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(54) **Spraying device for deformable container.**

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(73) Proprietor: **INTERSCENTS N.V.**
Foures Building,
Emmaplein
St. Maarten (AN)

(72) Inventor: **Workum, Donald**
Obere Heslibachstrasse 85a
CH-8700 Küsnacht (CH)

(74) Representative: **Lips, Hendrik Jan George, Ir.**
HAAGSCH OCTROOIBUREAU
Breitnerlaan 146
NL-2596 HG Den Haag (NL)

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Description

The invention relates to a spraying device as this is described in the preable of the main claim.

Such a device is known from US-A-4,673,110. When with this known device the angle, which the opening in the closing cap encloses with the axis of the cap, is too large, spraying of the liquid will be adversely affected.

Thus with increasing deflection of the mixture or the spray, the liquid drops wille unite so that the size of the drops will increase. The sprayed mixture, e.g. the spray will also have a less uniform composition.

In order to obviate this difficulty and adapt the device for spraying a liquid-air-mixture in several directions, according to the invention the features are applied as these are described in the characterizing portion of the main claim.

Owing to the fact that the opening ends laterally in the bore, it is achieved, that the mixture arriving in the bore is subjected to an air flow emerging from said air duct and being substantially square to the direction of flow of the mixture, which air flow produces the deflection of the mixture, the spray, while maintaining its quality.

According to a preferred embodiment of the invention, it can be provided for, that a duct section, running practically parallel to the axis of the cap and of the container, connects to the section of the air duct running practically parallel to the axis of the bore, which first mentioned section extends through a substantially cylindrical part of the cap, such that the inner end of the air duct connects directly to the space in the container which is normally situated above the highest liquid level.

The air duct can then simultaneously serve for sucking in air into the container when, after a spraying has taken place, it is released and will take up its original shape again. Due to this, the inflowing air will have a considerable velocity, by which a good cleaning of the narrow discharge bore is guaranteed.

There is also the possibility that a duct section running substantially parallel to the axis of the cap and of the container connects to the section of the air duct running practically parallel to the axis of the bore, which first mentioned section extends as far as into the space which is situated within a substantially cylindrical part of the cap, which cylindrical part, near its innermost edge, is connected to a substantially radially extending part of the supporting means, in which radially extending part one or more openings are situated for receiving air in the container when after discharge of the formed mixture, it takes up its original shape again.

Naturally, both air ducts could be applied simultaneously, but this only leads to a more complicated and thus more expensive spraying device.

Although the axis of the bore can be square to the axis of the container and of the cap, according to the invention it can also be provided for, that the axis of the bore encloses an angle between 10° to 150° with the extension of the axis of the container and of the cap. The discharged mixture or the spray can thus then be directed upward or downward, depending on the intended application of the deformable container.

Further, it will be obvious, that the features applied with the invention are also useful with other embodiments of spraying devices, than described in the US patent specification mentioned above.

The invention will now be explained on the basis of embodiments, shown in the drawing, which shows a vertical section through a spraying device according to the invention. In the drawing, a first embodiment is depicted in full lines and another possible embodiment in dash lines.

The spraying device shown in the drawing comprises a closing cap 1, which is provided with screw-thread 2 for applying it onto the neck 3 of a deformable container 4, of which only a small part is shown in the drawing.

The supporting means 5 are connected to the innermost edge 7 of the substantially cylindrical part 6 of the cap 1. The part 9 of the supporting means 5 running radially in relation to the axis 8 of the container 4 carries a valve support 10. The valve support 10 is provided with the valve seat 11 on which the movable valve 12 rests. Opposite to the valve seat 11 the support 10 is provided with the dip tube 13, which extends as far as near the not illustrated bottom of the container 4.

The valve 12 consists of the part 14 sealing in relation to the valve seat 11 and the cylindrical part 15 extending downwardly with an opening 16 in the transition between both parts. The opening 16 ends in a chamber 17, which is formed in the upper plane 18 of the valve 12. It is also possible that more than one opening 16 and chamber 17 are present.

Upon applying pressure on the container 4 by hand, liquid will be forced under the valve 12 through the dip tube 13 and the valve 12 will then be lifted from its seat 11 and with its upper plane 18 come to lie against the inner plane 19 of the cap 1. The liquid will then flow through the opening 16 into the chamber 17 and there be mixed with air which is forced from the container 4 into the chamber 17 through at least one opening 20 in the radial part 9 of the supporting means 5.

The formed mixture will leave the chamber 17 through an opening 21, the axis 22 of which can extend in the direction of the axis 8. The bore 23 connects to the opening 21, the axis 24 of which bore is practically square to the axis 22 of the

opening 21.

A section 25 of an air duct 26 connects to the bore 23, which section 25 runs substantially parallel to the axis 24 of the bore 23. The further section 27 of the air duct 26 extends through the cylindrical part 6 of the cap 1. The inner end 28 of the air duct 27 ends in the space 29 of the container 4, which space is in general above the level 30 of the liquid 31 present in the container 4.

As already mentioned above, a liquid-air-mixture will be formed in the chamber 17 upon squeezing the container 4. This mixture leaves the chamber 17 through the opening 21 and arrives in the bore 23. Simultaneously, air is forced to the inner end of the bore 23 through the duct 25, so that the mixture flowing from the opening 21 in the direction of the axis 22 is deflected in the direction of the axis 24 of the bore 23.

When the pressure on the container 4 is relieved, the container 4 will take up its original shape again. Hereby, the valve 12 will be closed and air will be sucked into the container 4 through the bore 23, the air duct 26, the opening 21, along the upper plane 18 of the valve 12, through the chamber 17 and through the openings 16 and 20. This will contribute to cleaning of the naturally small openings 16, 21 and 23, so that these will not easily get jammed by any possible curing liquid.

With dash lines it is indicated, that the section 27 of the air duct 26 can also extend as far as into the space 32, which is formed between the cylindrical part 6 of the cap 1 and the cylindrical part 15 of the valve 12. The section 27 will then be replaced by the section 27a.

As already mentioned above, it is possible to apply both a duct 27 and a duct 27a in the cap 1.

When one does not want to use the device described above for discharging a mixture, vapour, liquid particles, but for discharging foam, means known per se can be applied. For example, the mouth of the bore 23 can be enlarged and a sieve or other means can be mounted in the enlarged part. By the presence of the air duct 26, a better cleaning of the sieve or other means will be obtained here as well, when the container 4 takes up its original shape again after a deformation.

Although in the drawing the axis 24 of the bore 23 is square to the axis 8 of the cap 1 and the container 4, it will be obvious, as already mentioned above, that this axis 24 can also enclose an angle β with the axis 8. For example, this angle β can be between 10° and 150°, depending on the intended application of the deformable container. Therein, the air duct 25 will remain parallel to the axis 24 of the bore 23.

It will be obvious, that only one possible embodiment of a device according to the invention is illustrated in the drawing and discussed above, and that many modifications can be made without falling beyond the inventive idea.

Thus, the inventive idea can also be applied with a spraying device which is not provided with a shut-off valve. In general, the application of such a valve has the advantage, that upon squeezing the container, the mixture immediately flows out, since the level of the liquid in state of rest is up to beneath the valve.

Claims

1. Spraying device suitable for mounting to a deformable container (4), said device comprising: a closing cap (1) by which a container is closed when the spraying device is mounted to it; supporting means (5) inside said cap and being directly or indirectly connected to said cap (1); a dip tube (13) connected to said supporting means (5) and projecting outwardly from this means (5) and inwardly into a container after mounting of the spraying device to this; a chamber (17) situated within said cap (1) and being connected with said dip tube (13); an air channel extending between said chamber (17) and the space outside said supporting means (5) such that liquid flowing through said dip tube towards said chamber (17) and air flowing through said air channel can be mixed in said chamber; an opening (21) in said cap (1) through which the mixture formed in said chamber (17) can be discharged outwardly and through which opening air can flow towards said space outside said supporting means (5), said opening enclosing an angle with the axis (8) of the cap (1), **characterized in that** the opening (21) situated in the closing cap (1) ends laterally in a bore (23) made in the closing cap, said bore being open at one end for discharge of the formed mixture, while a section (25) of an air duct (26) ends in the bottom of the bore situated opposite the open end of this, with the axis of said section (25) extending substantially parallel to that of said bore (23) and which air duct (26) on the other hand is connected to said space (29,32) around said dip tube (13) where this is connected to the supporting means (5), which space after mounting of the spraying device on the container is normally situated above the highest liquid level (30) in the container (4).

2. Device according to claim 1, **characterized** in that a duct section (27) running practically parallel to the axis (8) of the cap (1) and of the container (4) connects to the section (25) of the air duct (26) running practically parallel to

the axis (24) of the bore, which first mentioned section extends through a substantially cylindrical part (6) of the cap, such that the inner end (28) of the air duct connects directly to the space (29) in the container which is normally situated above the highest liquid level (30).

3. Device according to claim 1, **characterized** in that a duct section (27a) running substantially parallel to the axis (8) of the cap (1) and of the container (4) connects to the section (25) of the air duct (26) running practically parallel to the axis (24) of the bore (23), which first mentioned section extends as far as into the space (32) which is situated within a substantially cylindrical part (6) of the cap (1), which cylindrical part (6), near its innermost edge (7), is connected to a substantially radially extending part (9) of the supporting means (5), in which radially extending part one or more openings (20) are situated for receiving air in the container (4) when after discharge of the formed mixture, it takes up its original shape again.

4. Device according to one of the preceding claims,
characterized in that the axis (24) of the bore (23) encloses an angle (β) between 10° to 150° with the extension of the axis (8) of the container (4) and of the cap (1).

5. Device according to one of the preceding claims,
characterized in that in the discharge opening of the bore (23), a sieve or other means have been mounted for forming foam from the mixture formed in the mixing chamber (17).

Patentansprüche

1. Sprühvorrichtung für einen deformierbaren Behälter (4), mit
einer Verschlußkappe (1), durch die ein Behälter verschlossen wird, wenn die Sprühvorrichtung an ihm angebracht ist,
einer direkt oder indirekt mit der Kappe (1) verbundenen Halteeinrichtung (5) im Inneren der Kappe (1),
einem mit der Halteeinrichtung (5) verbundenen und von dieser vorstehenden Tauchrohr (13), das nach Anbringung der Sprühvorrichtung am Behälter in diesen hineinragt,
einer in der Kappe (1) angeordneten und mit dem Tauchrohr (13) verbundenen Kammer (17),
einem Luftkanal, der so zwischen der Kammer (17) und dem Raum außerhalb der Halteeinrichtung (5) verläuft, daß die durch das Tauchrohr (13) zur Kammer (17) strömende Flüssigkeit und die durch den Luftkanal strömende Luft in der Kammer gemischt werden können,
einer Öffnung (21) in der Kappe (1), durch die das in der Kammer (17) gebildete Gemisch nach außen abgegeben werden kann und durch welche Luft zum Raum außerhalb der Halteeinrichtung (5) strömen kann, wobei die Öffnung einen Winkel mit der Achse (8) der Kappe (1) einschließt,
dadurch gekennzeichnet, daß
die in der Verschlußkappe (1) angeordnete Öffnung (21) seitlich in einer Bohrung (23) in der Verschlußkappe (1) endet, wobei die Bohrung zur Abgabe des gebildeten Gemisches an einem Ende offen ist, während ein Abschnitt (25) einer Luftleitung (26) im Boden der Bohrung mündet, der ihrem offenen Ende gegenüberliegt, wobei die Achse des Abschnitts (25) im wesentlichen parallel zu derjenigen der Bohrung (23) verläuft und wobei die Luftleitung (26) auf der anderen Seite mit dem Raum (29, 32) um das Tauchrohr (13) herum verbunden ist, wo dieses mit der Halteeinrichtung (5) verbunden ist, wobei der Raum nach Anbringung der Sprühvorrichtung am Behälter normalerweise über dem höchsten Flüssigkeitsniveau (30) im Behälter (4) angeordnet ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß ein Leitungsabschnitt (27), der praktisch parallel zur Achse (8) der Kappe (1) und des Behälters (4) verläuft, mit dem Abschnitt (25) der Luftleitung (26) verbunden ist, die praktisch parallel zu der Achse (24) der Bohrung verläuft, wobei der zuerst genannte Abschnitt sich durch einen im wesentlichen zylindrischen Teil (6) der Kappe zo erstreckt, daß das innere Ende (28) der Luftleitung direkt mit dem Raum (29) im Behälter verbunden ist, der normalerweise über dem höchsten Flüssigkeitsniveau (30) angeordnet ist.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß ein Leitungsabschnitt (27a), der im wesentlichen parallel zu der Achse (8) der Kappe (1) und des Behälters (4) verläuft, mit dem Abschnitt (25) der Luftleitung (26) verbunden ist, der praktisch parallel zu der Achse (24) der Bohrung (23) verläuft, wobei der zuerst erwähnte Abschnitt sich bis in den Raum (32) erstreckt, der innerhalb eines im wesentlichen zylindrischen Teils (6) der Kappe (1) angeordnet ist, wobei der zylindrische Teil (6) in der Nähe seiner innersten Kante (7) mit einem im wesentlichen radial verlaufenden Teil (9) der Halteeinrichtung (5) verbunden ist, und wobei in dem radial verlaufenden Teil eine oder

mehrere Öffnungen (20) zur Aufnahme von Luft in den Behälter (4) angeordnet sind, wenn dieser nach Abgabe des gebildeten Gemisches wieder seine ursprüngliche Form einnimmt.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Achse (24) der Bohrung (23) mit der Achse (8) des Behälters (4) und der Kappe (1) einen Winkel (β) zwischen 10° und 150° einschließt.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß in der Austrittsöffnung der Bohrung (23) ein Sieb oder eine andere Einrichtung zur Bildung eines Schaums aus dem in der Mischkammer (17) gebildeten Gemisch angeordnet ist.

Revendications

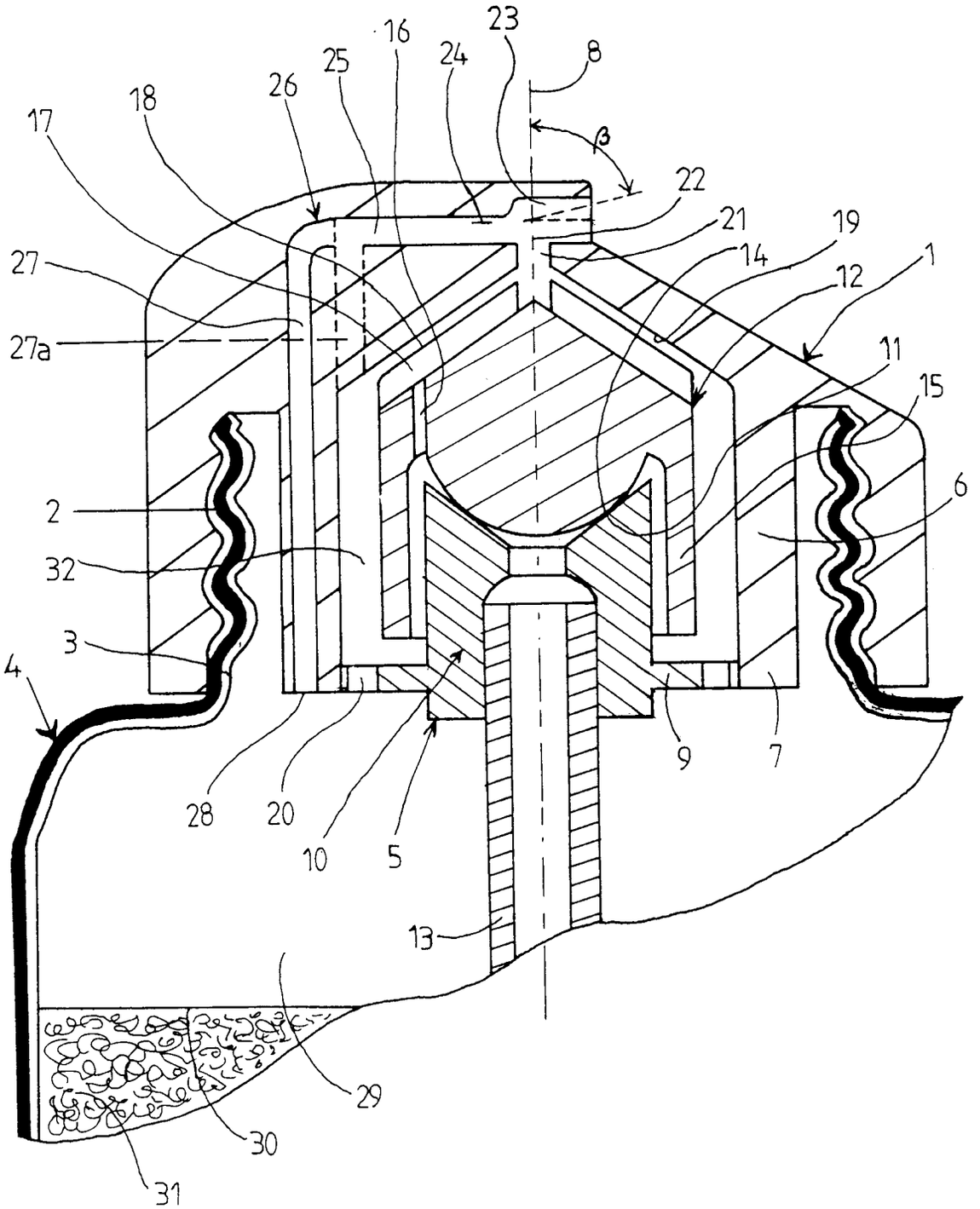
1. Dispositif de pulvérisation approprié pour être monté sur un récipient déformable (4), ce dispositif comprenant : un capuchon de fermeture (1) au moyen duquel le récipient est fermé lorsque le dispositif de pulvérisation est monté sur lui ; des moyens de support (5) à l'intérieur du capuchon et reliés directement ou indirectement à ce capuchon ; un tube plongeur (13) raccordé à ces moyens de support (5) et se projetant vers l'extérieur de ces moyens (5) et vers l'intérieur dans le récipient après montage sur celui-ci du dispositif plongeur ; une chambre (17) située à l'intérieur du capuchon (1) et communiquant avec le tube plongeur (13) ; un passage d'air s'étendant entre la chambre (17) et l'espace à l'extérieur des moyens de support (5) de façon que le liquide circulant à travers le tube plongeur en direction de la chambre (17) et l'air circulant à travers ce passage d'air puissent se mélanger dans ladite chambre ; une ouverture (21) dans le capuchon (1) à travers laquelle le mélange formé dans la chambre (17) peut être projeté vers l'extérieur et à travers laquelle l'air peut circuler en direction dudit espace à l'extérieur des moyens de support (5), cette ouverture faisant un angle avec l'axe (8) du capuchon (1), caractérisé en ce que l'ouverture (21) dans le capuchon de fermeture (1) se termine latéralement dans un alésage (23) réalisé dans le capuchon de fermeture (1), cet alésage étant ouvert pour permettre de projeter à l'extérieur le mélange formé, tandis qu'une section (25) d'un conduit d'air (26) se termine dans l'extrémité de l'alésage à l'opposé de l'extrémité ouverte de celui-ci, l'axe de cette section (25) étant pratiquement parallèle à celui de l'alésage (23) et le conduit d'air (26) communiquant à son autre extrémité avec l'espace (29, 32) entourant le tube plongeur (13) à l'endroit où celui-ci est raccordé aux moyens de support (5), lequel espace est normalement situé, après montage du dispositif de pulvérisation sur le récipient, au-dessus du niveau de liquide le plus élevé dans le récipient (4).

2. Dispositif selon la revendication 1, caractérisé en ce qu'une section de conduit (27), pratiquement parallèle à l'axe (8) du capuchon (1) et du récipient (4), se raccorde à la section (25) du conduit d'air (26) pratiquement parallèle à l'axe (24) de l'alésage, cette section (27) s'étendant à travers une partie pratiquement cylindrique (6) du capuchon de telle sorte que l'extrémité intérieure (28) du conduit d'air communique directement avec l'espace (29) dans le récipient, espace qui est normalement situé au-dessus du niveau de liquide le plus élevé.

3. Dispositif selon la revendication 1, caractérisé en ce qu'une section du conduit (27a), pratiquement parallèle à l'axe (8) du capuchon (1) et du récipient (4), se raccorde à la section (25) du conduit d'air (26) pratiquement parallèle à l'axe (24) de l'alésage (23), cette section (27a) s'étendant jusque dans l'espace (32) situé à l'intérieur de la partie cylindrique (6) du capuchon (1), cette partie cylindrique étant reliée, au voisinage de son bord interne (7), à une partie (9) des moyens de support (5) s'étendant radialement, une ou plusieurs ouvertures (20) étant ménagées dans cette partie s'étendant radialement pour admettre de l'air dans le récipient (4) lorsque celui-ci reprend sa forme d'origine après expulsion du mélange formé.

4. Dispositif selon l'une des revendications précédentes, caractérisé en ce que l'axe (24) de l'alésage (23) fait un angle (β) compris entre 10° et 150° avec le prolongement de l'axe (8) du récipient (4) et du capuchon (1).

5. Dispositif selon l'une des revendications précédentes, caractérisé en ce que l'on a monté, dans l'ouverture de décharge de l'alésage (23), un tamis ou un autre moyen pour former de la mousse à partir du mélange formé dans la chambre de mélange (17).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