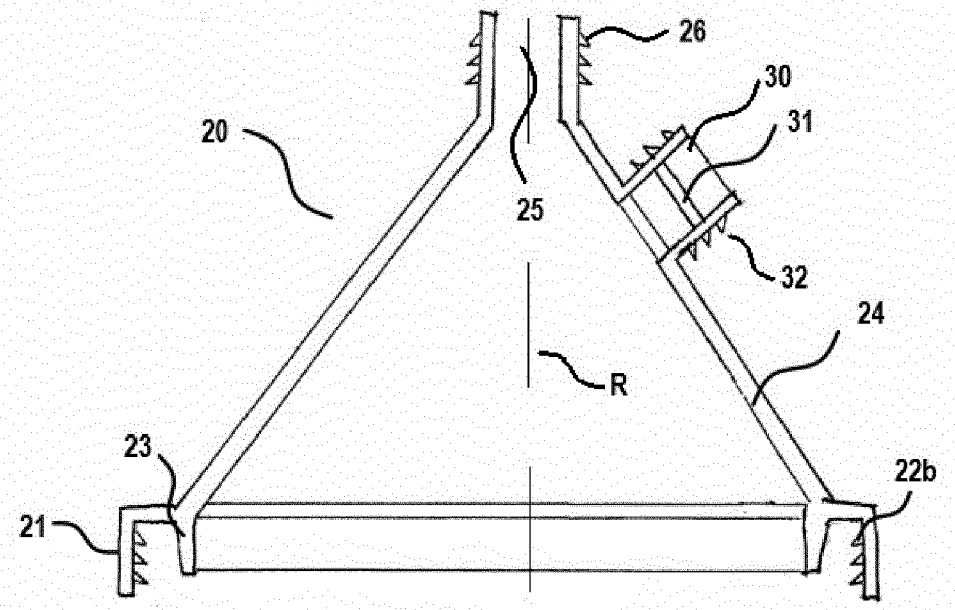

Fig. 5B

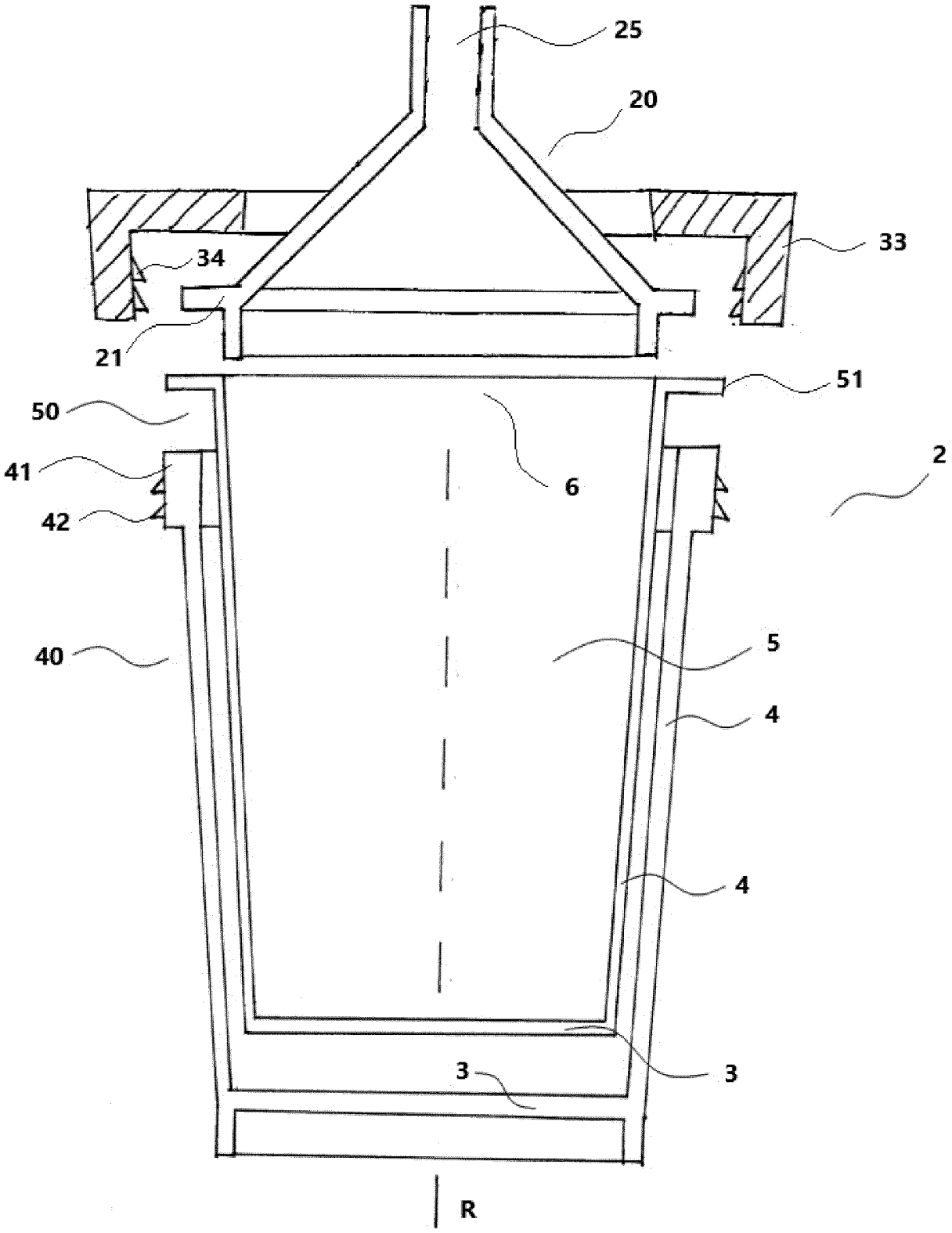

Fig. 6

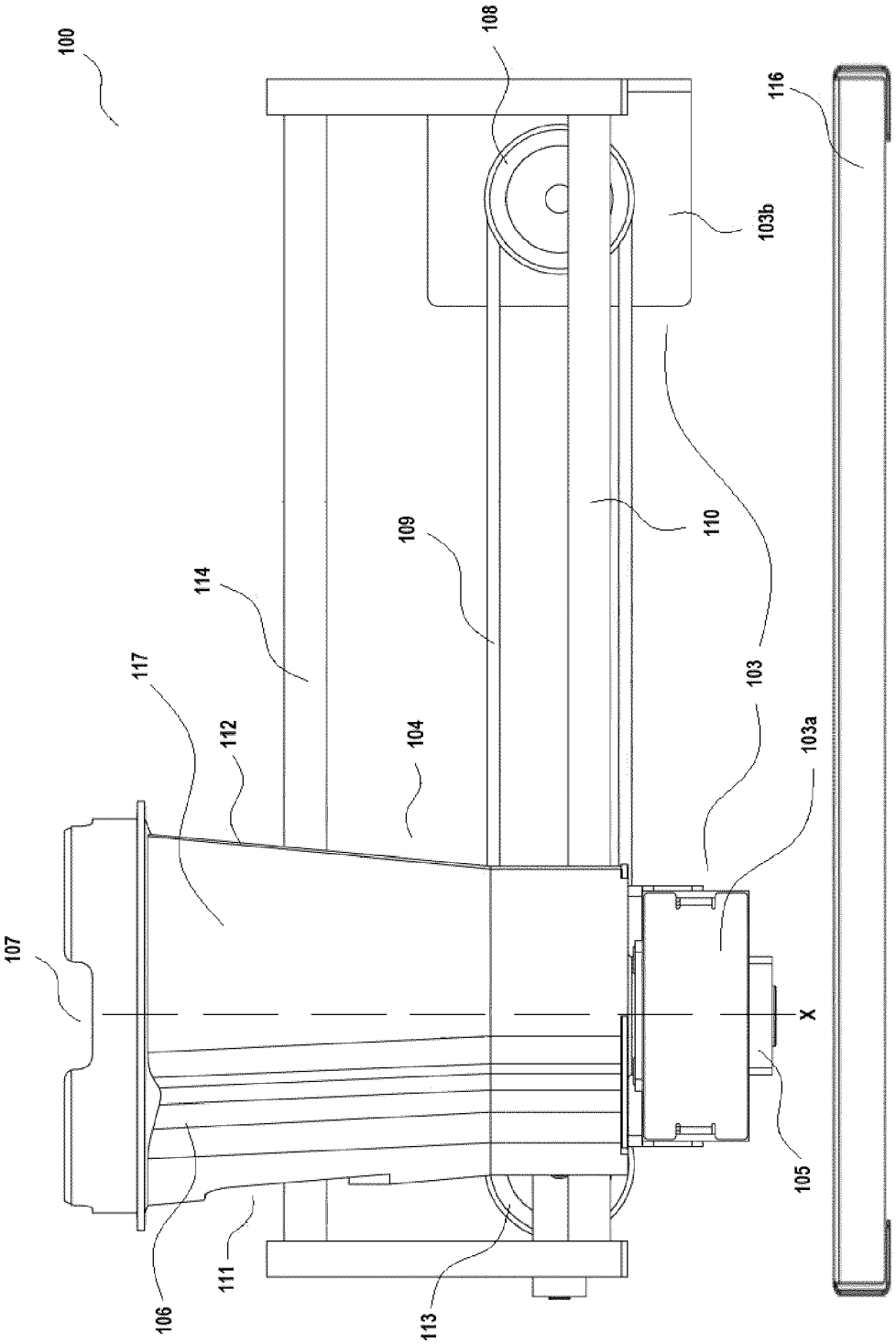
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Fig. 7A

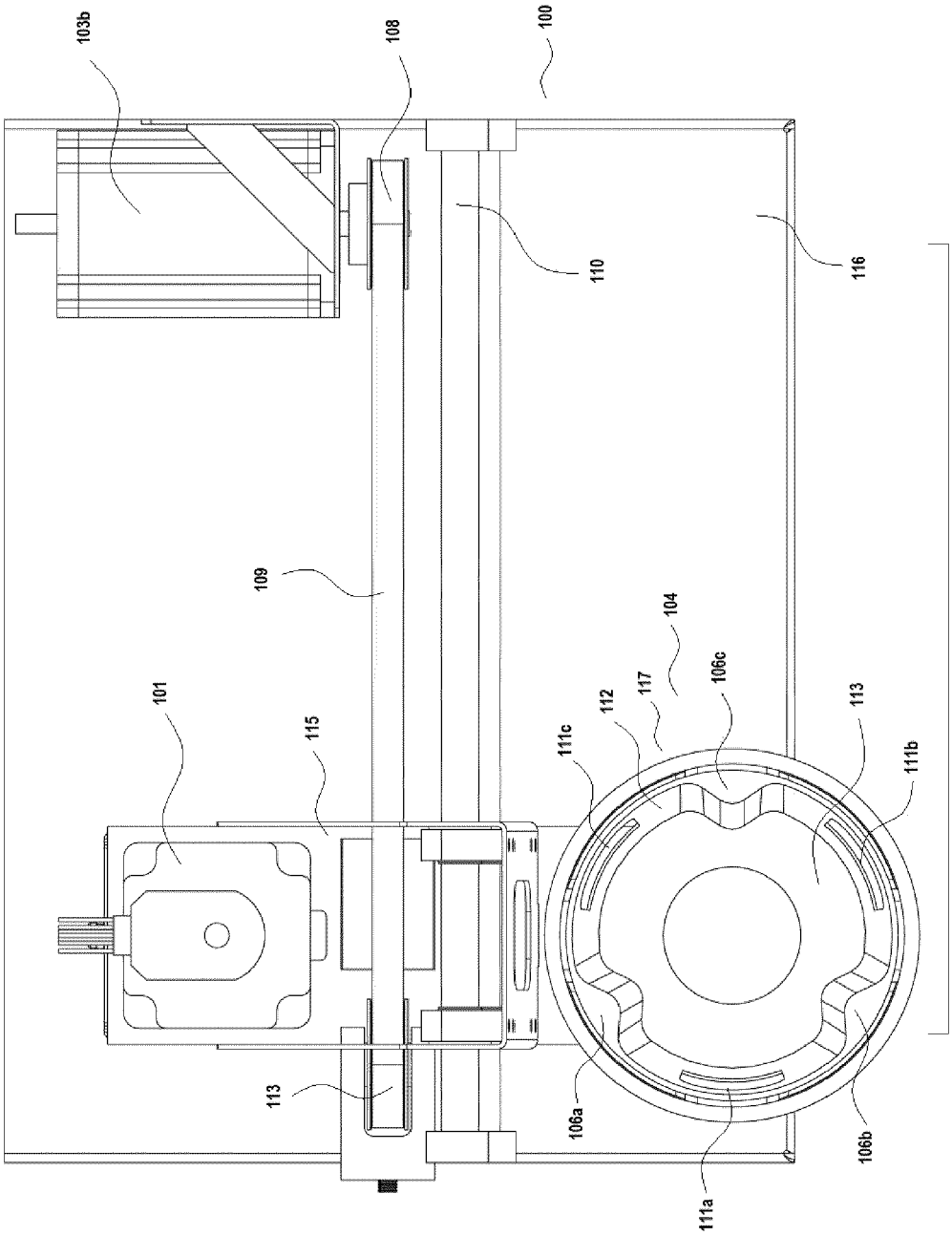
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Fig. 7B

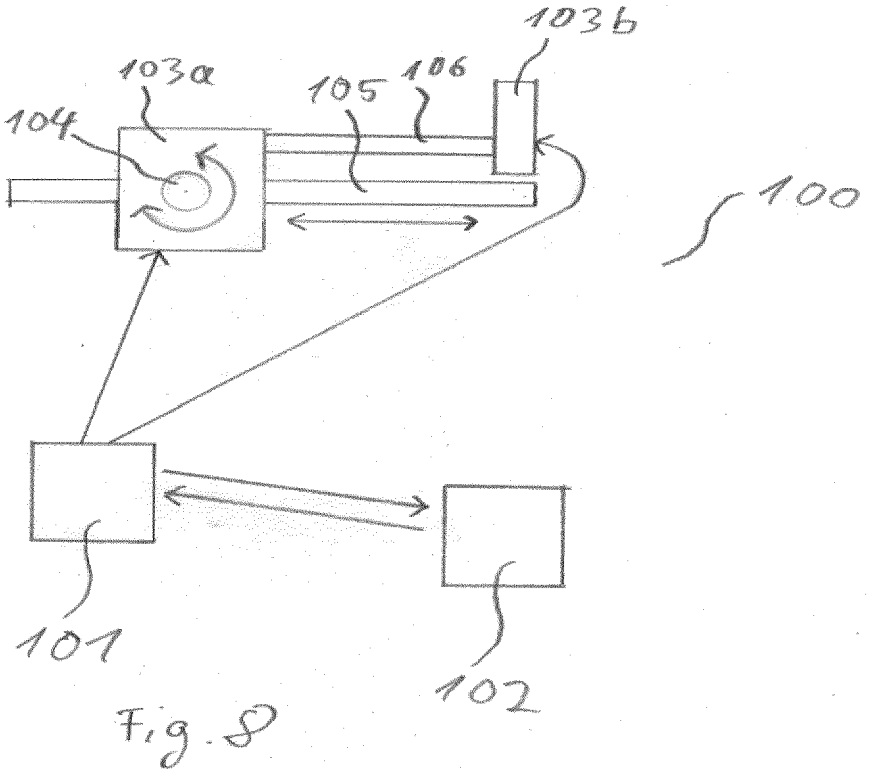

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 7743

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 92/18231 A1 (ODJOB INT LTD [NZ]; KING TERENCE CHRISTOPHER [NZ]) 29 October 1992 (1992-10-29) * page 4, line 6 - page 8, line 9 * * figures 1-14 *	1-3,5,6, 8,9	INV. B01F29/33 B01F29/00 B01F29/80 B01F31/25 B01F35/53
X	WO 2012/174331 A1 (GREEN MOUNTAIN COFFEE ROASTERS INC [US]; PETERSON PETER [US] ET AL.) 20 December 2012 (2012-12-20) * page 8, lines 16-28 * * page 17, line 4 - page 18, line 5 * * figures 24, 25 *	1-3,5-9	B01F101/30
X	US 2018/070761 A1 (SEDLACEK MATTHEW [US] ET AL) 15 March 2018 (2018-03-15) * paragraph [0028] * * paragraphs [0031] - [0048] * * figures 1-14 *	1-9	
X	US 2014/016431 A1 (TAKENAKA YUKI [JP] ET AL) 16 January 2014 (2014-01-16) * paragraphs [0064] - [0066], [0097] - [0101] * * figures 1, 8A, 8B *	10,11, 13-15	TECHNICAL FIELDS SEARCHED (IPC) B01F
X	WO 2006/077237 A1 (CPS COLOR EQUIPMENT SPA CON UN [IT]; GRECO GUIDO [IT]) 27 July 2006 (2006-07-27) * page 14, line 26 - page 15, line 11 * * figure 6 *	10,14,15	
X	IT 2019 0001 4613 A1 (COROB SPA [IT]) 12 February 2021 (2021-02-12) * paragraphs [0098] - [0106] * * figures 18-22 *	10,12, 14,15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 April 2024	Baytekin, Hüseyin

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)

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Application Number
EP 23 18 7743

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:

☐ 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).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 23 18 7743

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: 1-9

A container for mixing paint

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2. claims: 10-15

A paint mixing device

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 7743

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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17-04-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9218231 A1	29-10-1992	AU 1552492 A	17-11-1992
		CA 2053214 A1	17-10-1992
		EP 0580668 A1	02-02-1994
		GB 2254797 A	21-10-1992
		NZ 237848 A	27-06-1994
		PT 100390 A	29-04-1994
		US 5403086 A	04-04-1995
		WO 9218231 A1	29-10-1992
		ZA 922653 B	27-01-1993
WO 2012174331 A1	20-12-2012	CA 2839293 A1	20-12-2012
		CN 103781712 A	07-05-2014
		EP 2720961 A1	23-04-2014
		HK 1196806 A1	24-12-2014
		JP 6144257 B2	07-06-2017
		JP 2014519394 A	14-08-2014
		KR 20140039044 A	31-03-2014
		TW 201318564 A	16-05-2013
		US 2012308688 A1	06-12-2012
		WO 2012174331 A1	20-12-2012
US 2018070761 A1	15-03-2018	NONE	
US 2014016431 A1	16-01-2014	CN 103521119 A	22-01-2014
		JP 6115863 B2	19-04-2017
		JP 2014168769 A	18-09-2014
		US 2014016431 A1	16-01-2014
WO 2006077237 A1	27-07-2006	NONE	
IT 201900014613 A1	12-02-2021		

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5094543 A **[0004]**