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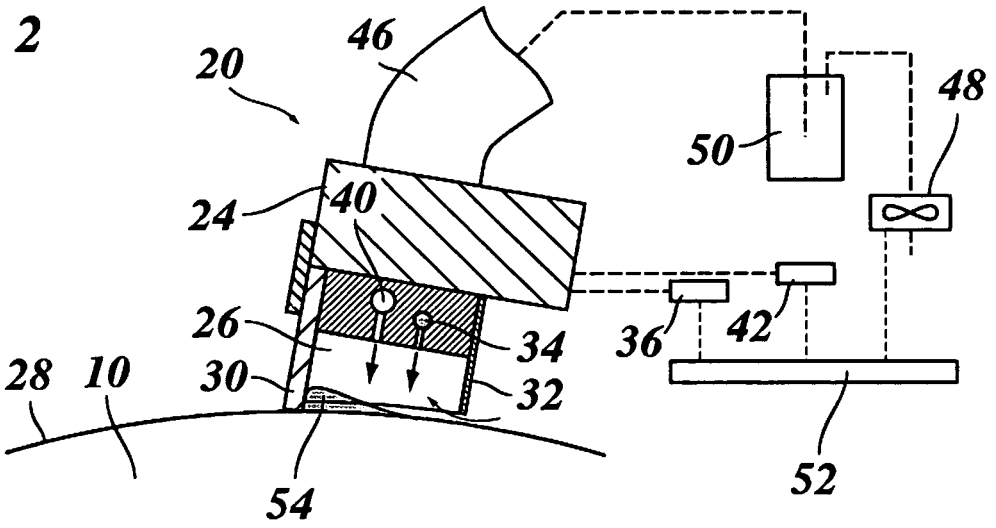
(54) Cleaning device for a cylinder of a rotary printing press

(57) A cleaning device (20) for a cylinder (10) of a rotary printing press, comprising an elongated body (24) adapted to be mounted in the printing press so as to extend in parallel with the axial direction of the cylinder (10) and in proximity to the peripheral surface (28) thereof, the body (24) defining a plenum chamber (26) that is open towards the surface (28) of the cylinder (10) and delimited on one side by a wiper (30) adapted to wipe the surface of the cylinder, and on the opposite side by a baffle (32) that forms a gap with the surface (28) of the cylinder, the device further comprising a liquid supply system (34, 36, 38) arranged to supply a liquid into the plenum chamber (26), a compressed air supply system (40, 42, 44) arranged to supply compressed air into the plenum chamber (26), and a suction device (46, 48, 50) capable of withdrawing both, liquid and air from the plenum chamber (26).

Fig. 2



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Description

[0001] The invention relates to a cleaning device for a cylinder of a rotary printing press and to a rotary printing press equipped with such a cleaning device. More particularly, the invention relates to a device for cleaning the peripheral surface of a central back pressure cylinder of a printing press having a plurality of colour decks arranged along the peripheral surface of the back pressure cylinder.

[0002] It is an object of the invention to provide a cleaning device that permits to rapidly and efficiently clean the surface of the cylinder so as to remove dust and other contaminants therefrom.

[0003] According to the invention, this object is achieved by a cleaning device for a cylinder of a rotary printing press, comprising an elongated body adapted to be mounted in the printing press so as to extend in parallel with the axial direction of the cylinder and in proximity to the peripheral surface thereof, the body defining a plenum chamber that is open towards the surface of the cylinder and delimited on one side by a wiper adapted to wipe the surface of the cylinder, and on the opposite side by a baffle that forms a gap with the surface of the cylinder, the device further comprising a liquid supply system arranged to supply a liquid into the plenum chamber, a compressed air supply system arranged to supply compressed air into the plenum chamber, and suction device capable of withdrawing both, liquid and air from the plenum chamber.

[0004] More specific features of the invention are indicated in the dependent claims. A preferred embodiment will now be described in conjunction with the drawings, wherein:

Fig. 1 is a schematic cross-sectional view of a central impression cylinder and a cleaning device arranged to clean the same;

Fig. 2 is an enlarged cross-sectional view of the cleaning device shown in Fig. 1; and

Fig. 3 is a view showing the cleaning device in a longitudinal section.

[0005] As is shown in Fig. 1, a rotary printing press, e.g. a flexographic printing press, comprises a central back pressure cylinder or central impression cylinder (CI) 10 and a number of colour decks 12 disposed at the periphery of the CI 10. Only two of the colour decks 12 have been shown in Fig. 1. Each of these colour decks comprises a printing cylinder 14 adapted to be adjusted against the peripheral surface of the CI. and an anilox roller 16 adapted to be adjusted against the peripheral surface of the printing cylinder 14.

[0006] When the printing press is operating, the CI rotates in direction of the arrow A in Fig. 1, and a web 18 of a printing medium is passed around the CI, so that successive colour separation images can be printed thereon with the printing cylinders 14 of the various colour decks.

[0007] In Fig. 1, the printing press is assumed to be in non-printing state, and the web 18 has been shown in dashed lines. In this non-printing state, a cleaning device 20 for cleaning the peripheral surface of the CI 10 is disposed in a working position directly above the top summit of the CI. The cleaning device 20 is supported on a transport mechanism 22, e.g. a belt drive, so that it can be moved (horizontally) to a rest position (shown in phantom lines in Fig. 1) in which it does not interfere with the web 18.

[0008] When it is necessary to clean the peripheral surface of the CI 10, e.g. because a large amount of dust has been deposited thereon and tends to become detrimental to the print process, the web 18 is removed, the cleaning device 20 is driven to the working position, and the CI 10 is driven with appropriate speed in the direction of the arrow A, so that the peripheral surface can be cleaned with the cleaning device.

[0009] As has been shown in greater detail in Fig. 2, the cleaning device 20 comprises a body 24 which extends in axial direction of the CI 10 over practically the entire width thereof and defines a plenum chamber 26 that is open towards the peripheral surface 28 of the CI 10. On one side, the downstream side in direction of rotation of the CI, the plenum chamber 26 is delimited by an elastic doctor blade or wiper 30 that engages the surface 28 of the CI with its lower edge. On the opposite side, the plenum chamber 26 is delimited by a baffle 32 that forms a narrow gap with the surface 28 of the CI. Similarly, both axial ends of the plenum chamber are closed off by end walls (no reference signs) which also form a gap with the surface of the CI.

[0010] The body 24 of the cleaning device includes a liquid supply line 34 connected to a liquid supply unit 36. The supply line 34 communicates with a number of nozzles 38 (reference signs shown in Fig. 3) which are distributed over the length of the CI and directed towards the peripheral surface thereof, so that a cleaning liquid, e.g. water or a solvent, can be jetted onto the surface 28 of the CI inside the plenum chamber 26.

[0011] The body 24 further includes an air supply line 40 connected to a compressed air source 42 and communicating with a number of air nozzles 44 for jetting compressed air onto the surface 28 of the CI inside the plenum chamber 26.

[0012] The plenum chamber 26 is further connected to a suction line 46 that is connected to a suction blower 48 via a liquid separator 50, so that both, air and liquid may be sucked-off from the plenum chamber 26 and the surface 28 of the CI.

[0013] The liquid supply unit 36, the compressed air source 42 and the blower 48 are controlled by an electronic control unit 52 which may also control a drive motor for the transport mechanism 22 shown in Fig. 1.

[0014] As can be seen in Fig. 3, the liquid nozzles 38

and the air nozzles 44 are arranged alternatingly in longitudinal direction of the plenum chamber 26, and the height of the plenum chamber, as measured in the direction normal to the surface 28 of the CI, increases gradually from the axial ends towards the central portion where the suction line 46 is connected to the plenum chamber.

[0015] When the cleaning device 20 has been brought into the working position and a cleaning process is to be started, the blower 48 is activated, so that air is withdrawn from the plenum chamber 26. This air will be replaced by ambient air that will mainly enter through the gap formed between the surface 28 of the CI and the lower edge of the baffle 32. As a result, an air current will pass over the surface 28 below the baffle 32 with relatively high velocity, so that dust and other contaminants will be removed from the surface 28 and sucked off.

[0016] In a modified embodiment, permitting a more precise control of the air flow through the gap, the continuous gap shown in Fig. 2 may partly be closed by a comb-like seal that leaves open only a discontinuous gap.

[0017] Simultaneously or somewhat later, the liquid supply unit 36 is activated, and the cleaning liquid is jetted onto the surface 28 of the CI via the nozzles 38. On the upstream side, as viewed in direction of rotation of the CI, the liquid is prevented from leaking through the gap formed by the baffle 32, because the counterstream of air entering into the plenum chamber will drive the liquid back into the plenum chamber. Moreover, frictional forces between the liquid and the surface 28 of the rotating CI will force the liquid towards the wiper 30. Since this wiper 30 is in elastic contact with the surface 28 of the CI, the liquid will be wiped off and retained in the plenum chamber 26, from where it is sucked away through the suction line 46. The liquid will then be collected in the liquid separator 50 from where it may be recirculated.

[0018] As is shown in Fig. 2, a surge 54 of cleaning liquid will develop inside the plenum chamber 26 in front of the wiper 30, and the amount of liquid in this surge will be determined by an equilibrium between the supply of liquid via the nozzles 38 and the liquid sucked off through the suction line 46. When the surface 28 of the CI passes through the surge 54, any contaminants adhering to that surface will be dissolved in and/or washed away be the cleaning liquid and sucked off through the suction line 46, so that the entire peripheral surface 28 of the CI will be cleaned very efficiently.

[0019] As is shown in Fig. 3, the length of a CI is slightly larger than the length of the body 24 of the cleaning device, and elastic seals 56 are provided for closing the gaps between the CI and the end walls of the plenum chamber 26. It will be understood that the length of the cleaning device is larger than the width of the web 18, so that the entire part of the surface 28 of the CI that is involved in the print process will be cleaned.

[0020] After at least one or preferably several complete rotations of the CI 10, the liquid source 36 will be switched off, and the compressed air source 42 will be activated instead, so that the liquid contained in the surge 54 will be sucked off and then the surface 28 of the CI will be blown dry by means of the compressed air jetted out through the nozzles 44. The blower 48 is kept operating, and its displacement will be larger than the supply of compressed air, so that ambient air is still being sucked-in below the baffle 32, so that no dirt that might still be present within the plenum chamber 26 will be blown out onto the clean surface of the CI. In this way, the surface of the CI will be thoroughly cleaned and dried, until finally, the cleaning device is moved back into its rest position, so that a new print run can be started.

[0021] The height profile of the plenum chamber 26 that is shown in Fig. 3 has the effect that the current of compressed air passing over the CI surface 28 towards the suction line 46 will have an essentially uniform intensity over the entire length of the cleaning device, so that an essentially uniform cleaning and drying action is achieved.

[0022] In a modified mode of operation, the phases in which liquid and compressed air are supplied may overlap, so that the cleaning effect is intensified by the combined action of liquid and compressed air.

Claims

1. A cleaning device (20) for a cylinder (10) of a rotary printing press, comprising an elongated body (24) adapted to be mounted in the printing press so as to extend in parallel with the axial direction of the cylinder (10) and in proximity to the peripheral surface (28) thereof, the body (24) defining a plenum chamber (26) that is open towards the surface (28) of the cylinder (10) and delimited on one side by a wiper (30) adapted to wipe the surface of the cylinder, and on the opposite side by a baffle (32) that forms a gap with the surface (28) of the cylinder, the device further comprising a liquid supply system (34, 36, 38) arranged to supply a liquid into the plenum chamber (26), a compressed air supply system (40, 42, 44) arranged to supply compressed air into the plenum chamber (26), and a suction device (46, 48, 50) capable of withdrawing both, liquid and air from the plenum chamber (26).

2. The cleaning device according to claim 1, comprising a control unit (52) adapted to activate the liquid supply system (34, 36, 38) and the suction device (46, 48, 50) in a first phase of a cleaning process and to activate the compressed air supply system (40, 42, 44) and the suction device in a second phase of the cleaning process.

3. The cleaning device according to claim 1 or 2, wherein the liquid supply system comprises a plurality of nozzles (38) distributed over the length of the body

(24).

4. The cleaning device according to any of the preceding claims, wherein the compressed air supply system comprises a plurality of nozzles (44) distributed over the length of the body (24).

5. The cleaning device according to claim 4, wherein the height of the plenum chamber (26), as measured in a direction normal to the surface (28) of the cylinder (10), increases gradually towards a location where the suction device (46) is connected to the plenum chamber.

6. A rotary printing press comprising a cleaning device (20) according to any of the preceding claims.

7. The printing press according to claim 6, comprising a central back pressure cylinder (10) and a number of colour decks (12) arranged at the periphery thereof, wherein the cleaning device (20) is arranged for cleaning the central back pressure cylinder (10).

8. The printing press according to claim 7, wherein the cleaning device (20) is arranged in a working position directly above a top summit of the cylinder (10).

9. The printing press according to any of the claim 6 to 8, wherein a transport mechanism (22) is provided for moving the cleaning device (20) between a working position and a rest position where it is removed from the cylinder (10).

Fig. 1

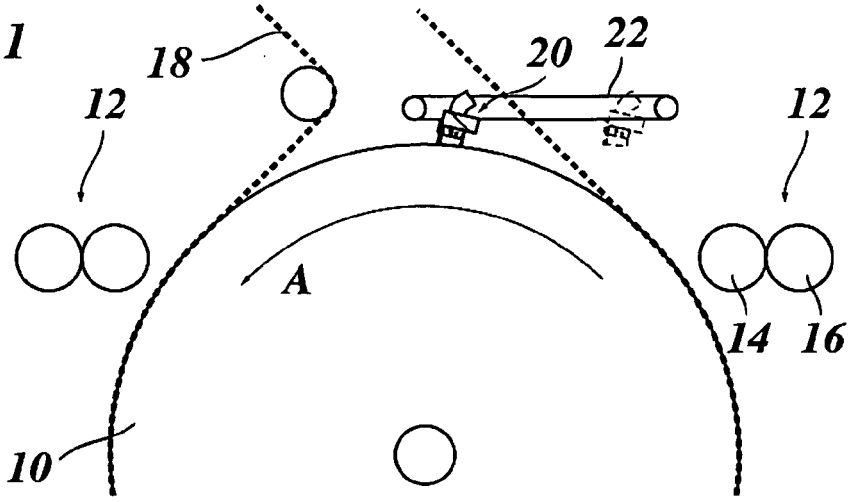


Fig. 2

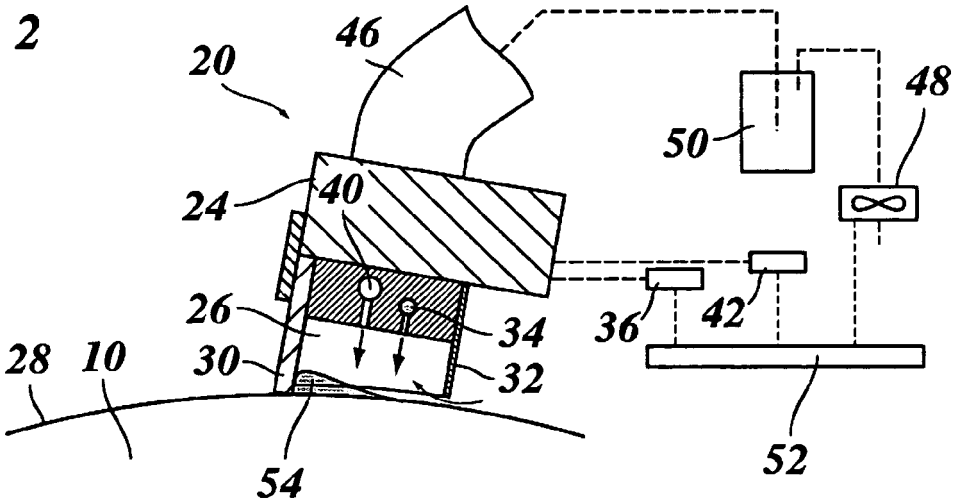
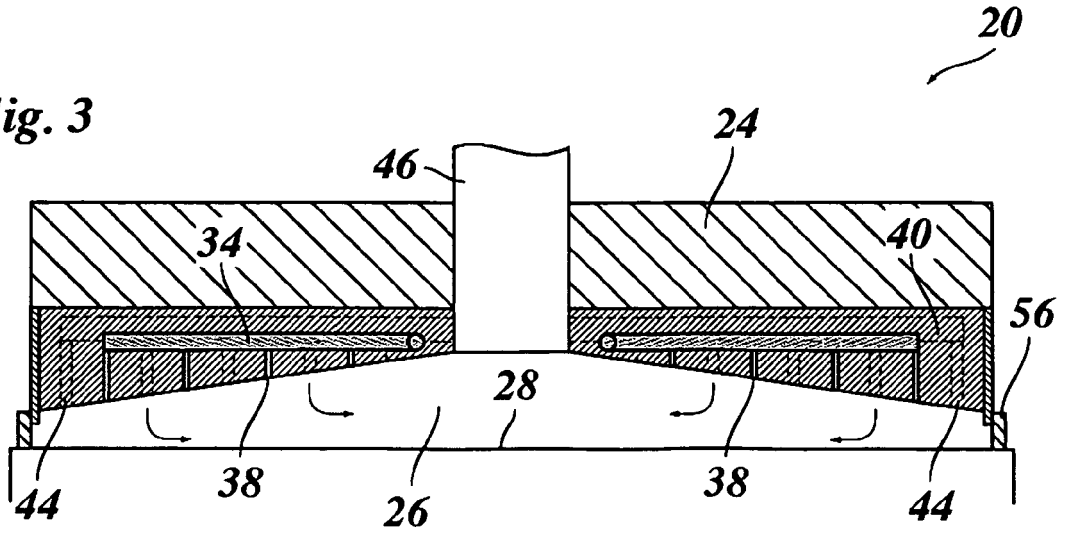


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 08 00 9597

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 03/059625 A (PROCTER & GAMBLE [US]) 24 July 2003 (2003-07-24) * page 5, line 6 - page 10, line 23; figures 1-11 *	1-8	INV. B41F35/02 B41F35/06
Y		9	
Y	EP 0 818 574 A (VOITH SULZER PAPIERMASCH GMBH [DE] VOITH PAPER PATENT GMBH [DE]) 14 January 1998 (1998-01-14) * the whole document *	9	
A	EP 0 747 217 A (ROLAND MAN DRUCKMASCH [DE]) 11 December 1996 (1996-12-11) * the whole document *	1	
A	US 5 657 693 A (KUMAKI TUNEO [JP] ET AL) 19 August 1997 (1997-08-19) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 September 2008	Dewaele, Karl

CATEGORY OF CITED DOCUMENTS

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09-09-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03059625 A	24-07-2003	AU 2003202944 A1	30-07-2003
		CA 2472352 A1	24-07-2003
		EP 1463635 A1	06-10-2004
		MX PA04006484 A	04-10-2004
		US 2003205157 A1	06-11-2003
EP 0818574 A	14-01-1998	CA 2208288 A1	11-01-1998
		DE 19627973 A1	15-01-1998
		US 5964960 A	12-10-1999
EP 0747217 A	11-12-1996	AT 194310 T	15-07-2000
		DE 19520551 A1	12-12-1996
		JP 8332718 A	17-12-1996
		US 5732631 A	31-03-1998
US 5657693 A	19-08-1997	NONE	

EPO FORM P0459

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