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(71) Applicant:
CreoScitex Corporation Ltd.
Herzlia 46103 (IL)

(72) Inventors:
• **Eshed, David**
Kfar Sava 44285 (IL)
• **Kamir, Yosef**
Netanya 42262 (IL)
• **Pilossof, Nissim**
Rehovot 76485 (IL)

(74) Representative:
Freed, Arthur Woolf et al
Reginald W. Barker & Co.,
Clifford's Inn,
Fetter Lane
London EC4A 1BY (GB)

(54) **Apparatus for collecting residual materials dispersed during imaging of flexographic printing plates**

(57) There is disclosed an apparatus for collecting residual material from a flexographic printing member on a Computer-To-Plate (CTP) system, that comprises a nozzle body, a nozzle tip attached to an end of the nozzle body, an adjusting mechanism for adjusting the

nozzle tip in proximity with a printing member on the CTP system, an exhaust blower and a conduit for communication with an end of the nozzle body and the exhaust blower.

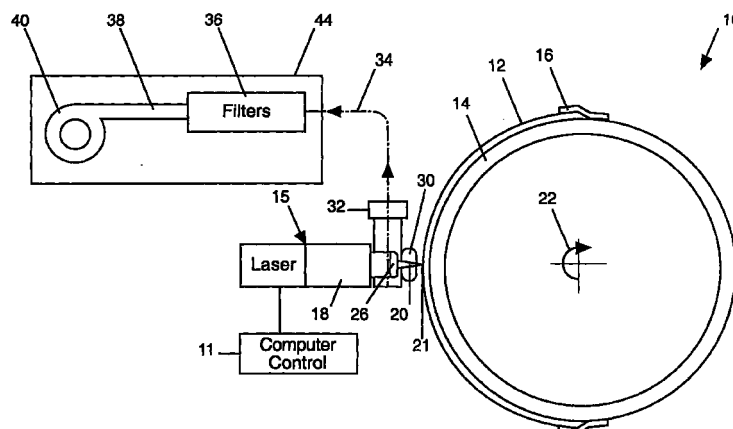


FIG. 2

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Description

[0001] This application claims priority from U.S. Provisional Patent Application, Serial No. 60/153,670, entitled: Apparatus And system For Collecting Residual Materials Dispersed During Imaging of Flexographic Printing Plates, filed on September 14, 1999 and this Provisional Patent Application S/N 60/153,670 is incorporated by reference in its entirety herein.

FIELD OF THE INVENTION

[0002] The present invention relates to an apparatus for collecting residual materials dispersed during the imaging process of flexographic printing plates.

BACKGROUND OF THE INVENTION

[0003] Reference is made to Fig. 1, which schematically illustrates a conventional flexographic Computer to Plate (CTP) imaging system referenced 10. Such an imaging system is, for example, LOTEM FLEX 40/45 plate setter manufactured by the assignee.

[0004] A flexographic plate 12 is attached by strips of adhesive tape 16 to the external surface of drum 14. Such flexographic plates are, for example, type DPS or DPH manufactured by Dupont Cyrel from Wilmington, DE, U.S.A. The flexographic plate 12 may consist of three main layers:

1. The topmost imaging layer is black, it is sensitive to laser radiation in the IR- range. This layer is destroyed where the laser beam strikes, exposing the relief layer.
2. The relief layer, which may consist of plastic monomer sensitive to polymerization by UV radiation.
3. Plastic base material.

[0005] The imaging of the flexographic plate begins with exposure of the black layer to laser beam, so as to expose the monomeric layer according to the required image, under control of computer 11. A consequent radiation of tile plate by UV will polymerize the plastic monomer at the exposed areas, leaving the unexposed area as monomer. Further processing of the plate will accommodate the flexographic plate to printing.

[0006] The drum 14 is rotated in the direction indicated by arrow 22.

[0007] The imaging system 10 further includes a laser system 15, comprising an optical system 18 for transmitting a focused laser beam 20 to the plate 12. Such a laser system may have a wavelength of 830 nanometer and power of 900 mw.

[0008] The optical system 18 is moved on a carriage (not shown) along the drum's longitudinal axis in a direction indicated by arrow 42 of Fig.2. Such travelling speed may be 48-96 mm/min.

[0009] The focused laser radiation on the imaging black layer causes local high temperature and thus local ablation of the black layer. The ablation process may cause some unwanted particulate matter 24 like carbon based particles to be deposited on the flexographic plate or on the optics window 26. Said deposits have detrimental effects on the flexographic plates, as the later exposure to UV will be disturbed. Further, carbon based deposits on the optics aperture will block the laser radiation.

[0010] It is the intention of the present invention to avoid deposition of the said unwanted particles by implementing a special absorption system.

SUMMARY OF THE INVENTION

[0011] It is an object of the present invention to provide an apparatus for collecting residual material from a flexographic printing member on a CTP system, said apparatus comprising:

- a nozzle body having at least a first end and a second end;
- a nozzle tip attached to said nozzle body at said first end thereof;
- means for adjusting said nozzle tip into proximity with said printing member;
- an exhaust blower; and
- a conduit in communication with said second end of said nozzle body and said exhaust blower.

[0012] It is a further object of the present invention to provide an apparatus for collecting residual material from a flexographic printing member on a plateless printing system, said apparatus comprising:

- a nozzle body having at least a first end and a second end;
- a nozzle tip attached to said nozzle body at said first end thereof;
- means for adjusting said nozzle tip into proximity with said printing member;
- an exhaust blower; and
- a conduit in communication with said second end of said nozzle body and said exhaust blower.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the appended drawings:

Fig. 1 is a schematic view of an imaging apparatus of the prior art;

Fig. 2 is a schematic view of the imaging apparatus with the exhausting system, according to a preferred embodiment of the present invention;

Fig. 3 is a schematic isometric view of the imaging drum, laser optics and the exhausting nozzles;

Fig. 4 is an isometric view of the nozzle tip; and

Figs. 5a and 5b are plan view and isometric view, respectively, of the nozzle body.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Attention is drawn to Fig. 2, schematically showing the imaging apparatus as in Fig. 1, with the additional exhausting system. The apparatus provided, in accordance with a preferred embodiment of the present invention, includes a nozzle tip 30 of special configuration, attached to nozzle body 32. The nozzle tip 30 and the nozzle body 32 are mounted on the laser optics 18, so that the nozzle tip 30 is in close vicinity with the laser beam ablation point 21. A flexible pipe 34, shown schematically as a dashed line, is attached in one of its ends to the nozzle body 32 and in its opposite end to an industrial fume exhauster 44, such as Zero Smog WFE35 manufactured by Weller. The fume exhauster comprises sub-micron filters 36 and an exhaust blower 40. Flexible pipe 34 may be constructed of flexible material such as rubber or plastic.

[0015] During the imaging process, the drum 14 rotates at a typical speed of 100-300 rpm, and the optics head travels along the longitudinal axis of the drum at a speed of 100-40 mm/min respectively, in a direction indicated by arrow 42 in Fig.3.

[0016] Attention is drawn now to Figs. 4, 5a and 5b, which are an isometric view of the nozzle tip 30, a plan view of nozzle body 32 and an isometric view of nozzle body 32, respectively. Nozzle tip 30 has screw holes 56, through which it is attached to the nozzle body 32 with matching holes 58. Nozzle tip 30 additionally comprises a front opening 50 and a side opening 54. When nozzle tip 30 is mounted onto nozzle body 32, the side opening 54 coincides with opening 52 of nozzle body 32. Nozzle body 32 additionally comprises adapter 60, adapted to receive flexible pipe 34 of Fig. 2. Nozzle body 32 and nozzle tip 30 may be constructed of any industrial material that can be mechanically processed, e.g. aluminum.

[0017] The angle by which nozzle tip 30 is inclined with respect to imaging drum 14 is determined by selectively adjusting the screws that hold nozzle tip 30 to nozzle body 32. This angle should be adjusted in conjunction with the drum 14 rotation speed, the optical system 18 carriage movement speed and the fume exhauster 44 speed, to assure a thorough collection of the residual particles produced by the imaging process.

[0018] During the imaging process, drum 14 rotates in the direction indicated by arrow 22, while imaging system 15, 18 moves along the longitudinal axis of drum 14, in the direction indicated by arrow 42, applying IR radiation to ablate the black topmost layer of plate 12 according to the required pattern. Fume exhauster 44 causes ablation residual particles to be sucked into nozzle tip 30, through opening 50. The residual particles

then move through opening 54 in nozzle tip 30, which coincides with opening 52 in nozzle body 32, into nozzle body 32. The residual particles are then sucked through nozzle body 32 into flexible pipe 34. The particles enter fume exhauster 44, where they are trapped by filters 36. The filtered air is blown out by exhaust blower 40.

[0019] It will be appreciated that the CTP system described hereinabove in conjunction with the present invention may be a system dedicated to flexographic plate imaging, or a plateless flexographic printing system, on which the printing process takes place after the plate has been imaged.

Claims

1. An apparatus for collecting residual material from a flexographic printing member on a CTP system, said apparatus comprising:
 - a nozzle body having at least a first end and a second end;
 - a nozzle tip attached to said nozzle body at said first end thereof;
 - means for adjusting said nozzle tip into proximity with said printing member;
 - an exhaust blower; and
 - a conduit in communication with said second end of said nozzle body and said exhaust blower.
2. An apparatus according to claim 1, wherein said CTP system is part of a plateless flexographic printing system.

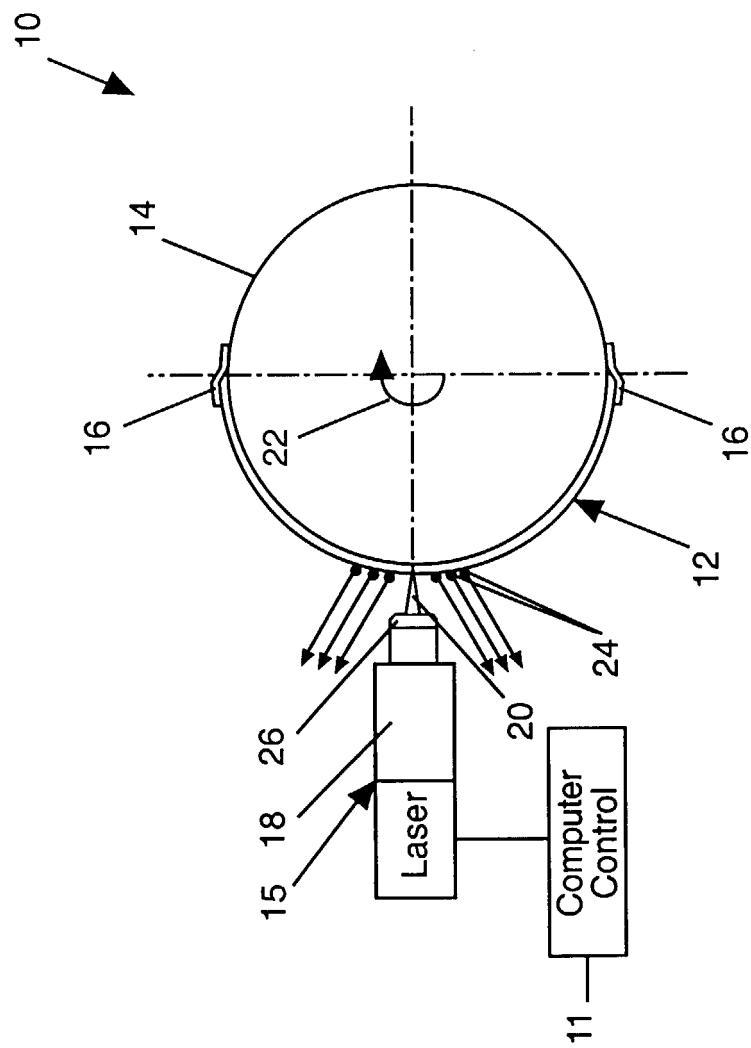


FIG. 1 (Prior Art)

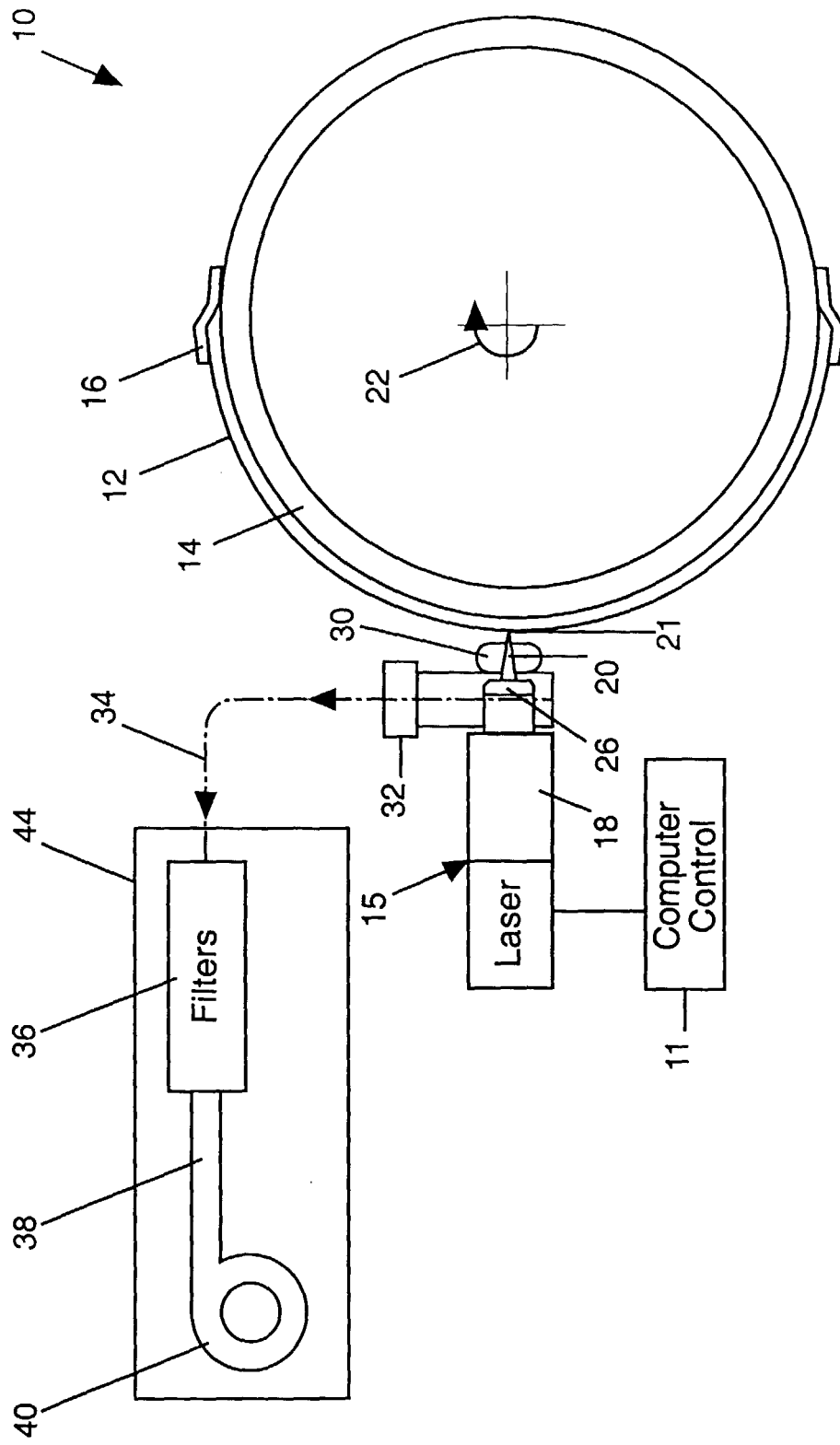


FIG. 2

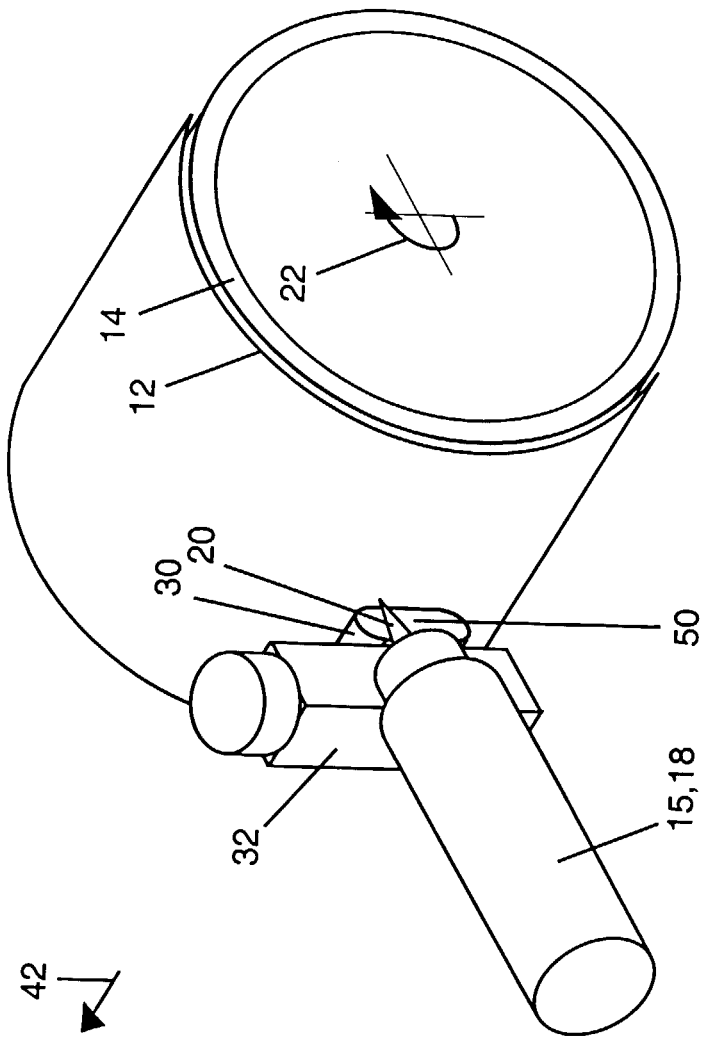


FIG. 3

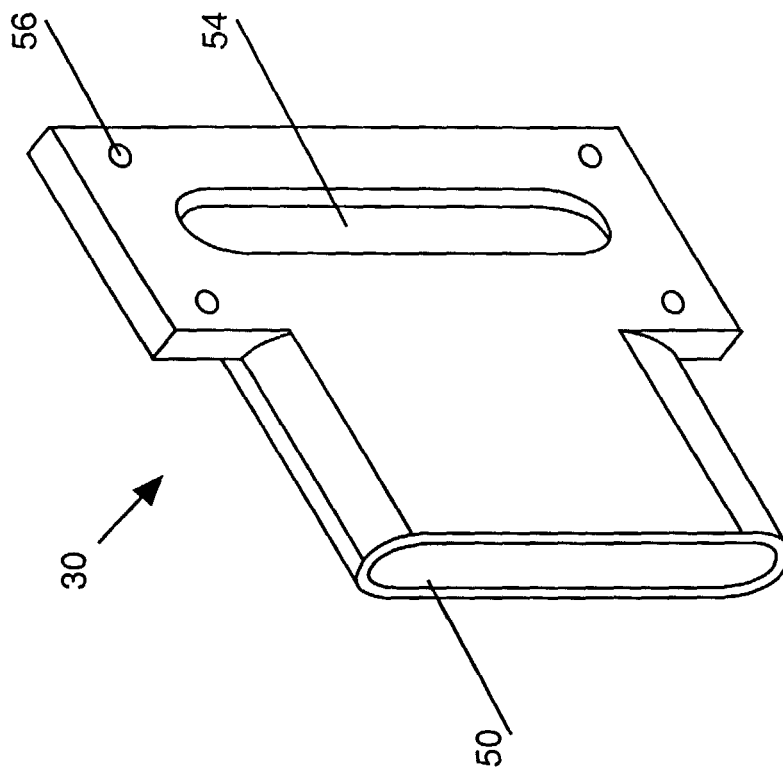


FIG. 4

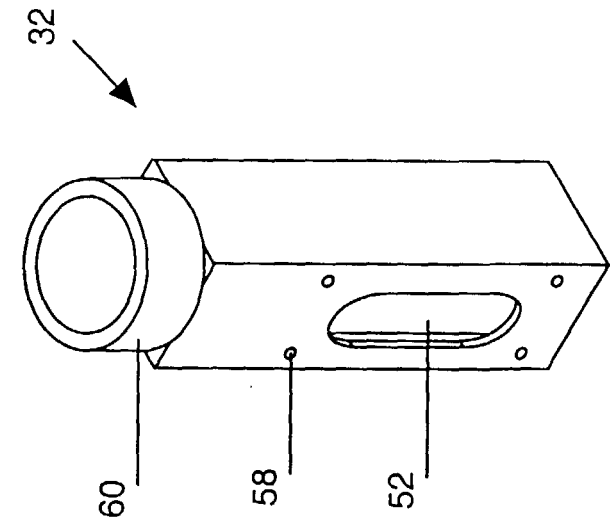


FIG. 5a

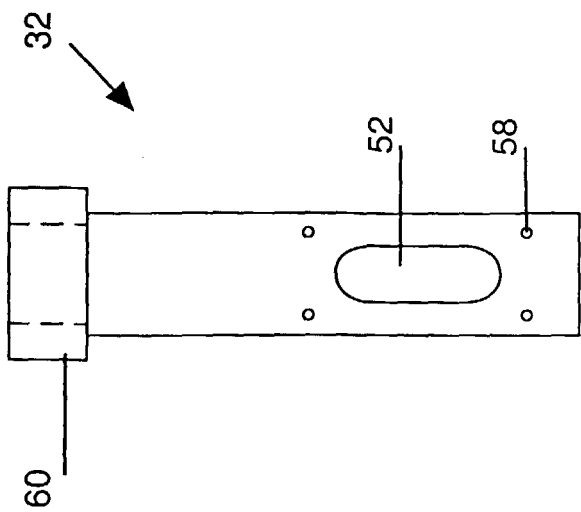


FIG. 5b