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NL-2517 GK Den Haag (NL)(54) **Device for cleaning containers.**

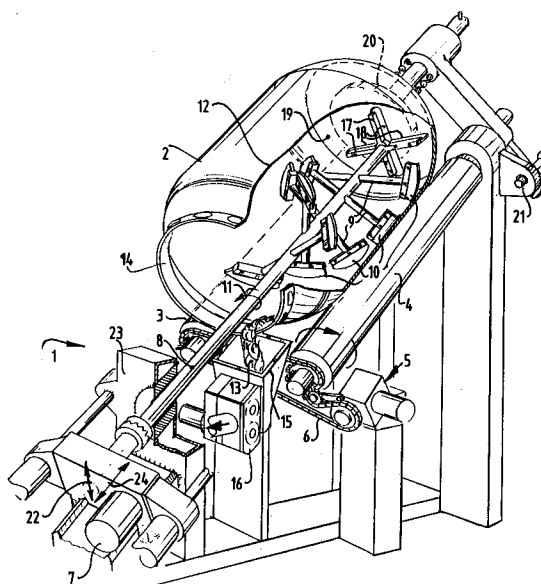
(57) A cleaning device (1) for cleaning rotation symmetrical vessels (2) used for viscous liquids which have for instance an at least partly cylindrical wall with a bottom (9) on the underside and a mouth (14) on the top, which cleaning device comprises:

positioning means (3,4) for positioning a vessel for cleaning such that the mouth faces downward and the axis of the vessel assumes an inclining position between a horizontal and vertical position;

drive means (5,6) for causing the vessel to rotate round its axis; and

scraping means (9,10,17,18) for scraping remaining liquid from the inside of the vessel during rotational driving of the vessel such that scraped-off liquid leaves the vessel substantially via the lowest point of the mouth;

which scraping means comprise a rotatably drivable shaft (8) which comprises at least one helically extending first flexible scraper element (10) which pushes liquid scraped off during rotational driving of the shaft in the direction of the mouth, which scraper element has an effective diameter which is smaller than the diameter of the mouth and extends through this mouth into the interior of a positioned vessel.

**EP 0 685 272 A1**

In order to clean vessels used for viscous liquids such as colour pastes and the like, use is normally made of a rinsing treatment. Used herefor is a relatively large amount of water which is sprayed with some force against the inner surface of a vessel. The water carries away a considerable part of the remaining viscous liquid. A considerable quantity of water is necessary for this rinsing treatment.

The object of the invention is to provide a cleaning device which can remove very effectively the remaining viscous liquid from vessels without rinsing water being necessary for this purpose. The advantage of such a device may then lie in the fact that it is possible with simple means to process the undiluted liquid in a waste processing plant or make it suitable for re-use, which is not possible in the case of the diluted liquids obtained with the rinsing treatment.

With a view to the above, the invention provides a cleaning device for cleaning rotation symmetrical vessels used for viscous liquids which have for instance an at least partly cylindrical wall with a bottom on the underside and a mouth on the top, which cleaning device comprises:

positioning means for positioning a vessel for cleaning such that the mouth faces downward and the axis of the vessel assumes an inclining position between a horizontal and vertical position;

drive means for causing the vessel to rotate round its axis; and

scraping means for scraping remaining liquid from the inside of the vessel during rotational driving of the vessel such that scraped-off liquid leaves the vessel substantially via the lowest point of the mouth;

which scraping means comprise a rotatably drivable shaft which comprises at least one helically extending first flexible scraper element which pushes liquid scraped off during rotational driving of the shaft in the direction of the mouth, which scraper element has an effective diameter which is smaller than the diameter of the mouth and extends through this mouth into the interior of a positioned vessel.

In a particular embodiment the device according to the invention has the special feature that the first scraper element is a brush.

A possibly more effective scraping off is realized with an embodiment in which the first scraper element is a blade whereof at least the active outer edge is flexible.

Use could be made of one scraper element which operates as an Archimedean helix. Two helical scraper elements can also be placed mutually interwoven.

An embodiment is recommended however in which a number of first scraper elements, all with

the same pitch direction, are supported axially overlapping by the shaft.

A determined embodiment has the special feature that the drive means comprise two rollers engaging on the outside of the vessel, at least one of which is drivable. Such rollers can be placed such that two rollers support the vessel.

In a preferred embodiment the device has the special feature that on its free end the shaft carries at least one substantially radially extending second flexible scraper element for scraping liquid from the bottom.

A particular embodiment comprises press-on means for pressing the vessel bottom to the second scraper element. An axial positioning of a vessel for cleaning is also achieved herewith by simple means. These press-on means can engage on the bottom for instance roughly in the axis of the vessel or be freely rotatable round this axis. In both cases damage to the outside of the vessel is effectively prevented.

Like the first scraper element, the second scraper element can also be a brush or be embodied as a blade, whereof at least the active outer edge is flexible.

A very practical preferred embodiment has the characteristic that the two rollers support the vessel rim and the scraping means press the vessel wall against these rollers. As noted above, two rollers, at least one of which is driven, can drive and support the vessel. The scraping means press the vessel wall against these rollers. A positive driving and a sufficient scraping force is hereby ensured with the simplest means.

The device preferably has the characteristic that the shaft is displaceable between a first inactive position in which a vessel can be placed over the scraping means and a second active position in which the scraping means are in contact with the vessel wall.

With this embodiment a vessel can be easily positioned and only after positioning of the vessel is the device set into the active state in which the drive means and the scraping means can be effectively operational.

A particular embodiment has the special feature that the shaft is axially displaceable. The scraping means, which extend over a predetermined axial length of the shaft, are hereby also able to clean larger vessels.

The invention will now be elucidated with reference to the annexed figure. This shows a partly broken away perspective view of a device according to the invention.

The figure shows a cleaning device 1 for cleaning rotation-symmetrical vessels used for viscous liquids. A positioned vessel is designated with 2.

The vessel 2 is supported by two driven rollers 3, 4. The drive comprises a motor with transmission 5 and a chain 6. The vessel 2 is hereby driven rotatably round its axis (not drawn).

A motor with transmission 7 drives a shaft 8 which carries a number of pins 9 on the ends of which are fixed rubber elastic scraper blades 10. The latter are all ordered axially overlapping with the same pitch direction. In the drawn active position the scraper blades 10 scrape over the inner surface of the wall 12 of the vessel during rotation 11 of shaft 8. Because the scraper blades have the same pitch orientation they operate due to their overlapping arrangement as an Archimedean screw, whereby scraped-off liquid 13 can leave the vessel via the lowest point of the mouth and can be collected in a funnel 15 to be drawn therefrom by a suction device 16.

Shaft 8 bears on its end four spokes 17 which carry rubber elastic scraper blades 18. These serve to scrape clean the inner surface of the bottom 19 of vessel 2.

It will be apparent that the rotation sense of the vessel, which is determined by the drive 5, is in principle random. It is however important that the pitch of scraper blades 10 corresponds with the rotation direction 11 for effective removal of scraped-off liquid.

A freely rotatable and spring-loaded pressing means 20 presses the vessel bottom 19 against the scraper blades 18. This enhances an effective scraping process. If desired, use of the pressing means can also be dispensed with. A locking 21 serves to place and hold pressing means 20 in position. It will be apparent that in this embodiment pressing means 20 must in preference be substantially rotatable round the axis of vessel 2.

Shaft 8 can be displaceable between a first inactive position in which vessel 2 can be placed over the scraping means 8, 9, 10, 17, 18, and a second active position as shown in the figure in which the scraper blades 10 are in contact with the vessel wall. The means suitable therefor are not shown in the figure but can be embodied for instance as hydraulic cylinder which can perform the said movement 22 between the two said positions by corresponding displacement of the frame 23, through which the motor with transmission 7 and shaft 8 are arranged.

Frame 23 is also movable as according to arrow 24 in the axial direction of shaft 8. The shaft 8 is hereby axially displaceable, whereby larger vessels can also be fully cleaned with a relatively smaller axial extension of the scraper blades 10. In this case the cleaning operation starts with scraping clean the bottom 19 with scraper blades 18, followed by a gradual axial displacement of shaft 8 downward to the left, while at the same time this

shaft 8 and the rollers 3, 4 are driven rotatably.

It will be apparent that many variants are possible within the scope of the invention. The rollers 3, 4 can for instance be provided on their underside with a widening, which widenings can serve as stop for the rim of the mouth 14. This can be particularly useful in an embodiment including the axial displacement 24. Other means can also be considered for blocking against downward sliding of the vessel 2. An (electro)magnet can for instance be employed instead of the pressing means 20. It will be apparent that such a holding means only acts with ferromagnetic bottoms.

Claims

1. Cleaning device for cleaning rotation symmetrical vessels used for viscous liquids which have for instance an at least partly cylindrical wall with a bottom on the underside and a mouth on the top, which cleaning device comprises:
 - positioning means for positioning a vessel for cleaning such that the mouth faces downward and the axis of the vessel assumes an inclining position between a horizontal and vertical position;
 - drive means for causing the vessel to rotate round its axis; and
 - scraping means for scraping remaining liquid from the inside of the vessel during rotational driving of the vessel such that scraped-off liquid leaves the vessel substantially via the lowest point of the mouth;
 - which scraping means comprise a rotatably drivable shaft which comprises at least one helically extending first flexible scraper element which pushes liquid scraped off during rotational driving of the shaft in the direction of the mouth, which scraper element has an effective diameter which is smaller than the diameter of the mouth and extends through this mouth into the interior of a positioned vessel.
2. Device as claimed in claim 1, wherein the first scraper element is a brush.
3. Device as claimed in claim 1, wherein the first scraper element is a blade whereof at least the active outer edge is flexible.
4. Device as claimed in claim 1, wherein a number of first scraper elements, all with the same pitch direction, are carried axially overlapping by the shaft.
5. Device as claimed in claim 1, wherein the drive means comprise two rollers engaging on the outside of the vessel, at least one of which is

drivable.

6. Device as claimed in claim 1, wherein on its free end the shaft carries at least one substantially radially extending second flexible scraper element for scraping liquid from the bottom. 5
7. Device as claimed in claim 6, comprising press-on means for pressing the vessel bottom to the second scraper element. 10
8. Device as claimed in claim 6, wherein the second scraper element is a brush.
9. Device as claimed in claim 6, wherein the second scraper element is a blade, whereof at least the active outer edge is flexible. 15
10. Device as claimed in claim 5, wherein the two rollers support the vessel rim and the scraping means press the vessel wall against these rollers. 20
11. Device as claimed in claim 1, wherein the shaft is displaceable between a first inactive position in which a vessel can be placed over the scraping means and a second active position in which the scraping means are in contact with the vessel wall. 25
12. Device as claimed in claim 1, wherein the shaft is axially displaceable. 30

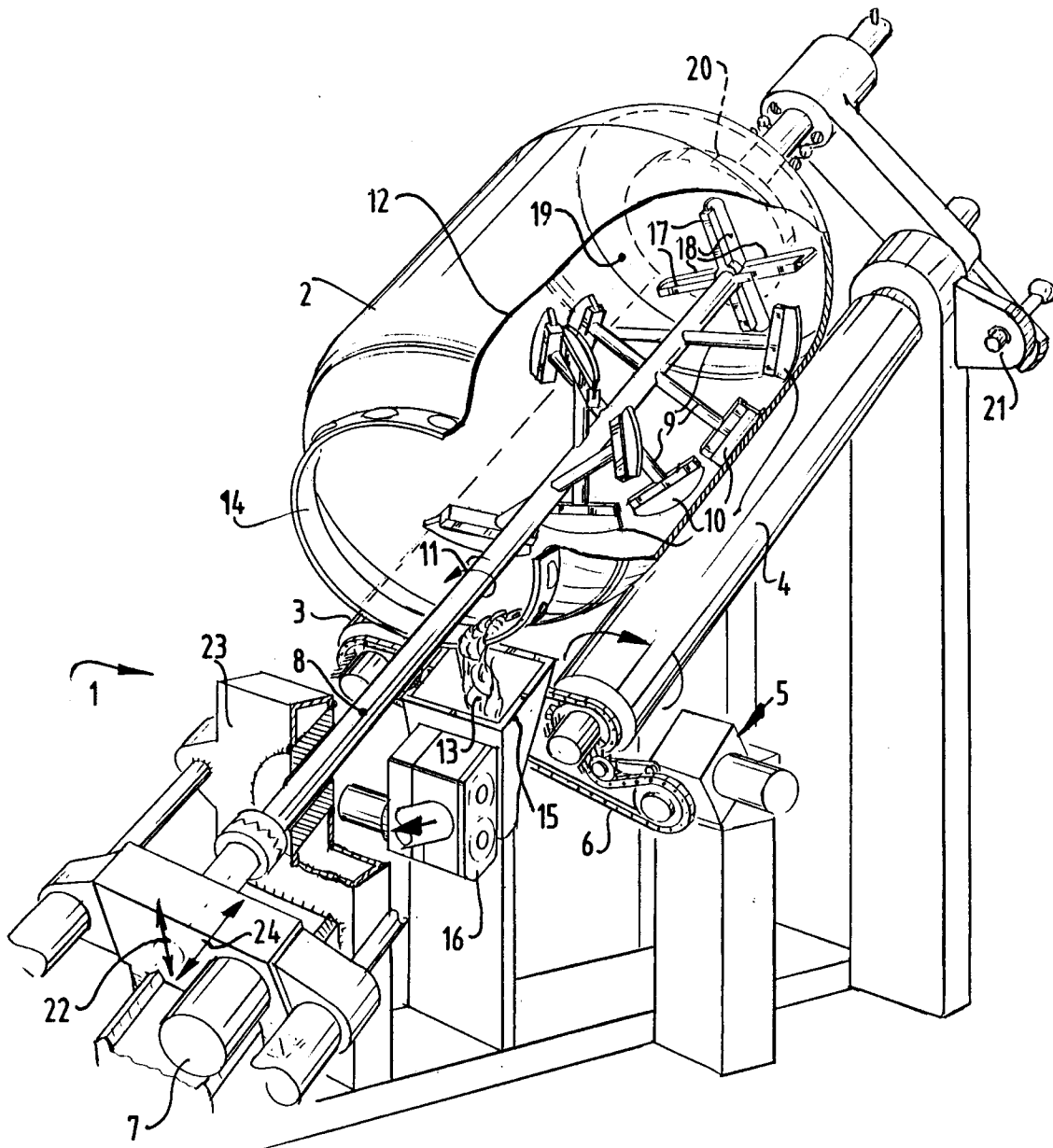
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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1569

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE-A-27 04 976 (R. BEER)	1,2,5-8, 10	B08B9/087
A	* the whole document *	3,4,9	
Y	DE-A-14 32 998 (W. LÖDIGE ET AL)	1,2,5-8, 10	
A	* page 8, line 8 - line 25 *	3,9	
A	CH-A-433 040 (MATOR AG,ANLAGEN FÜR MILCH-UND NAHRUNGSMITTELINDUSTRIE)	1	
	* column 1, line 23 - column 3, line 1 *		
A	DE-A-29 43 823 (H. GLAHN)	1	
	* page 11, line 2 - line 21 *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B08B A01J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 November 1994	Examiner Lilimpakis, E
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