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(54) Machine for washing articles, in particular metallic articles and components for industrial use

(57) Machine (M) for washing articles, in particular metallic articles and/or components for industrial use includes a support structure (ST) defining an inner washing chamber (C) equipped with a opening and closing liquid-tight door (P), which allows the articles and/or components (A) to be introduced into the washing chamber and which allows the articles and/or components (A) to be positioned into to suitable containment means (B). The washing chamber (C) includes, in its lower part, a predetermined quantity of washing and de-

contamination liquid, thus defining a withdrawing reservoir (S). The machine (M) includes at least one re-circulation hydraulic group (10) situated inside the washing chamber (C) in a region corresponding to the withdrawing reservoir (S) and aimed at withdrawing continuously and in a predetermined way, prefixed quantities of the liquid from said reservoir (S) and at directing it and spraying it, by directing means (U), toward the articles and/or components (A) in order to wash and decontaminate the latter.

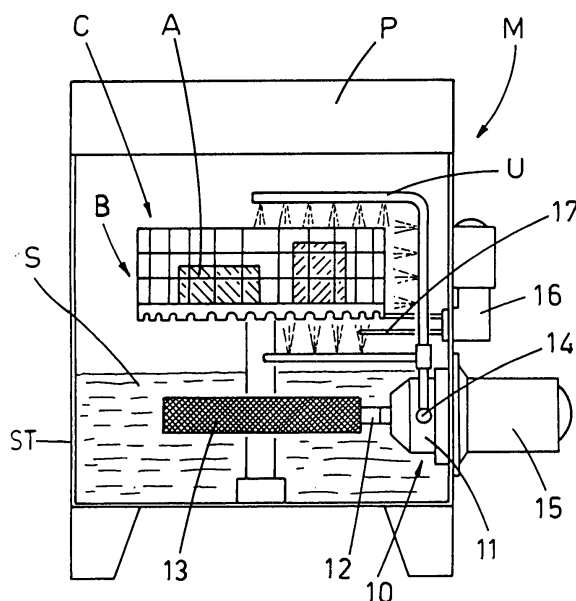


FIG. 1

Description

[0001] The present invention relates to machines and apparatuses for washing articles or mechanical components for industrial use, by using a suitable cleansing liquid.

[0002] Known machines for washing and decontaminating articles or mechanical components for industrial use include a support structure with an inner washing chamber having an upper opening/closing door, which allows the articles and components to be subjected to the washing procedure, to be introduced into the washing chamber.

[0003] In some types of known machines, the washing chamber defines directly in its lower region a reservoir or basin for washing liquid, which is composed of water containing suitable dissolved detergent substances (e.g. biodegradable alkaline, non-toxic detergents, etc.). The washing chamber also includes means for housing the articles to be subjected to the washing cycle, as well as means for directing and spraying jets of the deterging liquid directly onto the articles to be treated and decontaminated.

[0004] The containment means usually include a net basket, while the means for directing and spraying the deterging liquid and for decontamination include a series of pipes, communicating with one another, winding around the basket and equipped with suitable nozzles.

[0005] The washing machine includes also, fastened to one of the lateral walls on the outside, at least one re-circulation hydraulic pump and at least one motor reducer group, both controlled by of washing cycles control unit.

[0006] The re-circulation hydraulic pump is aimed at continuously withdrawing, via a relative suction line situated inside the basin of the washing chamber, the deterging liquid and at directing it into the above mentioned pipes via a relative delivery line, likewise situated inside the washing chamber, in order to spray jets of deterging and decontamination liquid through the relative nozzles onto the articles situated inside the basket.

[0007] A suitable filtering device, connected to the suction line at the relative inlet section, is aimed at avoiding the suction of residuals removed from the articles during the cycles of washing and decontamination.

[0008] The above mentioned motor reducer group is aimed at driving the basket, by suitable transmission means, into rotation on its vertical axis: this allows to obtain a uniform washing of all the articles contained in the basket, at each complete rotation thereof.

[0009] In this type of machine, the detergent liquid is made recirculate and is sprayed onto the articles and components to be treated many times; consequently, after many cycles, the same liquid can contain, dissolved or immersed therein, residuals removed from the components, oxidizing substances, oily substances, etc.

[0010] Therefore, the washing chamber becomes inevitably a highly oxidizing environment; consequently,

the elements contained therein and connected thereto, like the pipes for spraying the liquid, the relative nozzles, the basket, but particularly the suction line and the delivery line controlled by the hydraulic pump, and the pump itself, are subjected, in time, to oxidizing processes, and thus to the rust formation.

[0011] Consequently, it is inevitable, in time, the necessity of substituting the above mentioned elements.

[0012] The substitution operation is surely more difficult as far as the suction line and the delivery line are concerned.

[0013] The substitution difficulties result undoubtedly from the fact that the re-circulation hydraulic pump is completely outside the washing chamber, while the relative lines, suction and delivery, respectively, must be situated inside the chamber.

[0014] Consequently, in order to connect correctly the hydraulic pump with the relative suction and delivery lines through the lateral wall of the washing chamber, it is necessary to use fittings, hydraulic joints, sealing means, etc., which are also subjected to the oxidizing action of the contaminated liquid, and consequently, inevitably to the rust formation.

[0015] On the other side, making fittings, hydraulic joints, sealing means, etc., of anti-oxidizing material, such as stainless steel, is not feasible and convenient due to high costs of this material, costs which are much out of proportion to the total cost of the whole washing machine.

[0016] Another problem of the known machines, likewise deriving directly from the situating of the re-circulation hydraulic pump completely outside of the washing chamber, is to ensure, in time, a perfect and suitable reciprocal tightness between all the elements of the re-circulation hydraulic system composed of: suction line - connection and sealing means - (washing chamber wall) - hydraulic pump - (washing chamber wall) - connection and sealing means - delivery line.

[0017] This necessity results undoubtedly in design and production problems, which are not to be neglected.

[0018] The object of the present invention is to propose a machine for washing articles, in particular metallic articles and components for industrial use, which allows to avoid the previously described drawbacks of the prior art.

[0019] More precisely, the object of the present invention is to propose a machine for washing articles, which allows to protect each element of the re-circulation hydraulic system from the oxidation phenomenon and rust formation, thus avoiding necessity of their substitution and maintaining also the production costs substantially low.

[0020] Another object of the present invention is to propose a washing machine, which reduces, in the design and production steps, the problems deriving from the connection tightness between, respectively, the suction and delivery lines, and the hydraulic pump.

[0021] The above mentioned objects are obtained in

accordance with the contents of the claims.

[0022] The characteristic features of the present invention will be pointed out in the following description of preferred embodiments of a machine for washing articles, in particular metallic articles and/or components for industrial use, with reference to the enclosed drawings, in which:

- Figure 1 is a schematic front section view, taken along a vertical plane, of the washing machine according to the present invention;
- Figure 2 and Figure 3 are schematic and partial front section views, of respectively two possible and interesting variants of the washing machine according to the present invention.

[0023] The machine for washing articles, in particular metallic articles and/or components for industrial use, proposed by the present invention, has been indicated in the enclosed figures with the reference M.

[0024] The machine M includes a support structure ST, which defines, in its inside, a washing chamber C and is equipped, on the outside, with an opening and closing tight door P, through which the articles and/or components A to be subjected to washing and decontamination are introduced into the chamber C.

[0025] For this purpose, the chamber C features, situated therein, containment means B for the articles A, usually a net basket of cylindrical or polyhedral form, e.g. an octahedron, supported, rotatable and idle, by a relative support structure.

[0026] The washing chamber C is aimed at containing in its lower part a predetermined quantity of washing and decontamination liquid, thus defining a reservoir S from which the liquid can be withdrawn.

[0027] The machine M includes, inside the washing chamber C, means U for directing jets of said liquid, arranged winding around the basket B.

[0028] As in the example shown in the proposed figures, the directing means U can be formed by a series of ducts, communicating with one another and equipped with a series of nozzles.

[0029] Means for heating the washing liquid to the temperature of about 80°-90°C (not shown, since they are known), are situated inside the washing chamber C.

[0030] The proposed machine M includes also at least one re-circulation hydraulic group 10, situated directly inside the washing chamber C, in a region corresponding to the reservoir S and immersed, at least partially, in the washing liquid contained in the latter.

[0031] An outer motor group 16, connected to the lateral wall of the washing chamber C is aimed at driving the basket B to rotate, by relative and suitable transmission means 17, passing through the lateral wall, in order to cyclically position the articles A, contained in the basket, below the means for directing the jets of washing and decontamination liquid.

[0032] The above mentioned re-circulation hydraulic group 10 is suitably aimed at withdrawing, continuously and in a predetermined way, prefixed quantities of the washing liquid from the reservoir S, and at directing it and spraying it, by the above mentioned directing means U, to the articles and/or components A, in order to wash and decontaminate the latter.

[0033] The hydraulic group 10 includes, as in the example shown in the enclosed figures, a withdrawing and delivery unit 11, withdrawing means 12, equipped with a filtering device situated at the inlet, and delivery means 14, communicating respectively with said withdrawing and delivery unit 11 and with said directing means U.

[0034] The characteristic feature of the machine M, proposed by the present invention lies in the fact that the unit 11 for withdrawing and delivering the washing liquid is situated directly inside the washing chamber C and is operated by a relative motor unit 15, which is situated outside the washing chamber C, fastened to a related wall.

[0035] The motor unit 15 operates the withdrawing and delivery unit 11 by suitable operating means (not shown in the enclosed figures, since they can be reproduced by the person skilled in the art), which pass through the wall of the washing chamber.

[0036] According to a first advantageous embodiment of the proposed washing machine M, shown as an example in Figure 1, the motor unit 15 is fastened outside the washing chamber C on a related lateral wall, with the means for operating the withdrawing and delivery unit 11 arranged with their related working axis horizontal.

[0037] According to another embodiment, shown in Figure 3, the withdrawing and delivery unit 11, and consequently, the motor unit 15, can be situated on the bottom wall of the washing chamber C, respectively on opposite sides thereof.

[0038] In this case, the operating means of the withdrawing and delivery unit 11 will be arranged with their relative working axis vertical.

[0039] The arrangement of the withdrawing and delivery unit 11 directly inside the washing chamber C, in a region corresponding to the reservoir S of the washing liquid, allows to connect the above mentioned withdrawing means 12, as well as the above mentioned delivery means 14, directly to the unit 11, thus avoiding the use of fittings and hydraulic joints necessary to pass through the wall, as it was necessary for the prior art machines.

[0040] This allows undoubtedly to reduce considerably the number of components and elements necessary to construct the whole re-circulation hydraulic group, which thus can be wholly made of anti-oxidizing material, e.g. stainless steel, maintaining substantially low the costs with respect to the overall costs of the whole washing machine production.

[0041] Indeed, the withdrawing means 12 can be formed by only one duct, fed directly by the withdrawing and delivery unit 11, and likewise, the delivery means

14 can be formed by only one duct, fed on one side by the unit 11, and connected on the other side to the directing means U.

[0042] Consequently, also the directing means U are connected to the withdrawing and delivery unit 11.

[0043] The withdrawing duct can have different conformation in relation to different working needs, so as to allow to withdraw the washing and decontamination liquid at different heights, like e.g. shown in Figures 1 and 2.

[0044] Consequently, the withdrawing and delivery unit 11 can also be positioned at different heights without any constructive or design damage.

[0045] The positioning of the re-circulation hydraulic group 10 directly inside the washing chamber C, in a region corresponding to the relative withdrawing reservoir S, and therefore, at least partially immersed therein, allows advantageously manufacturing of the connection between the withdrawing means 12 and the delivery means 14 with the relative unit 11 without considerable constructive and design bond for assuring a perfect and best tightness.

[0046] A suitable control unit (not shown in proposed figures), coordinates the operation of the motor group 16 to drive to basket B to rotate, controls the motor unit 15 activating the hydraulic group 10 to perform washing cycles.

[0047] The withdrawing and delivery unit 11, made in stainless steel, is also welded directly to the inner wall of the washing chamber of the relative reservoir, likewise made in stainless steel. This undoubtedly allows to reduce substantially the constructive tightness problems with respect to the outer re-circulation hydraulic group, whose hydraulic pump is connected to the outer wall of the washing chamber by fastening elements (e.g. bolts, etc.).

[0048] Therefore, it results obvious from the above description, purely illustrative and not limiting with reference to the enclosed figures, how the washing machine proposed by the present invention overcomes the drawbacks and avoids the problems of the machines of known art.

[0049] Actually, the machine M proposed by the present invention, having the whole re-circulation hydraulic group 10 situated inside the washing chamber C allows advantageously, from one side, to reduce the number of components and elements necessary to connect, respectively, the withdrawing means 12 and the delivery means 14, with the relative withdrawing and delivery unit 11, and from the other side, allows a more extended design possibility and imposes less constructive bonds, since it is not necessary to assure perfect tightness of the joints.

[0050] The substantial reduction of the number of components to be used to produce the re-circulation hydraulic group, that is the use respectively, of one withdrawing duct and one delivery duct controlled directly by a withdrawing and delivery unit without the use of fit-

tings and hydraulic joints, allows an advantageous production of these elements in anti-oxidizing material, e.g. stainless steel, without increasing the overall costs, which result substantially unchanged with respect to the a corresponding washing machine of prior art.

[0051] Moreover, the proposed washing machine allows, advantageously with respect to the machines of prior art, to avoid the disadvantageous heat dispersion along the washing liquid re-circulation circuit; in other words, all the elements forming the re-circulation circuit of the washing liquid, i.e. withdrawing means 12, withdrawing and delivery unit 11, delivery means 14, directing means U, do not exchange heat with outside, because they are situated completely inside the washing chamber.

[0052] This results, from one side, in a considerable energy saving, because the washing liquid maintains substantially constant temperature, and from the other side, in an increase of security, because the operators do not touch the outer means, heated by the passage of the washing liquid.

[0053] The above mentioned advantages are obtained by an extremely functional and reliable technical solution, which assures, in any working conditions, carrying out repeated washing and decontamination cycles of high performance.

Claims

1. Machine for washing articles, in particular metallic articles and/or components for industrial use, the machine (M) including:

a support structure (ST) defining an inner washing chamber (C) equipped with a opening and closing liquid-tight door (P), which allows said articles and/or components (A) to be introduced into said washing chamber and which allows said articles and/or components (A) to be positioned into suitable containment means (B), with said washing chamber (C) including, in a region corresponding to its lower part, a predetermined quantity of washing and decontamination liquid, thus defining a withdrawing reservoir (S), and including means (U) for directing jets of said liquid, situated inside said washing chamber (C) and arranged surrounding said containment means (B);

said machine (M) being **characterized in that** it includes at least one re-circulation hydraulic group (10) situated inside said washing chamber (C) in a region corresponding to said withdrawing reservoir (S) and at least partially immersed in said washing liquid contained in the latter, said re-circulation hydraulic group (10) being aimed at withdrawing continuously and

with a predetermined mode, prefixed quantities of said liquid from said reservoir (S) and at directing it and spraying it, by said directing means (U), toward said articles and/or components (A) in order to wash and decontaminate the latter.

2. Machine, according to claim 1, **characterized in that** said re-circulation hydraulic group (10) includes a withdrawing and delivery unit (11), with-
drawing means (12) controlled directly thereby and
equipped with a filtering device (13) situated at the
inlet of said withdrawing means (12), and delivery
means (14), communicating respectively with said
unit (11) and with said directing means (U). 5
3. Machine, according to claim 2, **characterized in that** said withdrawing and delivery unit (11) is welded to a wall of said washing chamber (C). 10
4. Machine, according to claim 3, **characterized in that** said withdrawing and delivery unit (11) is operated by a relative motor unit (15), fastened from outside to said wall of the washing chamber (C), by
suitable operating means passing through said
wall. 15
5. Machine, according to claim 4, **characterized in that** said motor unit (15) is fastened to said washing chamber (C) on the outside onto a relative lateral
wall and that said operating means of said with-
drawing and delivery unit (11) are arranged with
their working axis horizontal. 20
6. Machine, according to claim 4, **characterized in that** said motor unit (15) is fastened to said washing chamber (C) on outside onto the relative bottom wall, and **in that** said operating means of said with-
drawing and delivery unit (11) are arranged with
their working axis vertical. 25
7. Machine, according to claim 2, **characterized in that** said withdrawing means (12) include only one duct connected directly to said withdrawing and delivery unit (11). 30
8. Machine, according to claim 7, **characterized in that** said only withdrawing duct includes, at its inlet section, said filtering device (13). 35
9. Machine, according to claim 2, **characterized in that** said delivery means (14) include only one duct connected, on one side, directly to said withdrawing and delivery unit (11), and on the other side communicating with said directing means (U). 40
10. Machine, according to claim 1, **characterized in that** said re-circulation hydraulic group (10) is made 45

of anti-oxidizing material.

11. Machine, according to claim 10, **characterized in that** said re-circulation hydraulic group (10) is made of stainless steel. 50
12. Machine, according to claim 1, **characterized in that** said directing means (U) include a plurality of ducts, communicating to one another and equipped with a series of nozzles. 55
13. Machine, according to claim 12, **characterized in that** said directing means (U) are made of anti-oxidizing material.
14. Machine, according to claim 13, **characterized in that** said directing means (U) are made of stainless steel.
15. Machine, according to any of previous claims, **characterized in that** it includes also an outer motor group (16), connected to a lateral wall of said washing chamber (C) and aimed at driving said containment means (B) into rotation by relative and suitable transmission means (17) passing through said wall, and a control unit, which controls, in suitable phase relation, the activation of said motor group (16) and of said motor unit (15) of said re-circulation hydraulic group (10) to define cycles of washing and decontamination of said metallic articles and/or components.

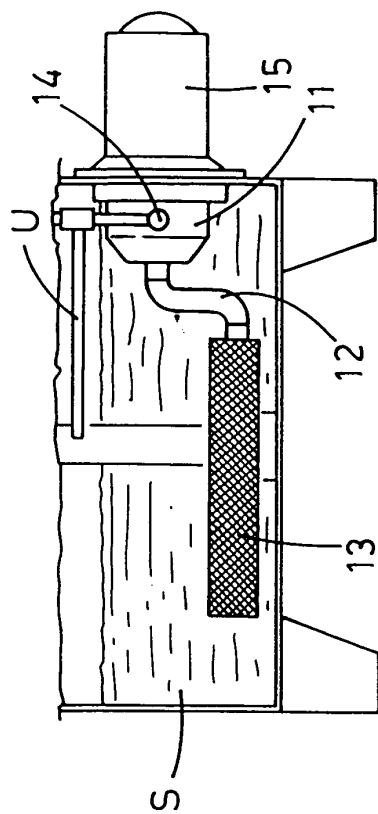


FIG. 2

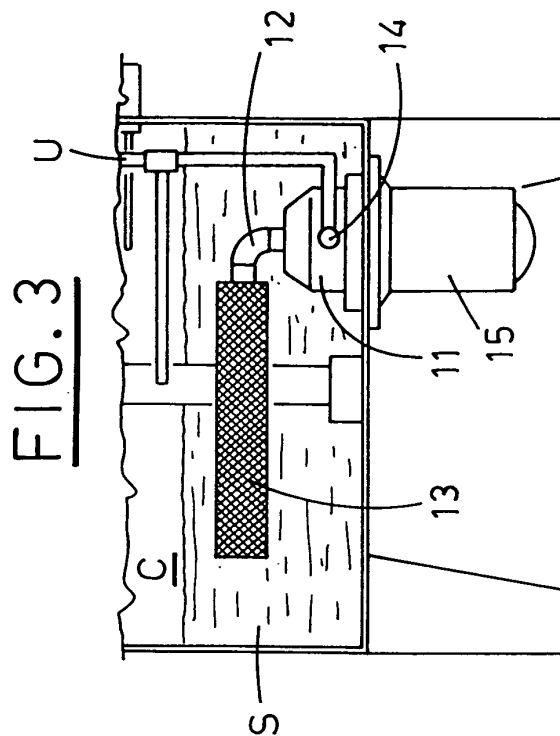


FIG. 3

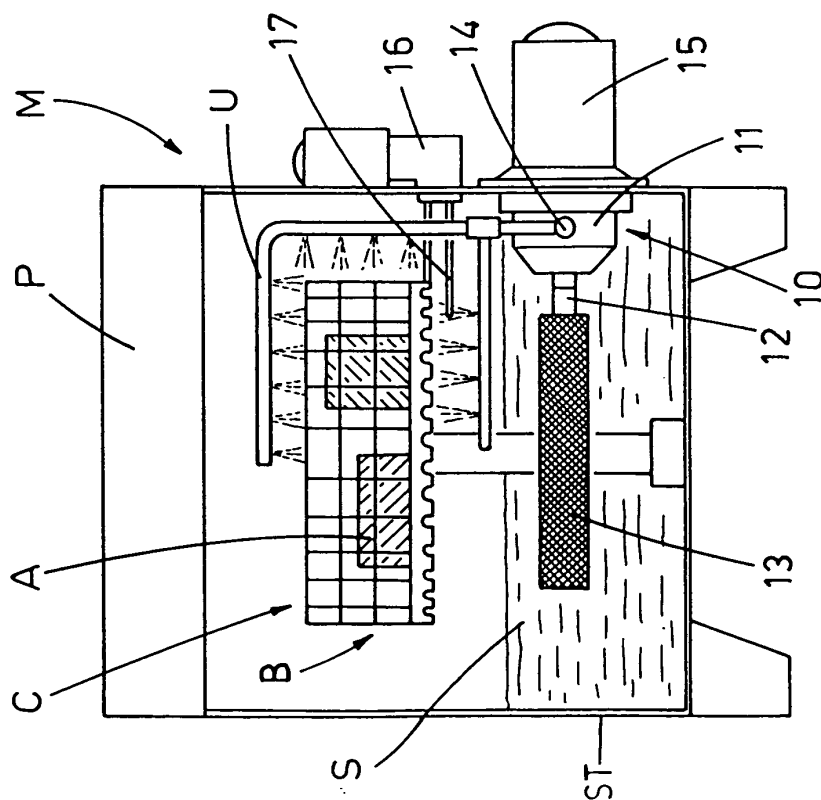


FIG. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 02 8172

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.7)
X	US 5 220 933 A (ALBERS TERRY A) 22 June 1993 (1993-06-22) * abstract; figures *	1-8, 12	B08B3/02
Y	* column 2, line 59 - column 3, line 25 * * column 4, line 27 - column 6, line 10 *	9-11, 13-15	
X	US 5 107 876 A (OZYJIVSKY ROMAN S) 28 April 1992 (1992-04-28) * abstract; figures *	1, 12	
Y	US 6 044 852 A (EPPERSON JR BILL GEORGE ET AL) 4 April 2000 (2000-04-04) * abstract *	9-11, 13, 14	
Y	US 5 398 708 A (SHELDON MORRIS W) 21 March 1995 (1995-03-21) * abstract; figures 1-5 * * column 5, line 40 - line 64 * * column 7, line 16 - line 48 * * column 9, line 52 - column 10, line 20 *	15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B08B
Place of search		Date of completion of the search	Examiner
THE HAGUE		26 March 2003	Plontz, N
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 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 02 8172

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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26-03-2003

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5220933	A	22-06-1993	NONE		
US 5107876	A	28-04-1992	AU	629011 B2	24-09-1992
			NZ	234541 A	26-08-1992
			ZA	9005669 A	24-04-1991
US 6044852	A	04-04-2000	US	6109277 A	29-08-2000
US 5398708	A	21-03-1995	NONE		