(54) Title: CONVERSION OF PRINTING PLATE CYLINDERS FOR INCREASED PRINTING LENGTH

(57) Abstract:
Devices for converting a printing plate cylinder from a first configuration that provides a first printable length to a second configuration that provides a second printable length greater than the first printable length.
ABSTRACT

Devices for converting a printing plate cylinder from a first configuration that provides a first printable length to a second configuration that provides a second printable length greater than the first printable length.
CONVERSION OF PRINTING PLATE CYLINDERS FOR INCREASED PRINTING LENGTH

Technical Field

The present invention relates generally to printing presses. More particularly, the present invention relates to conversion of printing plate cylinders from a first configuration that provides a first printable length to a second configuration that provides a second printable length greater than the first printable length. In an exemplary embodiment, the present invention relates to conversion of printing plate cylinders from a two-page-around configuration to a three-page-around configuration.

Background

A schematic drawing of an exemplary printing unit 10 for use in web printing is shown in Figure 1. The printing unit 10 includes, among other functional components, plate cylinders 12 and blanket cylinders 14. In use, the blanket cylinders 14 press web 16 (or substrate), typically paper, against printing plates, 18 and 20, mounted on the plate cylinders 12 that include the image to be printed. The printing plates, 18 and 20, as shown, are wrapped around the plate cylinders 12 and secured in place with two lockup mechanisms, 22 and 24, that are each removably positioned within respective channel, 26 and 28, of the plate cylinders 12.

The printing unit 10 illustrated in Figure 1 is conventionally referred to as being configured for two-page-around printing because two printing plates are used to form two printed pages. In one configuration, both printing plates have the same image so that two identical pages are printed with one revolution of the plate cylinders 12. In another configuration, the printing plates have different images such as consecutive pages so that two pages can be printed with one revolution of the plate cylinders 12.

Referring to Figure 2, an exemplary web 16 to be printed is shown. In the illustrated exemplary two-page-around configuration there are two printable image regions, 15 and 17, of the web 16 having length x (and width that depends on the particular printing unit) and two non-printable regions, 19 and 21, of the web 16 where no image is printed having length y. Printable image regions, 15 and 17,
greater than the first printable length is provided. The method comprises removing a lockup mechanism (or similar device) from a channel of a printing plate cylinder and positioning a conversion device in accordance with the present invention in the channel of the printing plate cylinder, wherein the conversion device comprises a supporting surface having a radius matching the radius of the supporting surface of the printing plate cylinder.

In another exemplary aspect of the present invention a method of converting a printing plate cylinder from a two-page-around configuration to a three-page-around configuration is provided. The method comprises removing a lockup mechanism (or similar device) from a channel of a printing plate cylinder and positioning a conversion device in accordance with the present invention in the channel of the printing plate cylinder, wherein the conversion device comprises a supporting surface having a radius matching the radius of the supporting surface of the printing plate cylinder.

**Brief Description of the Drawings**

The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate several aspects of the present invention and together with description of the exemplary embodiments serve to explain the principles of the present invention. A brief description of the drawings is as follows:

Figure 1 is a schematic view of an exemplary printing unit showing plate cylinders having printing plates and that can include a conversion device in accordance with the present invention in the place of a lockup mechanism (or similar device).

Figure 2 is a schematic view of an exemplary web that can be printed on with the printing unit shown in Figure 1 and showing exemplary printable and non-printable areas for an exemplary two-page-around configuration.

Figure 3A is a partial perspective view of an exemplary plate cylinder having an exemplary conversion device in accordance with the present invention in the place of a lockup mechanism (or similar device).

Figure 3B is an end view of the plate cylinder of Figure 3A.

Figure 3C is a partial cross-sectional of the plate cylinder of Figure 3A.
Referring to Figure 4, exemplary web 16 shows printable area 23 and non-printable area 25 for an exemplary single plate configuration in accordance with the present invention. In this exemplary configuration the length of printable area 23 is equal to 2x+y as compared to the web shown in Figure 2. Advantageously, using conversion devices in accordance with the present invention thus provides an increased printable length by providing the ability to print an image in non-image area 19.

Referring to Figures 5A-5C, cross-sectional views of conversion device 36 as positioned within channel 34 of plate cylinder 30 are shown. In Figures 5A-5C, printing plate 40 is shown as operatively positioned on and supported by plate cylinder 30. Referring to Figure 5B, a partial cross-sectional view of conversion device 36 taken through exemplary fastener 41 is shown. Fastener 41, as shown, comprises a conventional threaded bolt. It is contemplated however, that any desired fastening technique can be used to functionally and operatively secure a conversion device relative to a plate cylinder in accordance with the present invention. Moreover, fasteners that provide additional functionality, such as for adjusting the position of a conversion device relative to a plate cylinder in accordance with the present invention can be used. Devices for providing such adjusting can also comprise a device distinct from a device, such as a fastener or the like, for securing a conversion device relative to a plate cylinder in accordance with the present invention.

In typical use, pressure is applied to printing plate 40 to transfer an image from printing plate 40 to a substrate or web such as paper, for example. To provide image transfer, printing plate 40 needs to be properly and sufficiently supported to receive such pressure. A such support is provided by the outside surface of plate cylinder 30 and is important for achieving the desired image quality. However, when a plate cylinder having plural lockup mechanisms (or similar devices), such as exemplary plate cylinder 30, is used with a single printing plate (such as printing plate 40), only one of the lockup mechanisms is needed. Omission of the additional lockup mechanism(s) creates an undesired gap in the supporting surface of the plate cylinder corresponding with the channel of the additional lockup mechanism(s). See for example, channel 38 of plate cylinder 30.
A conversion device in accordance with the present invention preferably includes one or more features that allow the position of the conversion device to be adjusted relative to a plate cylinder in which the conversion device is installed. In one exemplary embodiment, conventional shims are used. In another exemplary embodiment, mechanical devices integrated with a conversion device are used. For example, one or more set screws can be used to adjust the position of the conversion device relative to a plate cylinder. Preferably, the supporting surface of the conversion device is sufficiently aligned with the supporting surface of a plate cylinder so a sufficiently smooth transition between the supporting surface of the plate cylinder and the supporting surface of the conversion device is provided. See Figure 5C, for example, which shows the portion of Figure 5A identified with reference numeral 43. Preferably, as shown, conversion device 36 includes bench 45 that minimizes any potential gap (or un-supporting region) between conversion device 36 and plate cylinder 30. Conversion device 36, in the region where conversion device 36 meets plate cylinder 30, may comprise any features or geometry such as extension portions or the like that function to minimize any potential gap formed between conversion device 36 and plate cylinder 30.

Any desired material can be used for a conversion device in accordance with the present invention. Preferably, the material used for a conversion device matches the material used for a plate cylinder of which the conversion device is used. The materials of the conversion devices and plate cylinders do not, however, need to match. Dissimilar materials can be used, if desired.

An exemplary conversion device 42 in accordance with the present invention is shown in Figure 6 and can be used in the same manner as described with respect to conversion device 36 herein. Conversion device 42 comprises mounting features 44 for attaching conversion device 44 to a plate cylinder and includes openings 46 for mass management of conversion device 42. Conversion device 42 also includes support surface 48 and which is formed to have the radius of the plate with which conversion device 42 will be used. Other geometrical aspects of conversion device 42 are determined based on the particular plate cylinder with which conversion device 42 will be used.
What is claimed is:

1. A conversion device for use with a printing plate cylinder to replace a lockup mechanism, the conversion device comprising a body comprising one or more mounting features to attach the device to a printing plate cylinder and a support surface having a radius substantially matching the radius of a printing plate support surface of the printing plate cylinder.

2. The conversion device of claim 1, comprising one or more adjusting device that can adjust the position of the support surface of the conversion device relative to the printing plate support surface of the printing plate cylinder.

3. The conversion device of claim 1, comprising one or more balancing feature.

4. The conversion device of claim 3, wherein the one or more balancing feature comprises at least one of addition or removal of weight.

5. The conversion device of claim 1 in combination with a printing plate cylinder.

6. The combination of claim 5, wherein the conversion device is positioned in a channel of the printing plate cylinder.

7. A method of converting a printing plate cylinder from a first configuration that provides a first printable length to a second configuration that provides a second printable length greater than the first printable length, the method comprising:
   
   removing a lockup mechanism from a channel of a printing plate cylinder; and

   positioning a conversion device in the channel of the printing plate cylinder, wherein the conversion device comprises a support surface having a radius matching the radius of the support surface of the printing plate cylinder.

8. The method of claim 7, comprising aligning the support surface of the conversion device with the support surface of the printing plate cylinder.

9. The method of claim 8, comprising aligning the support surface of the conversion device with the support surface of the printing plate cylinder by