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A request for correction of the claims has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) Brush-assisted removal of liquid residuals from transported can surfaces

(57) The invention describes a method for treating transported containers (D1,D2, Di, Dn) along a transportation line (100) and for substantially completely removing liquid from said transported containers from at least main portions of their outer surfaces, preferably the domes or the lid portions, wherein a conveyor (100) transports at least one row or line of containers, lined up and transported along a conveying direction with a conveying speed (v100);
at least a pair of removing units (50;51; 60,61) mechanically separate liquid from said at least main portions of said outer
surfaces (10a,10b;11a,11b) of said containers in a controlled, directed fashion toward a collector (62b,63b), allowing controlled or targeted return of the removed and collected liquid.

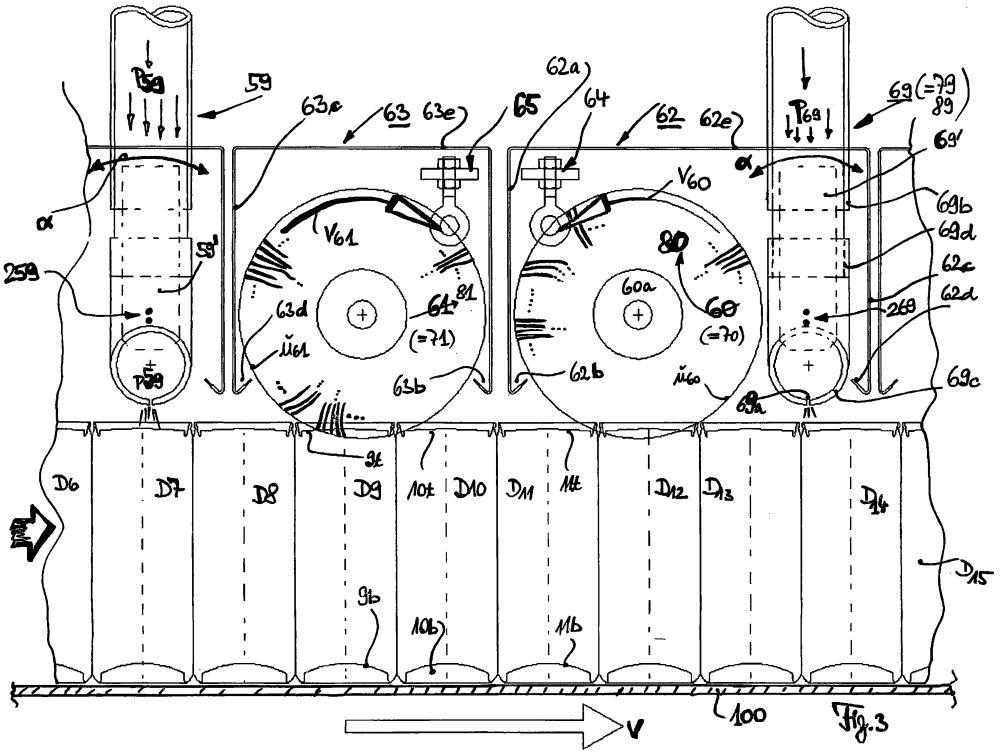

Fig.3

EP 1 719 562 A1

Description

[0001] The invention concerns a procedure (operating method) and a device (arrangement) for a cleaning, preferably final cleaning of one by one transported containers, namely already filled beverage cans.

[0002] In the food and beverage industry containers for beverages and food, e.g. beer and beverage cans, food preserves etc., are usually contaminated by residues of the filled product due to the filling and seaming procedure. Because of a following pasteurization and sterilization procedure or a direct procedure of washing, residues of water remain at the container that have to be removed by a drying process.

[0003] This is done both for hygienic and technical reasons.

[0004] Three essential reasons are:

- Application of ink to the container, e.g. production codes, a best before date or a refund code;
- Hygienic reasons since residual moisture supports the birth and growth of micro organisms;
- Formation of corrosion, since after the containers are packed, e.g. in foil, residual moisture leads to corrosion, which impairs the functional features and has a disadvantageous effect on the appearance of the containers.

[0005] It is state of the art to remove undesirable liquid on the transported containers in a more or less uncontrolled manner by means of an air jet, partly also a heated air jet, which is emitted from fans at high speed.

[0006] This method, however, is not completely convincing.

- Due to the strong air jet, the liquid is only pushed or rather strongly atomized in the reverse direction of the container flow, in spite of a correctly adjusted system.
- This results in residual moisture and contamination contained in the liquid that leads to corrosion of surfaces when the containers are packed in a non-dried matter.

[0007] The above mentioned residual moisture impairs the application (printing) of ink to the container, the basic hygienic requirements for a container, the appearance, the functionality and the shelf life as well as the safety in use of the container. Thus, there is an extensive need for improvements.

[0008] Another disadvantage is the lack of assurance of sensible use and consumption of resources with an eye to a long-term and sustainable protection of the environment, since according to the state of the art the above described procedure has a poor energetic efficiency and the removed liquid is not fed to a recycling system.

[0009] An object of this invention is to provide an efficient, cost-saving and environmentally sound system and procedure that meets the high quality requirements of a container in terms of the further procedure, e.g. flawless provision of a printing like "best before" date or shrink-wrapped packaging, storage in e.g. multipacks, as well as distribution and use. It should only minimally intervene in necessary procedure work flows since such intervention would lead to a reduction in efficiency and an increase in costs. For this reason, the procedure ought to be designed such that liquid is removed from the containers totally inline, the production speed should not have to be cut down, but should even be increased.

[0010] The invention presently claimed meets the above described requirements and solves problems that arise according to the current state of the art.

[0011] The invention covers the controlled mechanical separation and discharge of the liquid from the containers (Claim 1, Claim 2). This enables a targeted return to a recycling system (Claim 4).

[0012] The separation of the liquid from the transported containers is carried out both mechanically by brushing it away and through adhesion of the liquid to the brush hairs, the adhesion being caused by the adhesion forces between the brush hairs and the liquid as well as by the cohesion forces of the liquid that is carried out in the brush hairs (Claim 3).

[0013] A secondary unit, called stripper in the following, separates the liquid from the brush (Claim 6, Claim 7).

[0014] The efficiency of this system can be increased by support means of longitudinally extending air nozzles, the so-called "air knives", which move the liquid from complex geometries that are difficult to access for brush hairs into the rotating brushes in a targeted manner (Claim 5).

[0015] This stripping is achieved, on the one hand, through the centrifugal force of the rotating brush that moves the liquid to the outer end of the brush hairs and through a tension of the brush hairs that builds up and suddenly drops again on the stripper, on the other hand, thus counteracting the adhesion of the liquid to the brush hairs (Claim 3a).

[0016] An additional secondary unit as collector unit (catcher for expelled liquids) takes up the liquid removed from the brush by means of the stripper, to collect it and discharge it in a controlled manner, thus enabling return to a recycling system (Claim 8). A gapless chain of controlled transfer (take-up and removal) extends from the can to the recycling system (claim 4). This line enables the - removed and collected - liquid guided controlled to a recycling system, in said successive line of several controlled take-ups and discharges from the relevant outer surface portions to the recycling system. No non-controlled spaying or whirling in this line.

[0017] The procedure according to the invention is set up such that integration, maintenance and trouble-free operation of the predominantly mechanical system reduce the commissioning, repair and in particular the operating costs for the bottler through the high efficiency of

the simply designed, compact and resource-saving system with regard to production down time, energy consumption and recycling of the liquid inputted into the procedure.

[0018] Contrary to any conventional systems, which operate mainly with hot air, a mechanically touching force is used as controlled stripping of the liquid.

[0019] The goal is to meet the quality demands placed on the container with respect to complete removal of liquid from the container (Claim 1) as well as the substances in the liquid that impair the functional attributes: printability, hygiene, appearance and safety.

[0020] Preferably rotating forces are used (claim 3b), of which the combination among each other and in further combination with secondary units, such as strippers and walled catchers for expelled liquids, as well as supporting units such as air knives provide superior results in liquid take up and transfer.

[0021] The operating process applies mechanical, controlled targeted forces for complete removal of liquid from a moist surface of a container. Brushes in combination with secondary units, such as stripper and catcher for expelled liquids, collect the removed liquid. Several may be lined up (Claim 20, 23).

[0022] Possible arrangements of the brush hairs on the individual brush can be, for example, continuous, spiral-shaped, grouped or interrupted as well as in opposite directions to each other or running towards each other. The form of the brush hairs can be e.g. linear, bent or spiral-shaped. The number of brush hairs on each individual brush, as well as the number of brushes used is optionally determined. Among other things, it may depend on the transport speed and the number of containers.

[0023] The arrangement and combination respectively of brushes in relation to each other may be such that the axes of rotation of the brushes can run either parallel or perpendicularly to each other. Furthermore, the brushes can be arranged individually or on a modular basis. The rotational direction of the brushes can be the same or reverse. The brushes, in turn, can be mounted either longitudinally or crosswise or perpendicularly to the running direction of the containers.

[0024] The diameter of the brushes is to be selected according to the geometric features of the containers, the conveying system and the shape and arrangement of the brush hairs as well as depending on the combination of brushes among each other. The container transport can be carried out individually (single lane conveying system) or on a mass transport basis. The width of the conveyor belt and thus the width and length respectively of the brushes as well as their rotating speed are variable according to the requirements. Optionally, the containers may be rotated.

[0025] The secondary units are arranged such that they enhance (or support) the efficiency of the primary rotating units, such as brushes, in terms of a removal of the residual liquid from each dedicated surface portion of each can.

[0026] The design and arrangement of the supporting air knives have been selected such that they move the liquid, also from complex geometries that are difficult to access for brush hairs (from bags or undercuts), into the rotating brushes in a targeted manner, i.e. for providing an effective transport of the liquid away from the surface of the container and into the brushes (secondary uptake), for example through whirling, which reinforces the effect of liquid uptake through the rotating brushes themselves (direct primary uptake). Because of the rotation of the brushes the uptaken liquid is lead away from the container in a controlled manner. The stripper ensures separation of the liquid from the brushes and the catcher provides for collection, discharge and recycling of the separated liquid.

[0027] The position of the axis of the brushes in relation to the container is adjustable and lockable. A mechanical and electrical control system provides continuous and failure-free container transport procedure concerning for example fallen containers.

[0028] The direction of our flow from the supporting air knifes may also be variable, to enhance the controlled manner of liquid whirling into the rotating brushes and not just "away from the presently blown surface". A variation may be done by tilting and adjusting the lateral axis of the pressure operated supporting unit.

[0029] A detailed description of the embodiments of the invention, using enclosed graphic representations, is to enhance the inventions understanding.

Figure 1 is a lateral view on the conveyor line 100, from A to B, having feed means 100, e.g. a table or a transport belt.

Figure 2 is a view in transport direction v100 from the input end A onto the first brush 51.

Figure 3 is an enlarged part of figure 1, explaining the operation of two brush units 60,61, an air knife 69 and the stripper 64 and collector unit (catcher) 62. This corresponds to units 89, further downstream of the conveyer line 100. The sequence of reference signs is to be transferred here (plus 20, 89 for 69).

[0030] The process uses the mechanical, controlled and targeted action for a substantially complete removal of liquid from a moist area of each transported container by PRIMARY means of rotating brushes 50,51; 60,61; 70,71; 80,81 in combination with SECONDARY units, such as stripper 64,65 and "catchers for expelled liquids", said catchers 62,63 each having a case shape, open to the bottom and providing collect and flow channels 62b, 63b to guide the collected fluid in controlled manner to a recycling station. "Air knives" 89 (to be read from 69) form SUPPORTING units.

[0031] The rotating brushes, e.g. 60,61 are shaped

and arranged in a special manner, shown in the drawings.

[0032] Figure 3 displays an excerpt from **figure 1** and is shown in more detail. The corresponding description refers to the pair of rotating brushes 60,61 and an associated secondary pressure operated unit 69 (with respect to brush 60), both contained in a secondary unit 62 as catcher and a further secondary unit 64 as stripper, make up a "functional group" of units, of which several may be lined up along the transport line of containers, to be determined by a user.

[0033] What is described in the following with respect to 60,61 is to be read and understood as to refer to brushes 80 and 81 in Figure 1. The unit 89 is detachably mounted on a seat 89' by mounting aids 289, as well as the unit 69 is detachably mounted on a seat 69' by mounting aids 269. The unit 69, actually to be understood as 89, is to be mounted at seat 89'. Please read the reference signs as +20 in this repect, when viewing at figure 3: brush 60 is brush 80; brush 61 is brush 81. Correspondingly the transported cans below the brushes are D22, D23 and D24 (instead of D9, D10 and D11) and corresponding bottom 22b, 23b, and 24b.

[0034] In the enlarged figure 3 containers D6 to D15 (read as D19 to D28) are shown as a part of the transported container queue D1 to Dn of figure 1. The brushes 60,61 (read as 80,81) show, where the enlargement of figure 3 has been taken, still showing the places 59,69 for the secondary supporting air knifes empty, to be filled or mounted with units, corresponding to those units 59,69 as shown in figure 3 and units 79,89 shown in figure 1 at the other functional groups further downstream the transported container queue.

[0035] Thus, the explanation of the functional group 62,63 and air knife 69 (read as 82,83 and air-knife 89, placed at seat 89') is regarded sufficient to explain the four rowed up (de-liquefying) groups of functions, having - as a last functional group - a single brush 90, which corresponds to brush 61, catcher 63, stripper 65 and lateral wall 63c with collector 63d, for collecting and conveying the liquid in targeted and directed manner towards a recycling unit which is not displayed separately.

[0036] The arrangement of the brush hairs of e.g. brush 60, 70 or 80 on an individual brush carrier 60a (read as 80a) can be, for example, continuous, spiral-shaped, grouped or interrupted. The circumference u60 shows the extension in length direction of the brush hairs. The form of the brush hairs can be e.g. linear, bent or spiral-shaped. The number of brush hairs on each individual brush is variable. Among other things, it may be a function of the transport speed and the number of containers.

[0037] Two cooperating brushes 60,61 may operate in opposite directions V_{60}, V_{61} to each other or running towards each other. The number of brushes used for cleaning is variable. Among other things, it may depend on the transport speed and the number of containers to clean.

[0038] The arrangement and combination of brushes in relation to each other may be such that the axes of rotation of the brushes can run either parallel or perpendicularly to each other. Furthermore, the brushes can be arranged individually or on a modular basis. The rotational direction of the brushes can be the same or reverse (inverse).

[0039] The brushes can be mounted either longitudinally or crosswise or perpendicularly to the transport direction v100 of the containers along the conveyor 100. The corresponding orientation would then be accorded to the catcher housing as well. The axis of this housing and the rotation axis of the correspondingly housed brush is co-extending (parallel).

[0040] The diameter of the brushes is subject to the geometric features of the container surfaces to be defluided, the conveying system and the shape and arrangement of the brush hairs as well as depending on the combination of brushes among each other.

[0041] Container transport can be carried out individually (single lane conveying system) or on a mass transport basis, see figure 2 at the output. The width of the conveyor belt 100 and thus the width and length of the brushes as well as their rotating speed v60, v61 are variable according to the settings of a motor 10 and a drive belt 20. Optionally the containers can be set into rotation by a lateral belt or roller system 21 touching their side walls.

[0042] The supporting units are arranged to enhance the efficiency of the brushes in terms of removal of the liquid residuals.

[0043] *Remark: What is shown as 69 for placing at mounting seat 69', is to be understood as 89 and seat 89'. This "auto transformation" of related reference signs +20 concerns for the fourth functional unit, explained in terms of the second functional unit, and is for legibility to be inherently incorporated into the reading of the following.*

(a) A design and arrangement of "air knives" is corresponding to e.g. air knife 69, having a body 69b, 69d, an air pressure P69 inside, and a nozzle 69c, 69a. The shape and function are selected for moving liquid drops, remainders or portions. Special effect is achieved when removing liquid from complex geometries of surfaces, which are difficult to access for the hairs of the brushes 61,60. The longitudinally extended stream of air directs the liquid into the rotating brush 60 in a targeted manner.

(b) This provides for effective transport of the liquid away from the surface of the container and into the brush hairs, for example through (controlled) whirling, which enhances the effect of liquid uptake through the brush itself (direct uptake). The liquid taken up is conveyed away from the container in a controlled (rotating, but predetermined directed) manner through the rotation of the brushes, towards a corresponding stripper 64.

[0044] The secondary units are arranged to enhance the efficiency of the brushes in terms of controlled removal of the liquid residuals.

(c) Each Stripper e.g. device 64 provides for separation of the rotating liquid from the brush hairs and a corresponding catcher 62, with the front wall 62a and the channel 62b provides for collection, discharge and recycling of the can-separated liquid; shown for brush 60, but in same manner for brush 61, upstream of the brush 60.
This "group of functions", an individual brush, an associated individual Stripper device 64 inside a walled catcher housing having the corresponding discharge channel, is in the embodiment lined up several times along the transport line (the belt 100 or table).

(d) The position of each axis of each brush relative to the transported containers is adjustable and lockable relative to a vertical holding support frame or bars 32 on a mounting frame 30,31 or other suitable holding structure. A mechanical and electrical control system (not displayed) enables a continuous and failure-free container transportation process concerning e.g. any fallen container.
The mounting frame 30,31 has extended horizontal and vertical parts, mounted together to hold the brushes 50 to 90 at their adjusted height above the transport line 100.

[0045] The operation of brush 60 applies mutatis mutandis to the attributed brush 61, rotated in an opposite direction v_{61} and having brush outer circumference u61, stripper 65 and collector 63b at the bottom of wall segment 63a of neighboured catcher housing 63.

[0046] The supporting units "air knifes" 69,59,79 and 89 may be designed to be adjustable within the housing 62,63, or any other corresponding secondary "catcher" unit".

[0047] The tiling adjustment is around a mounting place 269 for pressure operated air knife 69, mounting place 259 for pressure operated air knife 59 or/and all the other eventually present air knifes provided in the lined up units of figure 1. The mounting place 269 is - as the other places - within the secondary unit "catcher housing".

[0048] Tilting of each air pressure operated knife (adjusting the angle α), results in a different oriented flow-out of line shaped air stream from the nozzle 69a.

[0049] Each nozzle may in an example be designed as slit in a longitudinal extending tube, provided at the bottom of two aligned vertically oriented hollow hose shaped bodies 69b,69d, guiding the pressure P69 towards the horizontally extending tube 69c. As the tube 69c is fixed on the lower body 69d, the change of angle α of the axis of the air knife results in a change of flow-out of air from the slit 69a.

[0050] The length of the slit 69a corresponds to the width of the transport line, when viewed from figure 2 form the outlet of the conveyer line 100. Effective is the line shape of the air outlet. It extends laterally over all transported cans.

[0051] Vertical adjusting of each air pressure operated knife (adjusting the height over the cans), results in a different oriented flow-out of line shaped air stream from the slit nozzle 69a.

[0052] Tilting and vertical adjusting is done at the mounting places 269, 289 for the corresponding air knife 69, 89. These places are provides in a lower portion of the seat 69', 89' for each of these SUPPORTING units.

[0053] Along the conveyer line, vertical bars 32 point down from an overall base frame which holds the arrangement shown in figure 1 from the top. As a corresponding guidance the belt 20 shown in figure 2, corresponds to belt 20 of figure 1, having travelling speed V_{20} to drive the brushes 51, 50, ... until brush 90, arranged along the transport line. This driving belt 20 is shown zic-zac-shaped when driving each brush with corresponding pulley to result in the rotation of these brushes, as shown by corresponding arrows, e.g. arrows v_{61}, v_{60} in figure 3. The belt has been omitted from figure 3 to allow a view into the brush operating system.

[0054] The depth in figures 1, 3 corresponds to the width w of the conveying line and is one option to provide more cans per hour to the de-liquefying unit. In longitudinal direction v100, the cans are rowed up starting from D1, D2 to Di until the last can Dn is reached in the row near the exit B of the de-liquefying machine.

[0055] Orthogonal to the transport direction 100 the cans are organised as D1a, D1b, D1x, D1y, giving a specific number of cans in lateral direction, which are simultaneously transported. The lateral width w of the transport belt 100 roughly defines the width of the brushes 51,52, ... operating above the cans and also defines the width of the secondary units, such as catchers, as housings for the brushes, strippers as lateral bars, to enforce detachment of liquid drops transported by the brushes, and a collector near a bottom end of a wall of each catcher, to guide and deliver the collected liquid towards a non-displayed recycling unit.

[0056] In figure 3, thus, only a lateral view is given, showing at least one longitudinal line of cans D6 to D15, to explain the function and transport way of liquid, taken of the tops of the cans, which are already closed, and containing, for example, beverage. Each can stands on its bottom end which is in figure 1 shown as a dome-shaped bottom end 10b for can 10, 11 b for can 11 and 9b for can 9. Correspondingly, the top of each of the named cans D9 to D11 are named lids 9t, 10t and 11t. Liquid is to be taken off from the tops of the cans, and in figure 3, the shape and orientation of the brushes, during rotation is sketched with only their outer ends along the respective circumference u60, u61. The brushes are deformed in places where they meet obstacles, like the seam end of the top of each can. An obstacle is also met at the stripper 65,64, where e.g. a bar of round shape is

hit, to strike off the liquid droplets which are held at and/or between the bristles of the brush.

[0057] The brushes could also counteract with the dome-portions 11b, 10b, 9b and all other domes of the transported cans, when they are transported upside-down.

[0058] The rotation direction of the first brush 51, where the containers enter the de-liquefying machine is provided in a direction to not tilt the can into the machine, but to exert force onto the incoming row of cans which is taken up by all cans, following the first can. This first can (container) may in lateral direction be extended to a group of cans, as shown in figure 2. When exiting the machine near part B, the rotation of the final brush 90 also is arranged in a way to not tilt and topple the can exiting the machine. The force also is provided in a direction against the upcoming stream of cans. By this organisation of forces, the row of cans is supported to stand reliably upright.

[0059] The specific shapes of brushes 51 to 90 can be one or more of the following organisation of bristles:

- a spiral line of brush hairs;
- a substantial continuous distribution along axis and circumference;
- grouped segments, having several spaced groups along the axis and each group having a substantial continuous distribution along axis and circumference;
- a group of individual brushes, each one rotating on its own.

[0060] The air knifes 69, and the other ones 59, 79, 89 are provided as said horizontal oriented tube, explained with respect to device 69. The tube 69c has said downward directed slot 69a, facing the upper lid ends of the transported cans when said lids are to be de-liquefied. The slit 69a is in longitudinal direction shorter than the full length of the tube 69c which itself is closed at one end and is guided to an axial directed hose 69b, 69d for supplying with pressurized air. The intake of the tube 69c on the opposite end is shown in phantom in figure 3.

[0061] The width of the nozzle slit 69a is small compared to the diameter of the tube 69c and small with respect to the diameter of the lids 10t, which are to receive a bundled line stream of air, to allow said liquid whirling into the brushes of the rotating removal unit 60.

[0062] Adjusting of these pressure operated secondary supporting unit is done by rotation around an axis 269 (corresponding axis 259 for air knife 59), which extends in parallel to the extension of the tube 69b, but still is within the secondary catching unit 62, having side walls 62e, 62c and 62a also closed axially which walls are not displayed in figure 3. On the bottom of each vertical oriented wall (crossing the conveyor transport line) is a V-shaped channel 62b, 62d, provided as folded up bottom end of both vertical walls.

[0063] One of those walls, near to the stripping unit 64 is provided as collecting and guiding surface for detached liquid from said bristles, running along said guiding wall into said V-shaped channel 62b.

Claims

1. Method for treating transported containers (D1,D2, Di, Dn) along a transportation line (100) and for substantially completely removing liquid from said transported containers from at least main portions of their outer surfaces, preferably the domes or the lid portions, wherein

(i) a conveyor (100) transports at least one row or line of containers, lined up and transported along a conveying direction with a conveying speed (v100);
(ii) at least a pair of removing units (50;51; 60,61) mechanically separate liquid from said at least main portions of said outer surfaces (10a,10b; 11a,11b) of said containers in a controlled, directed fashion toward a collector (62b,63b), allowing controlled or targeted return of the removed and collected liquid.

2. Method for treating and transporting containers (D1, Dn) along a transportation line (100), and for removing liquid (residuals) from said transported containers (D10, D11) at relevant outer surface portions of the containers, wherein

(i) a conveyor (100) continuously transports containers with a conveying speed (v100) along a conveying direction;
(ii) at least one rotating brush (60,61;80,81) as a primary removing unit having bristle portions mechanically touches the relevant outer surface portions with the bristle portions, wherein the at least one brush rotates in a first direction (v60,v61,v80), allowing a controlled transport of the liquid (residuals) removed by the rotation of and from the bristle portions, into a collector channel (62b,63b) of an associated receiving unit (62,63).

3. Method of claims 1 or 2, wherein the removing unit is a brush (60,60a,61,61 a) whose rotation axis is **other than parallel** to said conveying direction or speed (v100), preferably perpendicular.

3a. Method of claims 1 or 2, wherein the removing unit (60) is a brush with distributed hairs along its circumference (u60) for providing adhesion forces for liquid residuals and cohesion forces for other liquid residuals between neighboured brush hairs.
3b. Method of claims 1 or 2, wherein the removing unit (60) is rotating, having an axis of rotation.

3c. Method of claims 1 or 2, wherein the at least one removing unit (60) is the **primary unit**, having an axis of rotation.

4. Method of claim 1 or 2, wherein the - controlled removed and collected - liquid is guided to a recycling system, in a successive line of take-ups and controlled discharges from the relevant outer surface portions to the recycling system.

5. Method of claim 1 or 2, wherein at least one air knife (69,59,79) **as supporting** unit supports the removal of liquid, towards and into the at least one brush (60,61) as primary removing unit.

6. Method of claim 1 or 2, wherein at least one separator unit (64, 65) separates the removed liquid from the at last one brush (60) as removing unit, preferably as two spaced apart bars, oriented in parallel to the axes of the two brushes.

7. Method of claim 6, wherein said further unit (64, 65) is a liquid separator or stripper, adapted to at least touch the rotating bristles of the at least one brush (60,61).

8. Method according to claim 6, wherein a returning unit (62, 63) is case or box shaped and comprises the collector, adapted to catch removed liquid from said separator unit (64,65), to guide the received liquid into a recycling system.

9. Method of claim 1 or 2, wherein each brush as removing unit (60,61) is provided with one of

- a spiral line of brush hairs;
- a substantially continuous distribution along axis and circumference;
- grouped segments, having several spaced groups along the axis and each group having a substantial continuous distribution along axis and circumference;
- a group of individual brushes, each one rotating on its own.

10. Apparatus for performing the method according to one of claims 1 and claim 2, having

(a) a longitudinally extending transport device (100) for conveying at least a row or a group of containers (D1,Dn,D1a,D1x) with a conveying speed (v100);
(b) at least one removing unit (60,61;80,81) treating the containers by mechanically touching them, to remove moisture residues from at least one coherent portion of each outer surface of each conveyed container.

11. Method or apparatus of one of the previous claims, wherein the containers (D1) are rotated (21) during transporting them.

12. Apparatus of claim 10, wherein along a length of the transport device at least three removing units (50;51;90) are provided, adapted to act from above on transported cans.

13. Apparatus of claim 10 or 12, wherein each removing unit is housed in a walled catcher unit (62,63,82,83), open to the bottom, and each walled catcher unit having at least one channel (62b,63b) as a collector, extending in parallel with an axis of said removing unit.

14. Apparatus of claim 13, wherein a longitudinally extending stripping device for liquid (64,65,84,85) extends in parallel with said channel (62b,63b,82b, 83b).

15. Apparatus of claim 14, wherein the stripper device is near to said channel (65,63b).

15. Apparatus of claim 10, wherein the longitudinally extending stripping device for liquid (64,65,84,85) extends in parallel with said collector (62b,63b,82b, 83b).

16. Apparatus of claim 10, wherein a pressure operated secondary unit (69,89,79) is associated to at least one removing unit (60,80,70), for expelling liquid residues from can surface portions, and direct them - at least to a large extent - into the rotating removing unit (60,61).

17. Apparatus of claim 10, wherein the at least one removing unit is operable to rotate above the transported cans.

18. Apparatus of claim 10, wherein a rotating **primary unit** (60,80) as removing unit is housed together with a **supporting** pressure operated unit (69,89) in a **secondary** walled catcher unit (62,82), open to the bottom.

19. Apparatus of claim 18, wherein a **further secondary** unit (84,85) for stripping liquid from the rotating primary unit (80) is housed in said walled catcher (82).

20. Apparatus of claim 18 or 19, wherein several of said functional groups are lined up above said transport device (100), each having a primary rotating removing unit (60,80) and at least two secondary removing units (64,84,62b,82b).

21. Apparatus of claim 10, wherein a rotating **prima-**

ry unit (60,80) as removing unit is housed in a secondary walled catcher unit (62,82), open to the bottom, and a further secondary unit (84,85) is housed in said walled catcher (82), for stripping liquid from the rotating primary unit (80), to form a first de-liquefying functional group.

22. Apparatus of claim 21, wherein several of said functional groups are lined up above said transport device (100), each having a primary rotating removing unit (60,80) and at least two secondary removing units (64,84,62b,82b).

23. Apparatus of claim 22, wherein a pressurised air flow operated **supporting unit** (69,89) is associated to at least one of said de-liquefying functional groups.

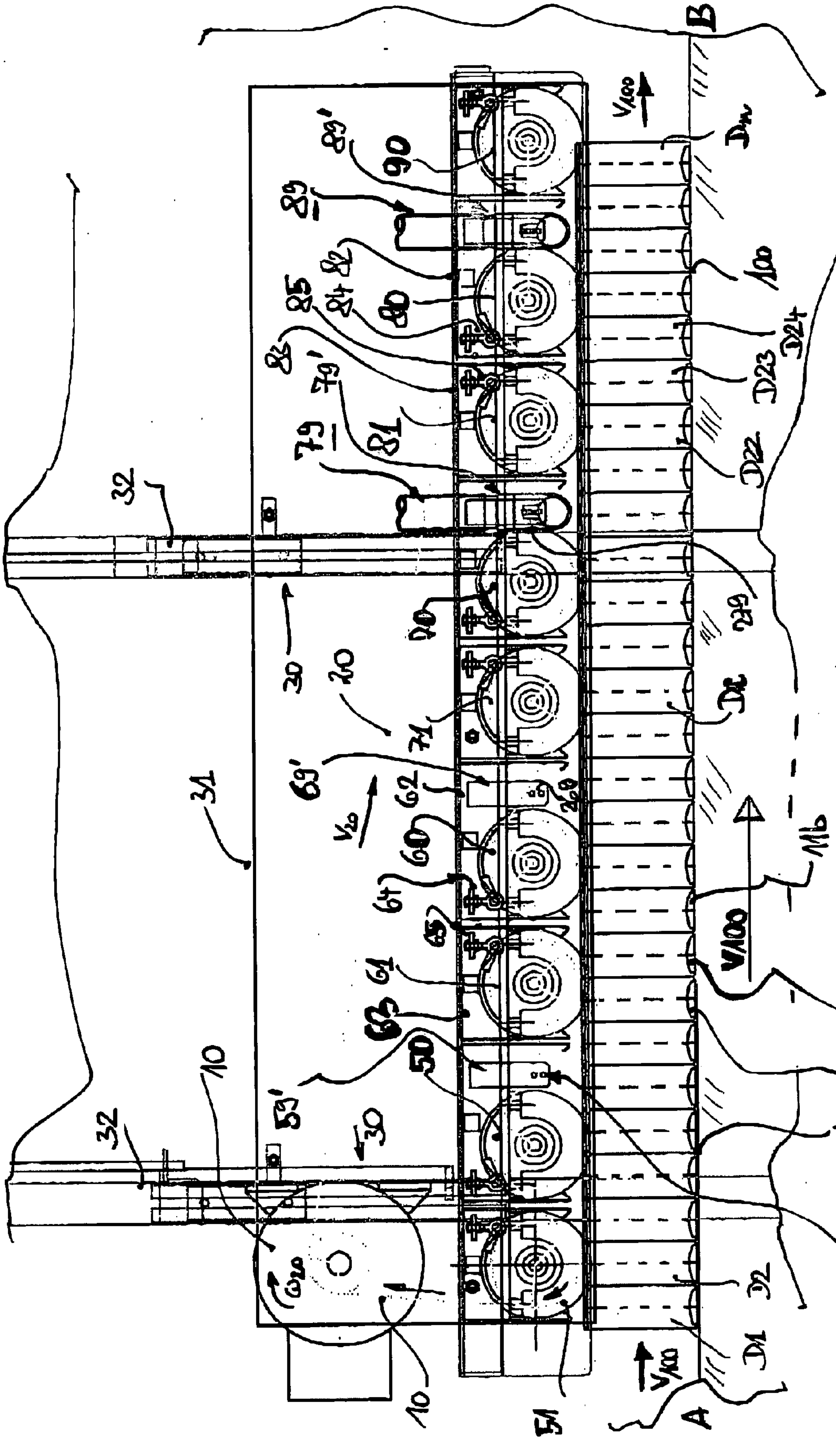

Fig. 1

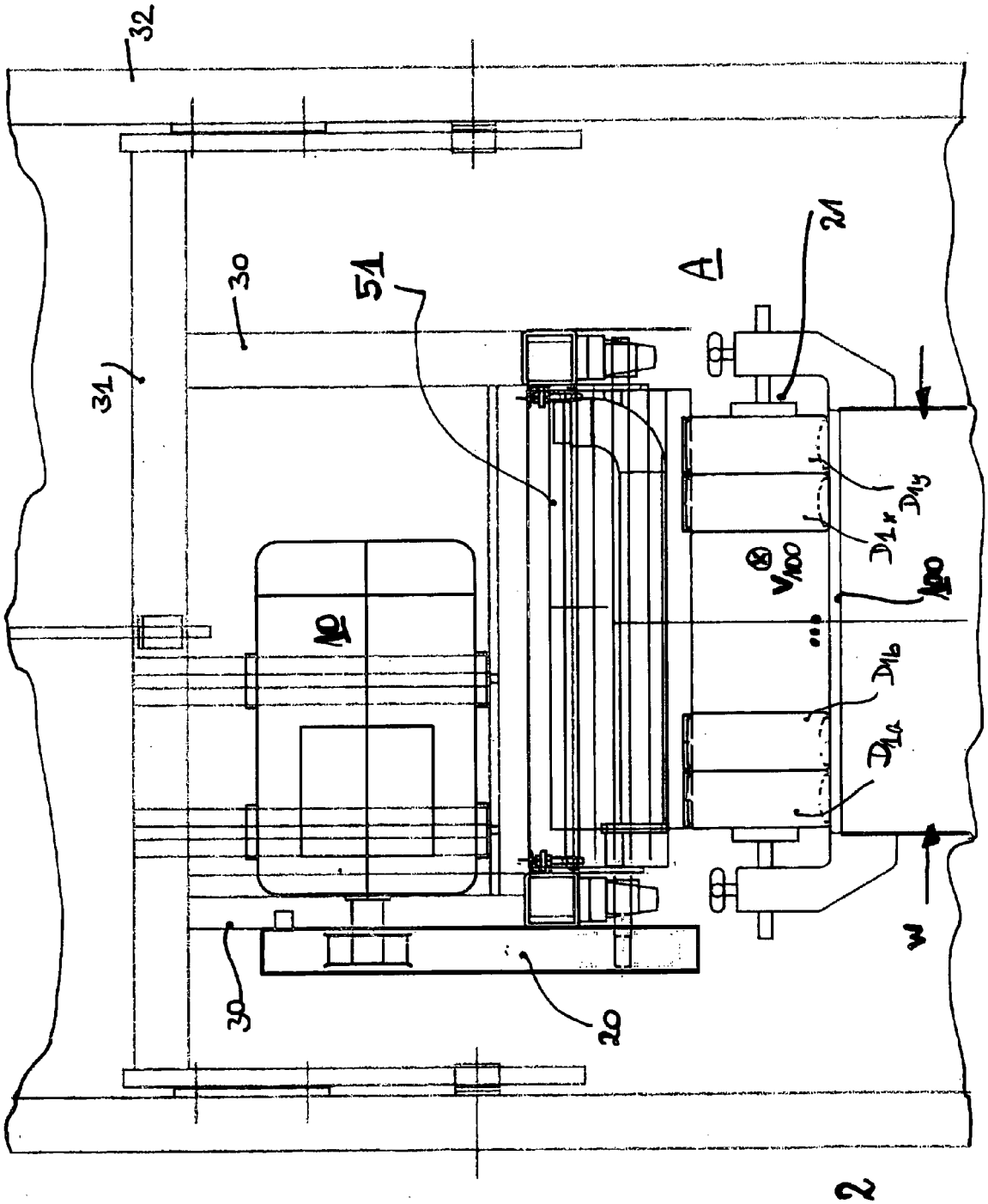

Fig. 2

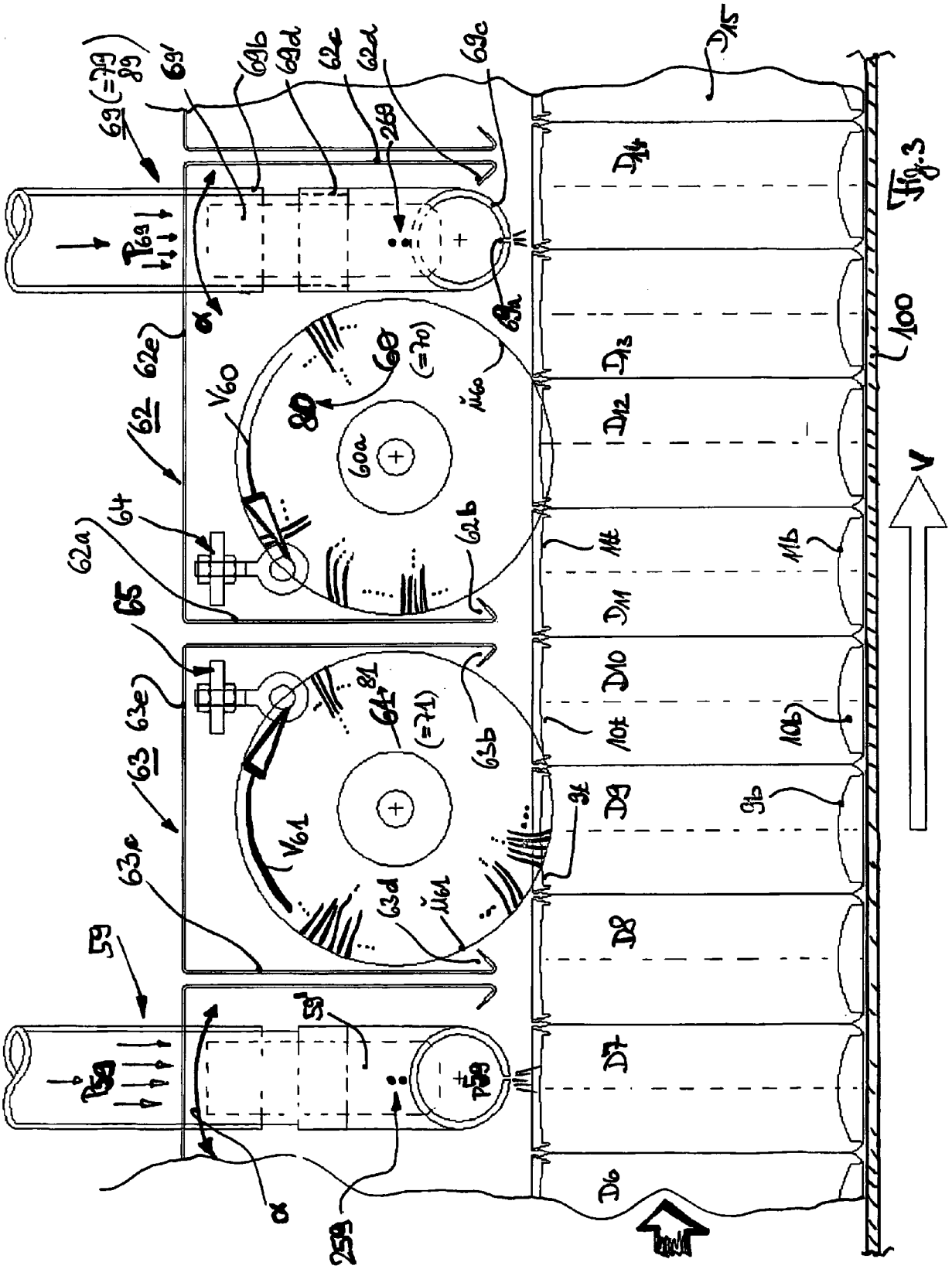

Fig.3

Europäisches Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung
EP 05 00 8326

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int.Cl.7)
X Y A	US 2 504 932 A (KOLPER CHARLES J ET AL) 18. April 1950 (1950-04-18) * Spalte 1, Zeile 1 - Spalte 5, Zeile 75 * * Abbildungen * -----	1-3, 9-12,17, 25-27 5-8,16, 21 13,18,22	B08B9/36 F26B15/18 F26B5/14
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B08B
F26B

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt

Recherchenort	Abschlußdatum der Recherche	Prüfer
Den Haag	8. November 2005	Plontz, N

KATEGORIE DER GENANNTEN DOKUMENTE

X : von besonderer Bedeutung allein betrachtet
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4

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ANHANG ZUM EUROPÄISCHEN RECHERCHENBERICHT ÜBER DIE EUROPÄISCHE PATENTANMELDUNG NR.

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In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten europäischen Recherchenbericht angeführten Patentdokumente angegeben.
Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

08-11-2005

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Für nähere Einzelheiten zu diesem Anhang : siehe Amtsblatt des Europäischen Patentamts, Nr.12/82