

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 050 409 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
18.12.2002 Bulletin 2002/51

(51) Int Cl.7: **B41F 35/00**

(21) Application number: **00108207.2**

(22) Date of filing: **14.04.2000**

(54) **A printing plate washing machine**

Druckplattenwaschvorrichtung

Machine de lavage pour plaques d'impression

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

(30) Priority: **03.05.1999 DK 59899**

(43) Date of publication of application:
08.11.2000 Bulletin 2000/45

(73) Proprietor: **HB El-Service v/Henning Bonde
8900 Randers (DK)**

(72) Inventor: **Andersen, Flemming
8900 Randers (DK)**

(74) Representative: **Olsen, Peter Vestergaard
Patrade A/S,
Fredens Torv 3A
8000 Aarhus C (DK)**

(56) References cited:
**DE-A- 19 605 058 DE-C- 404 300
US-A- 3 679 483 US-A- 3 946 454**

- **PATENT ABSTRACTS OF JAPAN vol. 1999, no.
03, 31 March 1999 (1999-03-31) & JP 10 315428 A
(DAINIPPON PRINTING CO LTD), 2 December
1998 (1998-12-02)**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 050 409 B1

Description

State of the Art

[0001] The present invention relates to a printing plate washing machine comprising a washing section with several rotatable brushes for scrubbing sides of printing plates under application of a rinsing fluid, a drying section for drying the plates, and a conveyor for moving the plates through the washing and drying sections of the machine with the plates in a substantial vertical position and in a largely plane condition.

[0002] In the present connection, the term "printing plate" is defined as a generic term for printing plates of different kinds that have form as a sheet or may easily be flattened as a sheet, especially plates made of rubber or synthetic material and for printing relative large surfaces as on cardboard boxes for packing, the plates having elevated or countersunk area for providing the printing pattern.

[0003] Today, soft printing plates of rubber or synthetic material as mentioned above are cleaned manually after being used in the printing process, using brush and soap water. This is a hard and time-consuming work requiring a substantial amount of man-power and thus being costly.

[0004] A washing machine of the kind indicated in the introduction and especially intended for rigid, flat plates is described in DE 196 05 058 A1. The plates are supported by their lower edge and moved through a washing section with long, cylindrical brushes rotating about their cylinder axes. The rinsing fluid is based on water. Subsequently the plates are dried just by letting them stand in the vertical position for a period. This prior art has the disadvantage that the unidirectional movement of the brushes relative to the plates is not sufficient to clean printing plates of the kind with elevated or countersunk areas, as the brush hairs do not penetrate into all corners in the plate profile as the brush hairs in the movement over the structures of the profile jump over these corners. A washing machine for flat, transported PC-cards is disclosed in US 3946454. This machine comprises rows of rotatable brushes having a mainly plane surface.

Explanation of the invention

[0005] The object of the invention is to avoid the disadvantages of prior art.

[0006] This is achieved by a washing machine of the kind indicated in the introduction which is peculiar in that the brushing surface of a brush constitutes a mainly plane surface, and that the axis of rotation of the brush is perpendicular to the surface, where the brushes are juxtaposed along rows arranged in mutual parallel lines at least at one side of a printing plate passing through the machine, and where at least one row of brushes is provided with a driving mechanism arranged to cause

the brushes in the row or rows to make oscillating rotational movement about the axis of rotation.

[0007] Thus the invention provides multiple end-face brushes at each side of a printing plate, and thereby every point on the plate surface is subjected to at least bi-directional brush action when the plate passes each brush row. If the brush rows are staggered as seen in the direction of movement of the plates, the plate surfaces may be subjected to four or more different brushing directions. Thereby an effective cleaning of corners and intricate details of the plate profile is performed.

[0008] The arrangement and suspension of the brushes is preferred with the brushes on plastic gear wheels mutually meshing in each row. As plastic gear wheels of e.g. polyoxymethylene or polyethylene may be lubricated by water, this embodiment simplifies the machine when soap water is used as rinsing fluid, the fluid also serving as lubricant for the teeth and suspension of the gear wheels.

[0009] A simple way of suspending the gear wheels is indicated in claim 3. Journals and bearings for each brush wheel may thus be avoided.

[0010] As indicated in claim 4, the brushes may be embedded directly in the side of each gear wheel in at least one row, the brush area being extended to the teeth of the gear wheels. Thereby overlapping brushing areas for adjacent brushes are attained.

[0011] As alternative or supplementing embodiment of the brush arrangement, the machine may comprise elongated brushes, where adjacent, separately rotatable brushes are arranged to sweep overlapping areas. The brushes may either be placed extending diametrically/radially or as chords/tangents to the rotating wheel. In a radial arrangement, two or more elongated brushes may be provided on each wheel. Also, hereby it is easy to obtain a secure overlap between adjacent brushes sweeping the plate surface. Furthermore, the brush components themselves are relatively cheap to obtain as elongated, rectangular brushes are standard products in the brush industry.

[0012] In a preferred embodiment of the invention, at least one row is provided with elongated brushes longer than the distance between adjacent axes of rotation of the brushes and with a driving mechanism arranged to cause the elongated brushes in the row to make oscillating rotational movement about a centre position in which the brushes in the row are situated one after another to be mutually parallel and displaced. The angular displacement in the oscillating, rotating movement is so small that the brushhairs only move a short distance on the plate surface before reversing; usually angular displacements are less than 50°. At the point of reversing, the position of the hairs changes from lying bent onto the plate surface in one direction to the opposite direction, and as the hairs reverse, they stand up and exert a greater pressure on the surface. Thereby the brush hairs have the opportunity to penetrate into the corners and intricate details of the elevated or countersunk are-

as of the surface, and the cleaning effect of the brushes is enhanced considerably.

[0013] A further preferred embodiment of the invention as indicated in claim 7 has two rows of brushes arranged opposite to and facing each other and arranged to wash both sides of a printing plate closest to an inlet end of the washing section, where the washing section is arranged with succeeding rows of brushes at one side only for washing the print side of a printing plate, and where the second side opposite to the succeeding rows of brushes is provided with a flat, substantially vertical surface for supporting the printing plate. The two opposite rows of brushes may then clean both side of the plate while the subsequent rows at one side of the passing plate do the further treatment necessary to remove the remaining ink from the profiled and uneven printing surface of the plate. The support plate counteracts the pressure of the brushes at the opposite side.

[0014] For pre-soaking dry ink on the printing plate it, may be preferred to design the machine as indicated in claim 8, wherein the rows of brushes in the washing section are preceded relative to the direction of conveyor movement by nozzles arranged for flushing a passing plate with rinsing fluid.

[0015] In order to blow off droplets of rinsing fluid, the washing section is succeeded by a drying section provided with nozzles for supplying pressurised air on both side of a passing printing plate. Hereby the plate is sufficiently freed from liquid so that it may air dry in the while before storage or in a storage compartment afterwards.

[0016] For easy conveying of soft printing plates, the machine according to the invention is provided with an overhead conveyor with attachment points designed to suspend a printing plate by its edge. Existing attaching means along one edge of the plate may then be utilized for suspending the plates, or special attaching means with clamps may be used.

The Drawing

[0017] An embodiment of the washing machine according to the invention will now be described in more detail with reference to the drawing, where

- Fig. 1 is a schematic view from above of a washing facility including a washing machine according to the invention,
- Fig. 2 is a schematic side view of the washing machine of Fig. 1,
- Fig. 3 shows the suspension of a gear wheel with a brush in section,
- Fig. 4 is a partial side view of a row of gear wheels with brushes with suspending means,
- Figs. 5a-b show two different extreme positions of oscillating gear wheels with brushes,
- Figs. 6a-c show three different stages of an oscillating wheel brush hair position relative to a

printing plate surface, and
Fig. 7 is a horizontal section through the drying section of the washing machine.

Description of Embodiments of the Invention

[0018] The schematic overview of an embodiment of the invention in Fig. 1 shows a washing facility for soft printing plates of rubber or plastic. The facility comprises a washing machine 3 and a closed-circuit overhead conveyor 1 with not shown attachment means for suspending the plates during conveying and treatment in the facility. The direction of movement of the conveyor 1 is shown with the arrow 2. The level of conveyor 1 is so that the machine may treat plates with vertical dimension of up to 160 cm.

[0019] The washing machine 3 is divided into a pre-soaking section 5, a scrubbing or washing section 7 and a drying section 9. The machine is placed in an enclosure 11 for avoiding spray and droplets being dispersed to the surroundings. An inlet 13 and outlet 15 for the moving printing plates are located at each end of the machine. Closures 16 in the shape of flexible means, e. g. rows of hairs meeting at an angle, are provided at the inlet 13, outlet 15 and at the partition 17 between the washing section 7 and the drying section 9, the closures 16 being able to deflect when a printing plate 10 passes but preventing airborne spray and droplets moving through. See also Fig. 2.

[0020] The pre-soaking section 5 contains two parallel pipes 19, one at each side of a passing printing plate 10, carrying rinsing fluid used in the process, in this embodiment soap water. At equidistant points, the pipes 19 are provided with outlets or nozzles directed toward the plate 10.

[0021] Moving to the washing section 7, the plate 10 is scrubbed simultaneously on both sides by end-face brushes 24 rotating about horizontal axes in rows 23. The brushes 24 are integrated in gear wheels which are drivably interconnected by gear teeth 34 (see Fig. 3) at the rim of each wheel. The side of the plate 10 facing the viewer on Fig. 2, the front, is a surface with a profiled section while the opposite side, the back, is blank and completely flat. The back of the plate 10 does therefore not require any more scrubbing, and in the following part of the washing section 7 there are no brushes for the back, but instead a support plate 25.

[0022] In the embodiment shown, the three brush rows 27, 28, 29 subsequent to the first row 23, are all provided with elongated, rectangular standard product brushes 31 fastened on gear wheels 33, see Fig. 3. In the first and the third rows 27, 29 as seen in the direction of travel of the plates 10, the brushes 31 are situated diametrically on the wheels 33, causing the axis of rotation to pass through a part of the brush 31 itself, and in these rows 27, 29 the wheels 33 are rotating continually as in row 23. The brushes 31 overlap the area swept by neighbouring wheels and are angularly displaced in re-

lation to adjacent wheels 33 as indicated on Fig. 2. The lowermost wheels 33a and 23a, respectively, are driven by not shown electric motors.

[0023] Soap water is supplied to the washing process through nozzles distributed on pipes 22 extending in parallel with the rows 23,27,28,29, see Fig. 1. A suitable detergent for the printing ink concerned is selected for making the soap water together with a foam inhibiting agent.

[0024] The suspension of the gear and brush wheels in the rows 23,27,28,29 is shown on Figs. 3 and 4, which by example show the arrangement in rows 27 and 29, but where the principle of suspension also apply to rows 23 and 28. Two rails 41 are fastened to the not shown frame of the machine, having longitudinal, mutually facing slits that accommodate annular, laterally projecting flanges 43 of the gear wheels 33. All wheels are made of high density polyethylene which has very low coefficient of friction when flushed with water or soap water. The soap water is distributed over the wheels so that gear teeth 34 and the adjoining surfaces of slits and flanges 43 are lubricated.

[0025] The middle row 28 has the brushes 31 fastened tangentially on the gear wheels 33 and alternately displaced so that they do not interfere. The reason for the tangential position of the brushes 31 is that only translational movement of brush hairs is desired which is possible when the axis of rotation does not pass through the brush 31 itself. The movement in the row 28 is oscillating rotation about a middle position shown on Fig. 2 so that the whole surface of the plate 10 is swept, the oscillation caused by a "rocker" mechanism known per se and shown in principle with the wheels 35 and 36 interconnected by a rod 37, where the motor-driven wheel 36 is rotating continually while the wheel 35 perform oppositely directed angular motions. Thereby the brushes 31 perform similar movements, the extremes of which are shown in Figs. 5a and 5b. The reversion of rotation of the wheels in row 28 causes the brush hairs to change their position as shown in Figs. 6a-c, where the arrow 45 indicates the direction of relative movement of the brush 31. In Fig. 6a, the brush hairs are drawn along the plate surface while deflecting to raised portions 47. Fig. 6b shows the situation immediately after reversing the direction of brush movement, and here the hairs tend to stand up, some buckling, while pressing hard on the plate surface. Now the hairs have possibility of penetrating into the corners at the foot of the raised portions 47, thereby cleansing the ink remaining here. Fig. 6c shows the situation when the brush movement is continued in the same direction as in Fig. 6b.

[0026] After passing through the closure 16, the plate 10 moves into the drying section 9 and passes between parallel pipes 49 conducting pressurised air and provided with a number of air outlets 51. The discharged air blows off any free liquid and drops from the plate surfaces, and after passing through the outlet 15 of the machine, the plate 10 is sufficiently dry to be stored, espe-

cially if the liquid temperature is held slightly elevated compared to ambient air temperature.

[0027] The washing machine is provided with a tank 21 for collecting used soap water under the pre-soaking and washing sections 5,7. In other embodiments, the tank 21 may also extend under the drying section 9 for collecting fluid blown off the plate 10. The soap water is recirculated to the pre-soaking and washing sections through a not shown piping system including pumps. No filtering systems is necessary for the rinsing fluid in the present application of the invention, and the soap water is just exchanged when too dirty.

[0028] As shown on Fig. 2, the different features for treating the plate 10 are arranged obliquely in order to facilitate the introduction of the vertical leading edge of the printing plate in each section or through the closures 16.

[0029] The form and arrangement of brushes 24,31 may be varied in other embodiments of the invention. Hence the disc-like brushes 24 may be applied in more or all the rows in the washing section 7, and the same applies to the elongated brushes 31. The oscillating brushes in row 28 may also be of the disc type 24. More or less number of rows may be used in the washing section, and the centres of rotation of brushes in adjacent rows may be staggered to avoid uniform treatment caused by the brush sweeping pattern.

Claims

1. A printing plate washing machine (3) comprising a washing section (7) with several rotatable brushes (24,31) for scrubbing sides of printing plates (10) under application of a rinsing fluid, a drying section (9) for drying the plates, and a conveyor (1) for moving the plates (10) through the washing and drying sections (7,9) of the machine with the plates (10) in a substantial vertical position and in a largely plane condition, **characterised in that** the brushing surface of a brush (24,31) constitutes a mainly plane surface, and that the axis of rotation of the brush (24,31) is perpendicular to the surface, where the brushes are juxtaposed along rows (23,27,28,29) arranged in mutual parallel lines at least at one side of a printing plate (10) passing through the machine, and where at least one row (28) of brushes (24 or 31) is provided with a driving mechanism (35,36,37) arranged to cause the brushes (24 or 31) in the row (28) or rows to make oscillating rotational movement about the axis of rotation.
2. Machine according to claim 1, wherein the brushes (24,31) are provided on plastic gear wheels (33) mutually meshing in each row (23,27,28,29).
3. Machine according to claim 2, wherein the gear wheels (33) are suspended in each row

(23,27,28,29) by a laterally projecting, annular flange (43) engaging opposite grooves in a pair of rails (41) which are fastened to the frame of the machine (3).

4. Machine according to claim 2 or 3, wherein the brushes (24) are embedded directly in the side of each gear wheel (33) in at least one row (23), the brush area being extended to the teeth (34) of the gear wheels (33). 5
5. Machine according to any preceding claim, wherein the machine (3) comprises elongated brushes (31), where adjacent, separately rotatable brushes are arranged to sweep overlapping areas. 10
6. Machine according to claim 5, wherein at least one row (28) is provided with elongated brushes (31) longer than the distance between adjacent axes of rotation of the brushes and where the driving mechanism (35,36,37) is arranged to cause the oscillating rotational movement of the elongated brushes (31) in the row (28) about a centre position in which the brushes in the row (28) are situated one after another to be mutually parallel and displaced. 15
7. Machine according to any preceding claim, wherein two rows (23) of brushes (24) are arranged opposite to and facing each other and arranged to wash both sides of a printing plate closest to an inlet end (13) of the washing section (7), and where the washing section (7) is arranged with succeeding rows (27,28,29) of brushes at one side only for washing the print side of a printing plate (10), and where the second side opposite to the succeeding rows (27,28,29) of brushes is provided with a flat, substantially vertical surface (25) for supporting a printing plate. 20
8. Machine according to any preceding claim, wherein the rows of brushes in the washing section (7) are preceded in the direction of conveyor movement by nozzles arranged for flushing a passing plate (10) with rinsing fluid. 25
9. Machine according to any preceding claim, wherein the washing section (7) is succeeded by a drying section (9) provided with nozzles (51) for supplying pressurised air on both sides of a passing printing plate (10). 30
10. Machine according to any preceding claim, wherein the conveyor (1) is an overhead conveyor with attachment points designed to suspend a printing plate (10) by its edge. 35

Patentansprüche

1. Druckplattenwaschvorrichtung (3) mit einer Waschsektion (7) mit mehreren drehbaren Bürsten (24, 31) zum Abschrubben der Seiten von Druckplatten (10) unter Verwendung einer Spülflüssigkeit, einer mit Trocknungssektion (9) zum Trocknen der Platten und mit einem Förderer (1) zum Transportieren der Platten durch die Wasch- und die Trocknungssektionen (7, 9) der Vorrichtung, wobei die Platten (10) in einer im wesentlichen vertikalen Stellung und unter weitgehend ebenen Bedingungen angeordnet sind, **dadurch gekennzeichnet, dass** die Bürstenoberfläche einer Bürste (24, 31) eine im wesentlichen ebene Oberfläche bildet und dass die Drehachse der Bürste (24, 31) lotrecht zu der Oberfläche verläuft, wobei die Bürsten nebeneinander in Reihen (23, 27, 28, 29) in gemeinsamen parallelen Linien an zumindest einer Seite einer sich durch die Vorrichtung hindurchbewegenden Druckplatte (10) angeordnet sind und wobei mindestens eine Reihe (28) der Bürsten (24, 31) mit einem Antriebsmechanismus (35, 36, 37) versehen ist, welcher dazu eingerichtet ist, die Bürsten (24 oder 31) in der Reihe (28) oder in den Reihen eine oszillierende Drehbewegung um die Drehachse ausführen zu lassen. 40
2. Vorrichtung nach Anspruch 1, wobei die Bürsten (24, 31) an Kunststoff-Zahnradern (33) vorgesehen sind, welche in jeder Reihe (23, 27, 28, 29) wechselseitig miteinander kämmen. 45
3. Vorrichtung nach Anspruch 2, wobei die Zahnräder (33) in jeder Reihe (23, 27, 28, 29) von einem seitlich hervorstehenden, ringförmigen Flansch (43) hängen, welcher mit einander gegenüber angeordneten Nuten eines am Rahmen der Vorrichtung (10) befestigten Schienenpaares (41) in Eingriff steht. 50
4. Vorrichtung nach Anspruch 2 oder 3, wobei die Bürsten (24) in zumindest einer Reihe (23) unmittelbar in die Flachseite jedes Zahnrades (33) eingebettet sind und die Bürsten bis zu den Zähnen (34) der Zahnräder (33) verlängert sind. 55
5. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Vorrichtung (3) verlängerte Bürsten (31) dort aufweist, wo unmittelbar nebeneinander, getrennt drehbare Bürsten angeordnet sind, um sich überlappende Bereiche zu bürsten.
6. Vorrichtung nach Anspruch 5, wobei mindestens eine Reihe (28) mit verlängerten Bürsten (31) ausgestattet ist, welche länger sind als der Abstand zwischen unmittelbar zueinander benachbarter Drehachsen der Bürsten, und wobei der Antriebsmechanismus (35, 36, 37) dazu eingerichtet ist, die oszillierende Drehbewegung der verlängerten Bürsten

in der Reihe (28) um eine Mittelposition zu bewirken, in welcher die Bürsten in der Reihe (28) nacheinander wechselseitig parallel und versetzt zueinander angeordnet sind.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei zwei Reihen (23) der Bürsten (24) einander gegenüber und einander zugewandt positioniert und angeordnet sind, um beide Seiten einer Druckplatte, welche dem Eingangsende (13) der Waschsektion (7) am nächst ist, zu waschen, und wobei die Waschsektion (7) an einer Seite mit aufeinanderfolgenden Reihen (27, 28, 29) von Bürsten eingerichtet ist, um nur die Druckseite einer Druckplatte (10) zu waschen, während die den aufeinanderfolgenden Reihen (27, 28, 29) von Bürsten gegenüber angeordnete zweite Seite mit einer flachen, im wesentlichen vertikalen Oberfläche (25) zum Abstützen einer Druckplatte versehen ist.
8. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei den Reihen von Bürsten in der Waschsektion (7) in Richtung der Förderbewegung gesehen Düsen vorgeordnet sind, welche dazu eingerichtet sind, eine sich vorbeibewegende Platte (10) mit einer Spülflüssigkeit abzuspritzen.
9. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Waschsektion (7) eine Trocknungssektion (9) folgt, die mit Düsen (51) zum Zuführen von Druckluft auf beide Seiten einer sich vorbeibewegenden Platte (10) versehen ist.
10. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei der Förderer (1) ein Hängeförderer mit Befestigungsstellen ist, welche zum Einhängen einer Druckplatte (10) mit ihren Kanten dienen.

Revendications

1. Machine à laver des plaques (3) comprenant une section lavage (7) pourvue de plusieurs brosses rotatives (24, 31) pour nettoyer à la brosse les côtés des plaques (10) avec l'application d'un liquide de rinçage, une section séchage (9) pour sécher les plaques, et un convoyeur (1) pour déplacer les plaques (10) à travers les sections lavage et séchage (7, 9) de la machine, les plaques (10) étant dans une position sensiblement verticale et dans une situation largement plane, **caractérisée en ce que** la surface de brossage d'une brosse (24, 31) constitue une surface principalement plane, et **en ce que** l'axe de rotation de la brosse (24, 31) est perpendiculaire à la surface, où les brosses sont juxtaposées le long de rangées (23, 27, 28, 29) disposées en lignes parallèles les une aux autres sur un côté au moins d'une plaque (10) traversant la machine,

et où au moins une rangée (28) de brosses (24 ou 31) est équipée d'un dispositif d'entraînement (35, 36, 37), de manière à ce que les brosses (24 ou 31) dans la rangée (28) ou dans les rangées aient un mouvement de rotation alternatif autour de l'axe de rotation.

2. Machine selon la revendication 1, dans laquelle les brosses (24, 31) se trouvent sur des roues d'engrenage en plastique (33) s'engrenant mutuellement dans chaque rangée (23, 27, 28, 29).
3. Machine selon la revendication 2, dans laquelle les roues d'engrenage (33) sont suspendues dans chaque rangée (23, 27, 28, 29) par une collerette annulaire en projection latérale (43) venant en prise avec des rainures opposées dans une paire de rails (41) qui sont attachés au cadre de la machine (3).
4. Machine selon les revendications 2 ou 3, dans laquelle les brosses (24) sont directement insérées dans le côté de chaque roue d'engrenage (33) dans au moins une rangée (23), la zone de brossage s'étendant jusqu'aux dents (34) des roues d'engrenage (33).
5. Machine selon l'une quelconque des revendications précédentes, dans laquelle la machine (3) comprend des brosses allongées (31), où des brosses adjacentes rotatives séparément sont réglées pour balayer les zones de chevauchement.
6. Machine selon la revendication 5, dans laquelle une rangée au moins (28) est pourvue de brosses allongées (31) d'une longueur supérieure à la distance entre les axes adjacents de rotation des brosses, et où le dispositif d'entraînement (35, 36, 37) est réglé pour provoquer le mouvement de rotation alternatif des brosses allongées (31) dans la rangée (28) autour d'une position centrale dans laquelle les brosses sont situées les unes derrière les autres dans la rangée (28), de manière à être réciproquement parallèles et déplacées.
7. Machine selon l'une quelconque des revendications précédentes, dans laquelle deux rangées (23) de brosses (24) sont disposées en face les unes des autres, et se faisant face les unes les autres, et sont réglées pour laver les deux côtés d'une plaque le plus près possible d'une entrée (13) de la section lavage (7), et où la section lavage (7) est composée de rangées successives (27, 28, 29) de brosses avec une seule face pour laver le côté imprimé d'une plaque (10), et où la seconde face opposée aux rangées successives (27, 28, 29) de brosses est pourvue d'une surface plane, relativement verticale (25) pour soutenir une plaque.

8. Machine selon l'une quelconque des revendications précédentes, dans laquelle les rangées de brosses dans la section lavage (7) sont précédées, dans la direction du mouvement du convoyeur, par des ajutages réglés pour nettoyer à grande eau une plaque qui passe (10) avec du liquide de rinçage. 5
9. Machine selon l'une quelconque des revendications précédentes, dans laquelle la section lavage (7) est suivie d'une section séchage (9) pourvue d'ajutages (51) pour fournir de l'air pressurisé sur les deux côtés d'une plaque qui passe (10). 10
10. Machine selon l'une quelconque des revendications précédentes, dans laquelle le convoyeur (1) est un convoyeur aérien avec des points d'attache conçus pour suspendre une plaque (10) par son bord. 15

20

25

30

35

40

45

50

55



