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I. GURWICK
PRINTING MECHANISM
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2,272,406

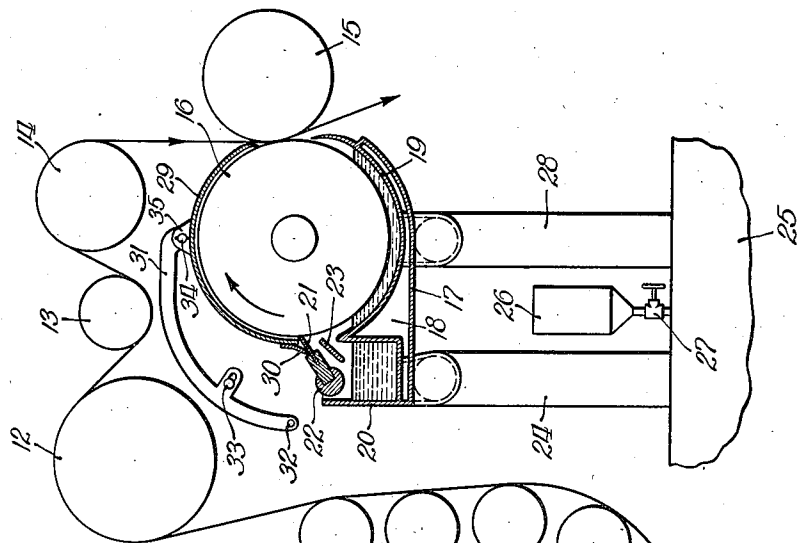


Fig. 1.

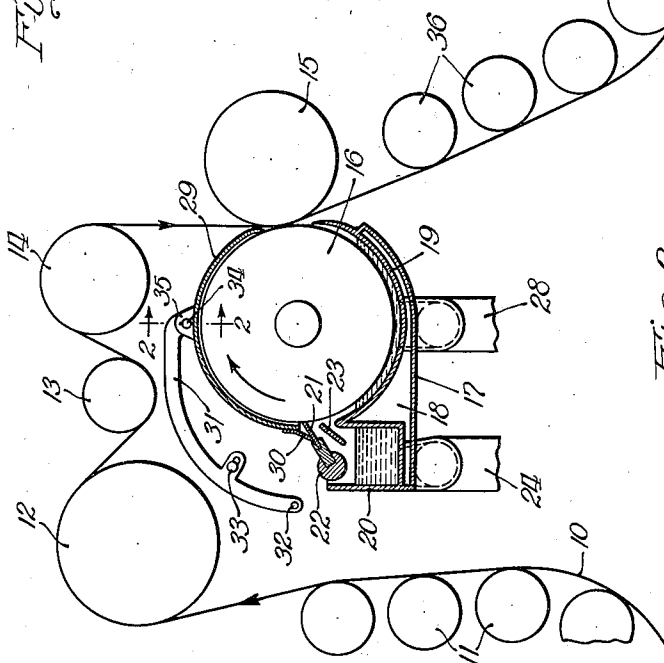
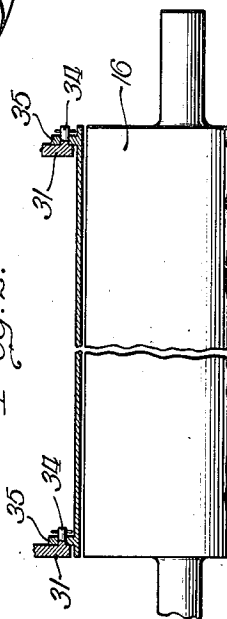


Fig. 2.



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PRINTING MECHANISM

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10 Claims. (Cl. 101—157)

The present invention relates to an improved type of printing device and has as a principle object the provision of a color unit for intaglio printing machines, in which vaporization of solvents is inhibited between the doctor blade and the point of deposit of ink, preferably by a cover member which is positioned between a color bath or doctor blade and the web to be printed.

An additional object is to provide a printing unit in which a printing cylinder carrying a quick-drying ink is protected against the drying effect after being wiped and prior to printing which has been encountered heretofore.

A further object is the provision of a multi-color intaglio printing machine in which the web to be printed is contacted with the etched printing cylinder on the side of the cylinder while traveling downwardly, the web having an initial downward and then upward movement between color units.

Another object is the provision of an intaglio or like printing device in which the impression roll and line of contact with the web to be printed are positioned on the vertical side of the printing cylinder opposite the doctor blade and the cylinder is provided with means for inhibiting vaporization of solvents between the doctor blade and impression line.

A still further object is the provision of an improved intaglio press for printing a web of lustrous non-fibrous material such as regenerated cellulose while the web is traveling downwardly, the etched cylinder for depositing the color being incased to prevent drying of high volatile solvents during the extra travel necessitated by the printing position of the web.

These and other objects will be evident upon consideration of the following description of a preferred embodiment of the invention and by reference to the accompanying drawing, in which

Fig. 1 is a side view, partly in section, of my improved apparatus; and

Fig. 2 is a fragmentary sectional view taken along line 2—2 of Fig. 1 and showing details of the printing cylinder cover.

In the printing of transparent cellulose sheeting the non-absorbent character of the stock presents problems of register and offset prevention which are of particular importance. The only method by which this material may be printed satisfactorily without the use of slip sheets, sandpaper and the like is as described in my Patent No. 1,367,314, in which quick-drying intaglio inks are deposited on the web in a color-on-color manner, and it is to this type of print-

ing that the present invention refers in particular.

In the drawing only two color units have been shown, but it will be understood that any convenient number of units may be employed in the machine, the construction being such as to be particularly adapted for use in a plurality of units. Only so much of the machine has been shown as will be necessary to an understanding of the invention, the other elements of the machine such as the drive, frame, feed, and rewind being conventional, one satisfactory construction being shown in my prior Patents Nos. 1,867,405 and 2,024,354.

The web 10 of transparent cellulose sheeting is shown as initially rising from a color unit which is not shown and being supported by a bank of closely spaced supporting rolls 11. At the top of its path of travel the web 10 passes over a relatively large driven roll 12 and has approximately 180° travel about this roll. This large lap provides a substantial area of frictional contact which allows the roll to drive the web by frictional contact and to progress the web through the machine. From roll 12 the web passes beneath an idler roll 13 and then laps over another relatively large driven roll 14, again having approximately 180° contact with the driven roll.

From driven roll 14 the web passes directly downwardly and between an impression cylinder 15 and a printing cylinder 16 of the first color unit shown, the former being positioned on one side of the printing cylinder instead of directly above. This side mounting of the impression cylinder results in a web contact line which is approximately 180° from the doctor blade by which excess ink is removed from the cylinder, as will be seen in the drawing.

The color unit is built around the etched intaglio printing cylinder 16 which is journaled in suitable supporting structure (not shown). The printing contact is made while the web is in downward travel and on the side of the printing cylinder.

Directly beneath the cylinder 16 is a color bath indicated generally at 17. The outer jacket of bath 17 forms a water circulating chamber 18 through which cold water is passed to maintain the ink in the bath at a relatively low temperature. The pool of ink maintained in contact with the lower part of the printing cylinder is held in the inner jacket 19. As the printing cylinder rotates in the direction shown by the arrow the ink adjacent the cylinder tends to pass into the side chamber 20.

A doctor blade 21 is mounted on a pivot 22 adjacent the left side of the cylinder and within chamber 20 of the color bath. To relieve the doctor blade of the centrifugally thrown ink which otherwise would strike it, a baffle 23 is provided. This baffle deflects the ink downwardly into chamber 20. From chamber 20 the ink passes into an outlet conduit 24 and from this conduit into a circulation reservoir 25 in which a relatively large quantity of the ink may be maintained in a state of agitation.

An auxiliary solvent tank 26 is mounted in the top of tank 25 and its valve 27 is adjusted to allow a gradual seepage of solvent into the reservoir to make up for evaporation losses.

From the reservoir the ink is pumped through line 28 back into the color bath, thereby maintaining a fresh and uniform supply in the color bath at all times.

It will be noted that the distance between the doctor blade and the web is almost 180°, due to the position required for the downward passage of the web during the printing operation. By the mechanism shown in the drawing it is possible to obtain even better printing results than possible heretofore even with this unusual distance between the color bath and the web. Between the doctor blade and the impression cylinder the printing cylinder is provided with a shield or cover 29 which is substantially concentric with the printing cylinder and slightly spaced therefrom.

The after end of the cover 29 preferably is positioned close to the end of the doctor blade but far enough away to permit manipulation of the latter.

The forward end of shield 29 extends to a point closely adjacent the web, so that the printing cylinder is protected against volatilization of the solvent from the ink it carries throughout its travel from the doctor blade to the web. A seal is provided between the doctor blade and the shield 29 by means of a flexible strip 30 attached to the shield and lightly bearing against the base of the doctor blade as shown in the drawing.

At the top of cover 29 are attached marginal supporting arms 31 which extend back to a point adjacent chamber 20. The other ends of arms 31 are pivoted at 32 to allow for adjustment of the position of the shield or cover with respect to the cylinder. Adjustable stop members 33 are positioned adjacent arms 31 and act as supports for the arms and the cylinder shield.

The attachment of the shield to arms 31 may be seen in Fig. 2. Arms 31 are provided with pins 34 which slip into engagement with openings in flanges 35 attached to the shield. Thus, the shield may be dismounted to provide access to the printing cylinder merely by longitudinal movement with respect to the cylinder.

After the web leaves the printing cylinder it passes downwardly beneath a second set of closely spaced rolls 36 and then upwardly to driven drum 12 of the next color unit. These rolls 36 provide closely spaced lines of contact which materially assist in maintaining the web in proper register. Some of the rolls 36 may be heated to expedite the drying of the freshly deposited ink, and it is preferred to drive the rolls to prevent frictional drag on the web.

In operation the web is progressed through the machine by the described intermediate driven rolls 11, 12, 14 and 36 which have a carrying effect that inhibits distorting stresses on the web such as are apt to occur where reliance is

placed on draw rolls positioned at the delivery end of the machine. The printing of the web while traveling downwardly provides for a minimum web travel between units and a minimum amount of "dead web." That is, the freshly printed side of the web does not come in contact with the guide rolls until the roll 12 of the succeeding color unit is reached. As a result the press may be operated at an advantageous speed with improved printing registration. At the same time breakage and other waste is maintained at a minimum.

The distance between the protective covering 31 and the printing cylinder preferably is small. It may be of the order of a few thousandths of an inch. Rotation of the printing cylinder causes the space between the cover and the cylinder to become filled with the solvent vapor from the ink and thereafter the cylinder operates in an atmosphere saturated with the solvent which prevents evaporation from the cylinder, thereby making possible an excellent quality of printing during downward travel of the web at a point spaced substantially from the doctor blade. The web travel between units is short but ample to provide for complete drying of the web. In fact the protective covering permits the use of lower boiling solvents which dry quite rapidly without gumming the printing cylinder. As the cylinder rotates the tendency is for a current of air to flow between the shield and printing cylinder in the direction of rotation of the latter. The resilient seal between the doctor blade and the shield effectively prevents this air flow.

The shield plate may have a variety of shapes and may be mounted variously with respect to the printing cylinder. Side bearers resting on the edges of the cylinder or shaft, end seals and the like may be employed if desired. The particular form shown in the drawing is illustrative of the invention and other satisfactory embodiments likewise may be utilized.

The many changes which may be made in the invention as described herein for the purpose of explanation are intended to be included in the appended claims.

I claim:

1. Apparatus for intaglio printing with a quick-drying ink, comprising an intaglio printing cylinder, means for directing a web to be printed in contact with said cylinder on the downwardly turning side of the latter, a color bath for said cylinder, a doctor blade for removing excess color from said cylinder, and an imperforate cover member for said cylinder positioned between said doctor blade and said web, said member being closely positioned about said printing cylinder.

2. Apparatus of the type described, comprising a printing cylinder, means for passing a web to be printed downwardly in contact with said cylinder on the side thereof, a color bath for said cylinder, and means positioned between said color bath and said web for preventing escape of drying quantities of vapor, said last named means comprising a shell fitted in closely spaced relation with respect to said cylinder.

3. In a printing unit of the type described, a printing cylinder, a color bath therefor, an impression cylinder and an imperforate cover member for said printing cylinder extending between said color bath and said impression roll, said cover member being spaced from said printing cylinder in closely adjacent relation.

4. A printing press of the type described, comprising a series of spaced intaglio units each hav-

ing an etched printing cylinder and a driven roll progressing a web downwardly adjacent one side of said cylinder, a color bath, a doctor blade on the other side of said cylinder, and a closely spaced vapor retaining means positioned between said doctor blade and said web.

5. Apparatus of the type described, comprising a printing cylinder, an adjacent impression cylinder, an ink fountain for said cylinder, an adjustable doctor blade for removing excess ink from said cylinder, an imperforate cover member for said cylinder positioned between said doctor blade and said impression cylinder, said cover comprising a closely fitting shell and a flexible connection extending between said cover and said doctor blade.

6. Apparatus of the type described, comprising a printing cylinder, an adjacent impression cylinder, an ink fountain for said cylinder, an adjustable doctor blade for removing excess ink from said cylinder, a vapor retaining cover member for said cylinder positioned between said doctor blade and said impression cylinder, and means forming a seal between said cover and said doctor blade.

7. A method of feeding a web through a multi-color printing press including a plurality of aligned and substantially horizontally disposed printing couples, which comprises feeding the web from a source of supply to a position above the first printing couple; passing said web substantially vertically downwardly through said printing couple; continuing the downward movement of the web and then leading it upwardly, with the printed surface free from contact with any other surface, to a position above the next adjacent printing couple; and feeding said web substantially vertically downwardly through such next printing couple.

8. A method of feeding a web through a multi-color printing press including a plurality of printing couples, each having a printing cylinder

and an impression cylinder cooperatively mounted at the side thereof, which comprises feeding the web to a position above the first printing couple; passing said web downwardly through said printing couple; continuing the downward movement of the web and then leading it upwardly, with the printed surface free from contact with any other surface, to a position above the next adjacent printing couple; and feeding said web downwardly through such next printing couple.

9. A method of feeding a web through a multi-color printing press including a plurality of printing couples, each having a printing cylinder and an impression cylinder cooperatively mounted at the side thereof, which comprises feeding the web to a position above the first printing couple; passing said web downwardly through said printing couple; continuing the downward movement of the web and then leading it upwardly, with the printed surface free from contact with any other surface and for a sufficient distance to permit said printed surface to become substantially dry, to a position above the next adjacent printing couple; and feeding said web downwardly through such next printing couple.

10. In a multi-color printing press, the combination of a plurality of printing couples, each having a printing cylinder and an impression cylinder cooperatively mounted at the side of said printing cylinder; means for feeding and guiding a web to a position above the first printing couple so that it may be passed downwardly through said printing couple; and means for guiding the web, from beneath said printing couple, downwardly and then upwardly to a position above the next adjacent printing couple, said guiding means being constructed and arranged so that the web travels through a substantially curved path with the printed surface free from contact with any other surface including said guiding means.

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