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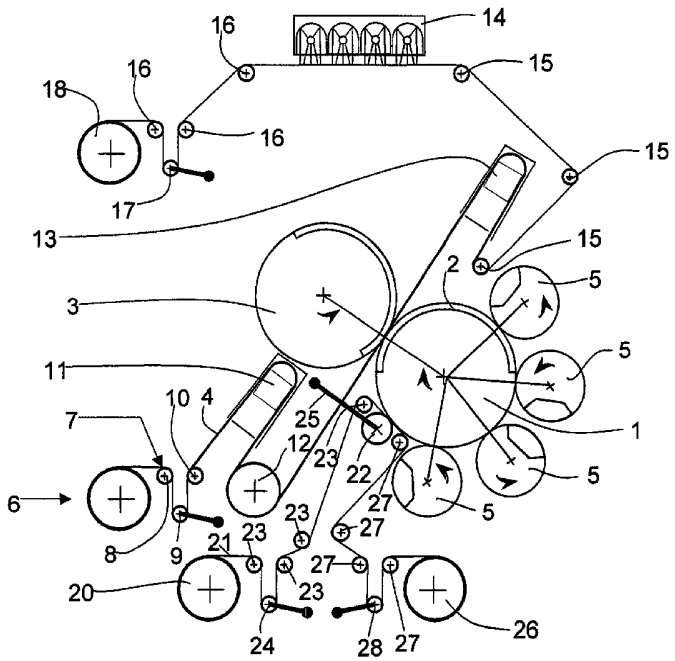
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(54) Title: INTAGLIO PRINTING MACHINE




(57) Abstract: The machine for printing items, such as securities, on a substrate, comprises at least a plate cylinder (1) supporting at least one printing plate (2) and inked by inking units, and an impression cylinder (3), both cylinders (2,3) forming a printing nip through which the substrate (4) passes during the impression operation. It further comprises a wiping system (21,22) for wiping the ink on the plate cylinder and a high energy beam drying system (14) to dry the printed substrate (4).

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Intaglio printing machine

The present invention concerns an intaglio printing machine for printing items, such as securities, on a substrate comprising at least a plate cylinder supporting at least one printing plate and inked by inking units, and an impression cylinder, both cylinders forming a printing nip through which the substrate passes during the impression operation.

Sheet fed or web fed Intaglio printing machines are known in the art. US patent 5,062,360, the content of which is enclosed by reference in the present application, discloses an example of such a printing machine. The known machine is a rotary web-fed printing machine with three successively arranged printing units and is able to print securities, such as banknotes, with a safety background with a main design made by an intaglio printing process. As is conventional in web-fed printing machines, the paper web is transported continuously at a speed which is equal to the circumferential speed of the printing cylinders of the printing units forming a printing nip between the cylinders, since the web is continuously gripped between the cylinders. As a first intaglio printing unit, this machine comprises a plate cylinder mounted in a stand and an impression cylinder interacting with the plate cylinder. The plate cylinder has sectors which are separated by cylinder pits and on which printing plates are mounted. The plates are clamped on said sectors by gripping means arranged in said pits. The impression cylinder has corresponding equal number of sectors also separated by pits and both cylinders form the printing nip. The plate cylinder is inked in a direct or indirect manner, as is known in the art. In the disclosed machine, the web is also printed on its other side by a second intaglio printing unit similar to the first intaglio printing unit.

The aim of the invention is to improve the known printing machines.

More specifically, an aim of the invention is to provide an intaglio printing machine that is efficient and simple.

To this effect, the printing machine according to the present invention is defined by the features of the claims.

The invention will be best understood by the detailed description of an embodiment of a machine according to the invention with reference to the drawings in which the single figure shows an intaglio web-fed printing machine according to the invention.

The web-fed intaglio printing machine comprises a plate cylinder 1, carrying at least a plate 2, which is held on the cylinder 1 by known conventional means (not shown), for example clamping bars in pits formed in the cylinder 1. Next to the plate cylinder 1, there is an impression cylinder 3, which presses the web 4 against the plate cylinder in the printing nip formed between both cylinders 1 and 3. The plate cylinder is inked by several inking rollers 5, in the example a direct inking system is represented, which are themselves inked by corresponding inking units (not shown) as is known in the art. The principle of direct and indirect inking is disclosed in US 5,062,360 incorporated herein by reference as an example. The web of substrate, for example paper, is taken from a production paper unwinding unit 6 which also comprises a tensioning system 7 made of three rollers 8 to 10, the roller 9 being movable to control the tension in the web 4. After the tensioning system 7, the web passes into a paper-web store 11, which, as an example, works with air under depression, i.e. a vacuum chamber. This paper-web store 11 is known per se in the art and is controlled in such a way that tension in the web is maintained at a preset value. The paper web is then driven by a stop-and-go draw roller 12. This draw roller 12 is individually controlled intermittently for a forward a backward movement of the web 4. This roller 12 can be a suction roller similar to the one disclosed in US 5,062,360 driven by an independent motor. The stop-and-go roller 12 is used to adapt the motion of the paper web to the repeat length of the prints on the plate. Depending on the size of the individual prints and their number on each plate carried by the plate cylinder 1, it is necessary to be able to displace the web in a stop-and-go manner so that successive prints made by the plates can be placed close to each other on the web, thus saving web material.

Accordingly, the web 4 exiting the store 11 loops around the roller 12 and then runs through the printing nip formed by cylinders 1 and 3.

After the printing nip, the printed web 4 is maintained in tension by second paper-web store 13 and is guided to high energy beam drying units 14 by rollers 15. The drying units 14 may be UV lamps that dry the side of the web 4 on which the printing ink has been deposited. Other possible high energy beam drying units include electron beam systems, as made by the Firm Energy Science Incorporated, and excimer UV radiating systems, both known in the art. After the drying units 14, rollers 16 and 17 guide the web 4 to a production paper rewind unit comprising, for example, roll 18. The web is maintained under tension by a movable roller 17. Once a complete web has been printed, roll 18 is taken away for further treatment, for example other printing operations, cutting into individual sheets, quality control etc.

The machine according to the invention also comprises a wiping unit using wiping paper. The wiping unit comprises firstly a wiping paper unwind system, with, for example a roll 20 of wiping paper 21, the wiping paper 21, in the present example having the shape of a continuous paper web, being guided to a wiping paper application cylinder 22 by rollers 23, 24. Roller 24 can be displaced in order to maintain a predetermined tension in the wiping paper 21. The wiping paper 21 is then applied against the plate cylinder 1 by a wiping paper application cylinder 22. Said cylinder 22 is moved towards and away from the plate cylinder 1 by a moving system schematically represented by a rotatable bar 25 in the figure. The wiping paper 21 is applied (contrary to the direction of rotation of the plate cylinder 1) after the inking units but before the printing nip, and is used to wipe the ink present outside the cuts of the plate 2 carried by the plate cylinder 1 to improve the quality and precision of the inking. Preferably, the application of the wiping paper 21 is adapted to the size of the plates 2 and to the position of the engravings in the plates 2 in order to minimize consumption of wiping paper 21. The wiping paper 21, once used is brought to a wiping paper rewind system 26, comprising for example a rewind roll, by rollers 27, 28. Roller 28 may be displaced in order to maintain a predetermined tension in the wiping paper 21 web.

The machine described in reference to the figure is only disclosed as an exemplary embodiment, variations are possible without restrictions and many alternative versions as regards the numbers and type of rollers, of paper stores are possible. Not only printing is possible in such a machine but also quality control, cutting operations may be added.

Further, it is possible to use direct inking units for the plate cylinder (as shown in the figure) or indirect printing units with a collecting cylinder. Such indirect print units are disclosed in US 5,062,360 and the corresponding description is enclosed by reference in the present application.

Claims

1. Intaglio printing machine for printing items, such as securities, on a substrate, comprising at least a plate cylinder (1) supporting at least one printing plate (2) and inked by inking units, and an impression cylinder (3), both cylinders (2,3) forming a printing nip through which the substrate (4) passes during the impression operation, being characterised in that it comprises a wiping system (21,22) for wiping the ink on the plate cylinder and a high energy beam drying system (14) to dry the printed substrate (4).

2. Intaglio machine as claimed in claim 1, characterised in that said substrate is a paper web (4).

3. Intaglio machine as claimed in claim 1 or 2, characterised in that said wiping system comprises a web of wiping paper (21).

4. Intaglio machine as claimed in claim 3, characterised in that the wiping system further comprises a wiping paper unwind roll (20) and a wiping paper rewind roll (26), said wiping paper (21) being applied against said plate cylinder (1) by a wiping paper application cylinder (22) actuated in accordance with the size of the plate (2) and the position of the cuts in the plate (2).

5. Intaglio machine as claimed in one of the preceding claims, characterised in that the drying system (14) comprises UV lamps, or an electron beam device or an excimer radiator.

6. Intaglio machine as claimed in one of the preceding claims, characterised in that it further comprises a stop-and-go system (12) for displacing the substrate (4).

7. Intaglio machine as claimed in one of the preceding claims, characterised in that it further comprises stores (11, 13) for storing said substrate before and after the printing nip.

8. Intaglio machine as claimed in one of the preceding claims, characterised in that said stores are vacuum chambers (11, 13).

9. Intaglio machine as claimed in one of the preceding claims, characterised in that said inking units are direct inking units with inking rollers (5).

10. Intaglio machine as claimed in one of claims 1 to 8, characterised in that said inking units are indirect inking units with inking rollers and a collecting cylinder.

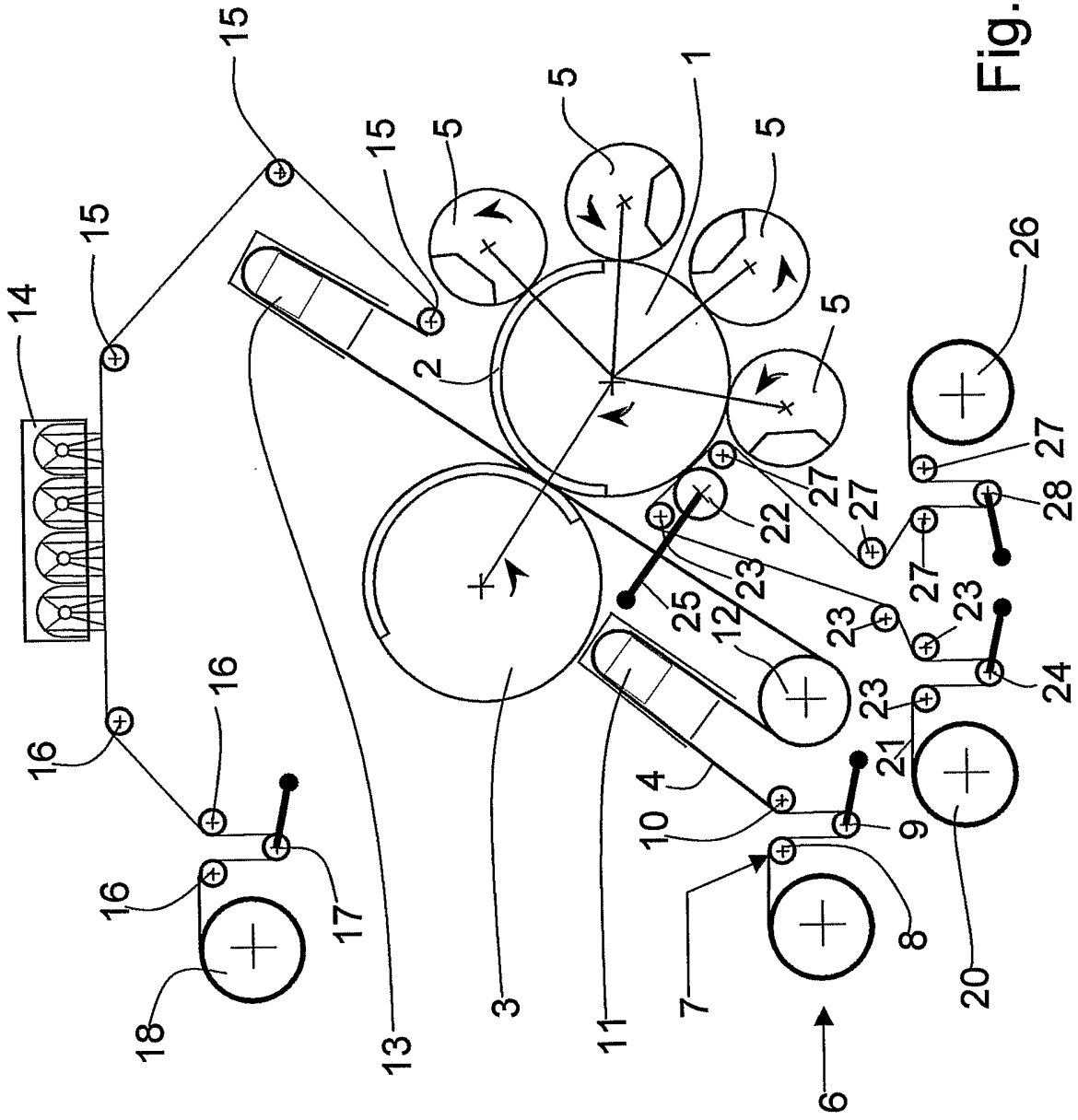

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Fig.1

# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41F11/02 B41F9/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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| 22 December 2003 | 05/01/2004 |

| Name and mailing address of the ISA | Authorized officer |
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| European Patent Office, P.B. 5818 Patentlaan 2<br>NL – 2280 HV Rijswijk<br>Tel. (+31–70) 340–2040, Tx. 31 651 epo nl,<br>Fax: (+31–70) 340–3016 | Loncke, J |

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