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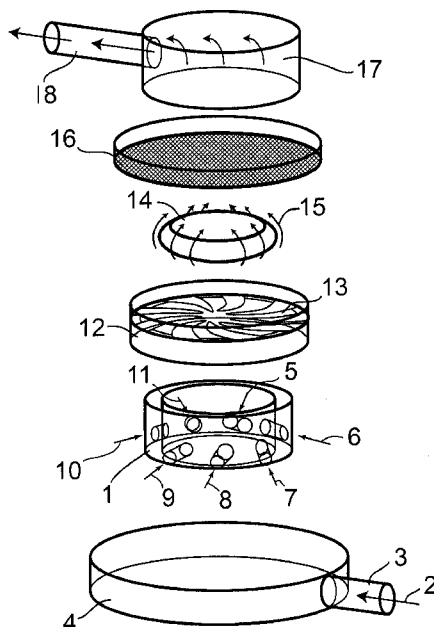
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: DISSOLUTION CHAMBER FOR CLEANING TABLETS

Fig. 1



(57) Abstract: In order to dissolve cleaning tablets in a constant stream of media, a rinsing out chamber is suggested, in which the tablet is dissolved in an upward rotary stream of the medium, that keeps it afloat against a filter mesh.

WO 2012/069893 A1

DISSOLUTION CHAMBER FOR CLEANING TABLETS

FIELD OF THE INVENTION

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The invention refers to a dissolution chamber for tablets, as for adding cleaning agents, nutrients, fertilizers, or biocides to a stream of water or other solvents.

10 BACKGROUND OF THE INVENTION

For cleaning equipment, or in irrigation systems and disinfection devices, water or other media are mixed with additives, that are compacted to form a tablet. These use to be dissolved in a mixing chamber.

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However, the dissolution of tablets hitherto can only be achieved with large quantities of water or solvent. Since the amount of material that is carried away in the medium decreases, the cleaning effect declines with the reduction of the tablet size. In the end, much water or other solvent must be spent for complete dissolution, without adequate cleaning effect.

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Therefore the process is often interrupted beforehand, so that a remainder of the tablet remains in the dissolution chamber, which sometimes is tedious to remove..

Another reason for annoying cleaning procedures is, that turbulences in the stream through the dissolution chamber lead to active and neutral zones, where the material easily deposits at walls and in corners.

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This pertains particularly to cleaning agents with abrasive components, which are usually water insoluble and heavier and therefore are prone to deposition in partitions with low flow rate, mostly with applications, in which rather tight nozzles must be applied for to achieve an appropriate cleaning effect, because of then only a comparatively small flow speed arrives at high pressure.

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For a such kind of applications - e.g. tooth cleaning with removal of plaque - a larger number of proposals have been made for cleaning agents containing abrasive particles.

35 PRIOR ART

The majority of the suggested solutions refer to the use of compressed air: either powdered blast grains are blown directly onto the teeth, or injected into a stream of water to be coated or mixed with it, or a cleaning mixture with blast grain (so-called slurry) is applied to dental surfaces with compressed air.

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For dental practices these techniques are common, because there compressed air is regularly at hand for drills and blowing out devices.

However, for everyday dental hygiene with removal of biofilms and plaques the use of a compressor seems odd and would come at disproportionately high cost.

Nevertheless it is well known, that biofilms and deposits are only roughly removed with a toothbrush and therefore it is obvious, that daily cleaning with gently abrasive means is preferable, particularly since the surface of smooth teeth give a more pleasant and hygienic feel when touched with one's tongue.

For this purpose the employment of abrasive means in oral irrigators would be obvious - but this is, where the above mentioned problems arise.

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Thereon a multiplicity of solutions had been presented, which however could not achieve acceptance so far:

Early proposals, like DE 197 29 516 A1, US 1.664.369 US 2,814, 877, US 3971,136, US 3.863.628, as well as US 2003/0013063 A1, US 4,214, 871 and US 4.174.571 refer to the use of pastes and powders, the mixing of which into a water jet is comparatively simple.

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But these approaches failed commercially, as cleaning and refilling of the containers turned out to be quite cumbersome and cartridge systems tended to be blocked by agglomerations of insoluble media. Starting from the seventies of last century, therefore replaceable inserts were offered, such as tablets or caps.

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Thus in DE 3322716 A1 a rod of preservative agent is suggested, that is rinsed along its long sides. However, increased thinning of the shank in its center often leads to its early breakdown with consequent blockage of the nozzle and/or filters.

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A mouth rinsing device of Gillette S.A. (DE 696 05 184 T2) with tubular caps, offered briefly on the market in the USA, exhibited similar problems, although similar rinsing out devices for garden hoses had quite worked satisfactory, while its larger nozzles permit rinsing out of rougher components, as long as they do not block the nozzle gap.

But this does not work with abrasive and insoluble components. Therefore the erosion of the caps and their breaking apart here led as well to a blockade of the discharge orifices.

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An opposite problem appears with the solution on WO 2008/046580 A1 to Gimelli, where the tablet is positioned in an embracing housing against the direction of the water flow. It therefore cannot break apart, however inevitably neutral zones develop: here again residual substrates are intricately to be removed before a new tablet can be used.

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PROBLEM TO BE SOLVED

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The task of the here disclosed invention therefore is, to design a dissolution chamber for tablets - the simplest form of a compact preparation of cleaning agents - in such a way, that these effects cannot occur.

PROBLEM APPROACH - INVENTIVE STEP

The inventive step is the idea to manage a uniform circulation of water under the tablet, that therefore is less affected from stronger erosion on the rim of its outer layers, and to avoid that
5 it breaks up in the final phase. This is achieved with a hydrodynamically shaped dissolution chamber, wherein a coerced vortex keeps the tablet horizontally afloat.

SUMMARY OF THE INVENTION

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The dissolution chamber for detergent tablets is designed in a way, that the incoming stream of water is first shifted into upstream turbulence by a centrifugal element, that lifts the tablet from a holding bracket against a filtering mesh, that covers the outlet above.

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The distance between brackets and mesh must not be more than one quarter of the diameter plus the thickness of the tablet, so that the tablet cannot turn laterally, even when fairly ablated.

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The brackets preferably consist of spiral fingers, whereon the tablet it is laid up. The whirling surge and the degassing of chemical contents from the tablet induces vibration, that provokes its rotation between the spiral fingers and the mesh until the entire surface is quite evenly ablated.

This way it is secured, that a constantly decreasing erosion of the components of the tablet can be accomplished.

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This may be complemented by a multi-layer tablet composition of progressively softer, more easily ablating coatings (as described in our application DE 10 2010 051 226.5)- so not only to ablate a constant magnitude of active agents, and in the end to dissolve the tablet completely with a high concentration of hygroscopically swelling ingredients.

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PREFERRED EMBODIMENT

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In a preferred embodiment the water intake is directed through circular, inwardly converging orifices into a center bore, where it results in an upward torrent. The tablet, rested on finger-like brackets halfway up in this center bore is set afloat against a filter mesh above, that separates the cylindric bore from the duct of the outlet chamber, which leads through a hose into the nozzle.

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DETAILED DESCRIPTION OF THE INVENTION IN DRAWINGS

The preferred embodiment of the system is illustrated by following drawing:

5 Fig. 1 demonstrates, how the water or medium jet **2** enters through the lower connecting stub **3** into the supply segment **4** of the dissolution chamber **1**, where it is forced into turbulent motion by a centrifugal element **5** through its diagonal inlet bores **6** to **11** to the centrifugal chamber **12**, on whose finger shaped brackets **13** the cleaning tablet **14** is placed.

10 The water stream **15**, this way forced to carry it afloat, dissolves the tablet prior from its down side and gives it a lift up to the filter mesh **16** for holding it there, whereby the small gap **17** between brackets **13** and mesh **16** avoids, that it laterally turns or breaks.

The water stream, then containing the dissolved and the now released abrasive particles, enters into the transfer chamber **18** and from there into the connecting stub **19**, which is the discharge opening.

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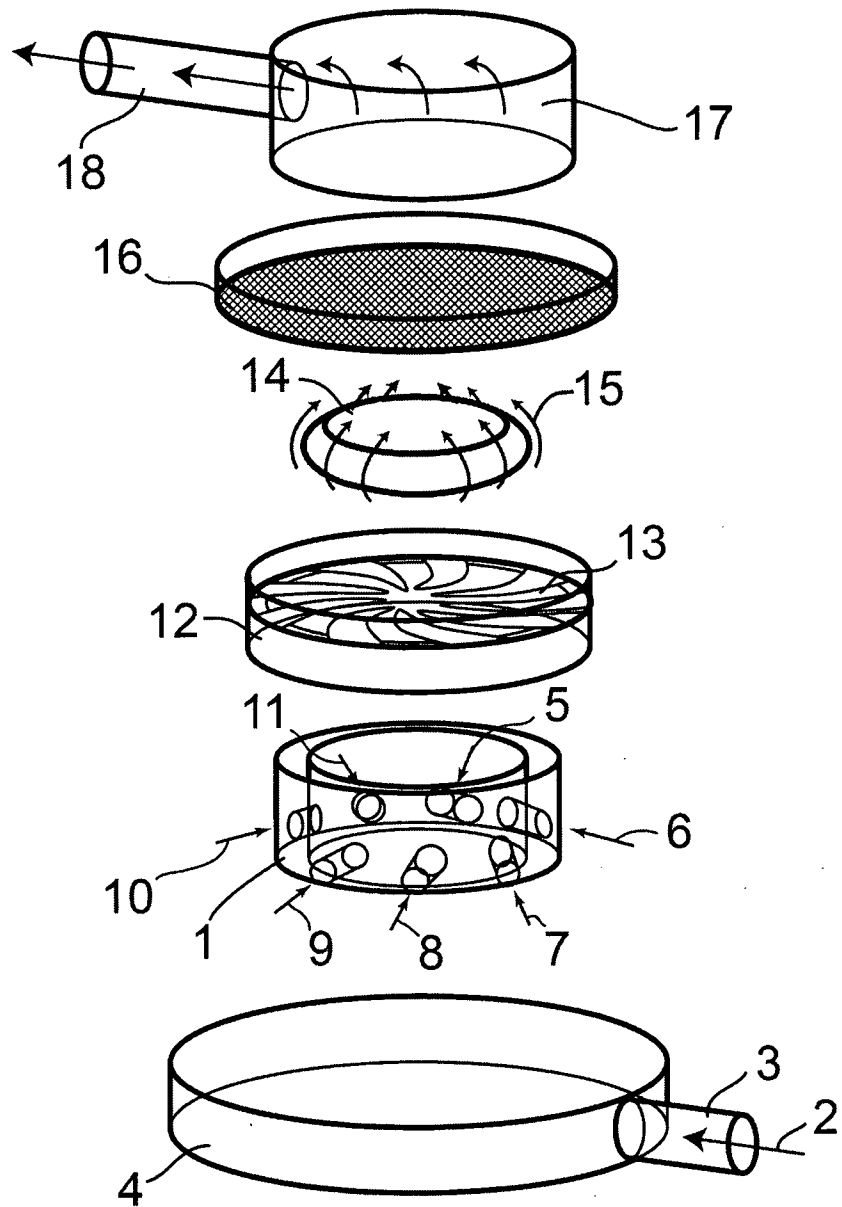
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WHAT IS CLAIMED IS:

1. Dissolution chamber for detergent tablets, wherein the ablating medium is conducted to form an upstream torrent under the tablet.
2. Dissolution chamber for detergent tablets as to claim 1, wherein the upstream torrent is achieved through a centrifugal element 5 with diagonal inlet bores 6 to 11 to the central chamber 12 .
3. Dissolution chamber for detergent tablets as to claim 1 and 2, wherein the inlet bores to the central chamber run horizontally and vertically at a 45°-inclination to the cylinder axle.
4. Dissolution chamber for detergent tablets as to claim 1, where in the outlet side of the central chamber is terminated by a filter mesh.
5. Dissolution chamber for detergent tablets as to claim 1, wherein a bracket supports the insertion of a tablet.
6. Dissolution chamber for detergent tablets as to claim 1, 4 and 5, wherein a gap between the holding bracket and the filter mesh is not wider than a quarter of its diameter plus the tablet thickness.
7. Dissolution chamber for detergent tablets as to preceding claims, wherein the input pressure of the medium may be 4 to 10 bar.

Fig. 1



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/001324

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61C3/025 B24C7/00 B01F1/00
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
A61C B24C B01F
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 810 999 A (BACHAND STEVEN P [US] ET AL) 22 September 1998 (1998-09-22) column 3, lines 23-38 figures 3,4	1-7
X	----- WO 2007/110710 A2 (CERAMATEC INC [US]; JOSHI ASHOK V [US]) 4 October 2007 (2007-10-04) paragraph [0010] paragraph [0029] paragraph [0037] figure 4	1,4
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X	----- US 4 978 297 A (VLOCK DAVID G) 18 December 1990 (1990-12-18) column 3, lines 58-65 figures 1,4	1,4
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Fortune, Bruce

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/001324

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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