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A. M. WICKWIRE, JR

2,240,249

TEXTILE PRINTING PRESS

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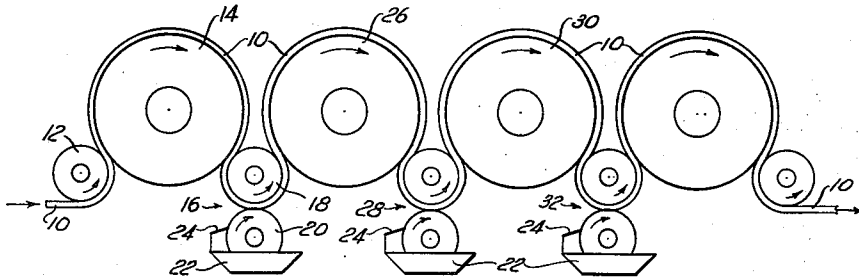


FIG. 1

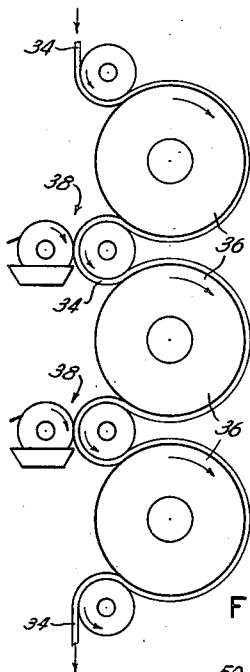


FIG. 2

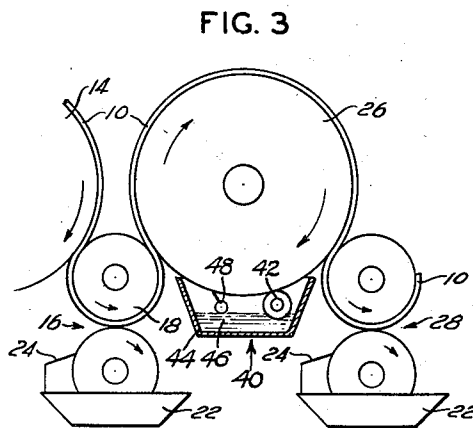


FIG. 3

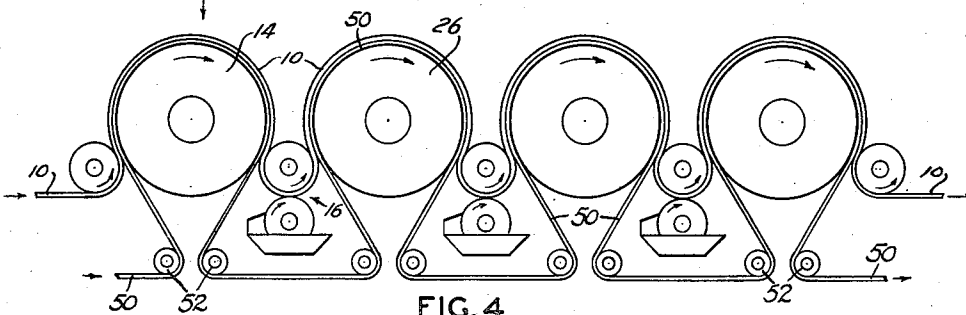


FIG. 4

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TEXTILE PRINTING PRESS

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12 Claims. (Cl. 101—178)

This invention relates to the art of printing and has for its principal object the provisions of an improved printing press arrangement by means of which textile fabrics may be effectively printed with a plurality of colors at high speeds.

In the multi-color printing of textiles, it is necessary to provide a continuous support for the web and the most common form of press now in use consists of a large web supporting drum having a plurality of printing cylinders suitably arranged about the periphery thereof, the number of printing cylinders employed in any case depending upon the number of colors that are desired. The textile or fabric web is led about the surface of the drum which constitutes the impression cylinder and receives the different colors successively as it passes beneath each printing cylinder. In order that proper printing may be obtained with the ordinary inks dyes and marking materials now in use, the surface of the large drum is usually covered with a so-called blanket or other soft packing material. This makes it necessary to press the printing cylinders against this soft surface with considerable force which frequently results in springing or bending the cylinders so that further packing may be required at the center of the drum. Even then, because the impression cylinder or drum is so large and the contact area of the printing cylinder with the drum becomes so great, it is difficult to obtain sharply defined markings. Furthermore, it is almost impossible mechanically to maintain the drum and its packing absolutely true so that uneven pressure must result as it revolves. Supplying of marking material to the printing cylinders also presents some difficulty because the cylinders are spaced around the large drum and the position of the usual fountain or ink applying means is different for each one. The result of these and other features of construction in the presently used presses for printing textiles is that they cannot be operated at high speeds; nor can sharpness of detail in the printing or good register be attained.

I have devised a novel multi-color press arrangement for printing textiles which is subject to none of the difficulties mentioned above and by means of which sharply defined prints may be obtained at speeds considerably higher than is possible with presses now in use.

In accordance with my invention, there is provided a plurality of spaced printing couples and means for maintaining a continuous surface contact or support for the web between each printing couple. Preferably the various printing

couples are in horizontal or vertical alignment and each may comprise an engraved or printing cylinder with associated inking mechanism and doctor blade and an impression cylinder immediately above or beside the printing cylinder. For providing the continuous surface contact or support between printing couples, I have provided a comparatively large transfer or carrier roller between each printing couple and arranged them to have operative contact with each of the two adjacent impression cylinders, such transfer rollers being driven at a peripheral speed which is the same as the peripheral speed of the impression cylinders. I have discovered that, although the freshly printed surface of the web comes in contact with the surface of the drum immediately after printing, all objectionable transfer of ink to the surface of the drum may be reduced to a minimum and substantially prevented and the drum maintained in a clean condition. This I preferably accomplished by having the drum surface of a character that will either tend to repel ink or prevent complete contact of the web with the drum surface; and by providing a special cleaning device for the drum surface at a position between printing couples where the web is not passed and the drum surface is exposed.

The above and other features and objects of my invention will become apparent upon consideration of the following description of certain specific and now preferred embodiments thereof and by reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic view showing a horizontal arrangement of the apparatus, the web thickness being greatly exaggerated;

Fig. 2 is a diagrammatic view of a vertical arrangement of the apparatus;

Fig. 3 is a diagrammatic view of a portion of the apparatus shown in Fig. 1, illustrating one type of cleaning device for the drum surface; and

Fig. 4 is a view similar to Fig. 1 showing one manner in which that form of apparatus may be used with a backing strip.

Referring now to the drawing, and particularly Fig. 1, it will be observed that a web 10, of textile material, is led into the press beneath an idler roller 12 and onto the surface of a first transfer or carrier roller 14. It is then led over the surface of this roller to the first printing couple, which is designated as a whole by the reference numeral 16 and comprises an impression cylinder 18 contacting the transfer roller 14, an engraved

or printing cylinder 20 having any suitable means for applying ink or marking material thereto, such as a fountain or bath 22, and a doctor blade 24. As indicated, the web passes about the surface of the impression cylinder to the printing line where it receives the first color, and then, continuing in contact with the impression cylinder, is led to a second transfer or carrier drum 26. It passes over the surface of this drum to a second printing couple 28 for the second color, then over transfer roller 30 to a third printing couple 32, and so on over as many additional transfer rollers and into any further printing couples or web treating devices that may be desired.

In Fig. 2 I have shown a vertical arrangement of the apparatus which is substantially the same as the Fig. 1 apparatus except for the general direction of movement of the web. It will be noted that a web 34 is led over transfer drums 36 and through printing couples 38 as in the Fig. 1 construction. However, the engraved or printing cylinder of each printing couple is arranged horizontally beside each associated impression cylinder rather than vertically beneath it.

In each of the forms of the invention described above the impression cylinders are preferably fixed in the press frame and the engraving is movable with respect thereto for regulating the pressure at the printing line. The pressure may be regulated in any convenient manner, such as by means of hydraulic cylinders. The printing cylinders may also be removed easily for changing to different sizes or patterns, for cleaning and the like. All rollers with which the web contacts are preferably driven at the same peripheral speed.

With the press arrangements described above, it will be apparent that the freshly printed surface of the web is brought directly into contact with the surface of the transfer drums 26 or 36. Because such contact is made directly after printing, some ink may set off on the drum surface where it may accumulate and cause undesirable marking of the web during subsequent revolutions of the drum. I have discovered, however, that this difficulty may be eliminated by having the surfaces of the transfer drums so treated that they will either tend to repel the ink or prevent complete surface contact of the web therewith. For this purpose, said drum surfaces may be highly polished; or they may be knurled or covered with a layer of sand paper or other material for preventing complete contact of the printed web with the surface.

In addition to, or in lieu of this, I have found it desirable to provide a means for positively cleaning the drum surface, or removing any ink that may have been transferred to the drum surface. In Fig. 3, I have shown one form of cleaning device 40 disposed in a position between printing couples where the transfer surface is exposed. As shown, the cleaning device 40 comprises a cleaning roller 42 which may be a cylindrical brush or a cloth or fabric surfaced roller that is preferably driven at a speed somewhat slower than the speed of the transfer drums. This roller 42 is arranged to make light surface contact with the drum surface and is partially submerged for rotation in a pan or bath 44 containing some suitable cleaning liquid 46, such as a solvent or softener for loosening or removing any ink that may be on the surface of the drum. At a position immediately adjacent and to the left of the cleaning roller 42 (Fig. 3) I find it desirable to provide a doctor blade 48 which may

be mounted on the pan 44 and is caused to bear in cleaning contact with the surface of the transfer drum 26. When the drum has a smooth polished surface, the doctor blade may consist of a thin blade of spring steel about 0.006 inch thick, and is preferably reciprocated in the manner of the usual doctor blade employed in gravure printing. Thus, any ink that may adhere to the surface of the transfer drum comes in contact with the solvent moistened roller 42 which softens and tends to dissolve the ink, and the doctor blade 48 removes excess solvent as well as the undesired ink and leaves the drum surface completely clean for subsequent contact with the web. Although I have shown the cleaning device 40 as applied to the horizontally arranged apparatus of Fig. 1, it will be understood that a similar device could be used with the vertically arranged apparatus of Fig. 2, if desired.

It will be noted that my improved press arrangement is well suited for the use of a backing web or tympan, though such a backing web may or may not be used depending, in the main, on the type of marking material employed and the surfacing used on the transfer rollers. In Fig. 3, where I have shown one successful way in which a backing web may be fed through the press described above, it will be observed that a backing web 50 is passed below the textile web 10 and over the first transfer roller 14. Said backing web is then guided beneath the first printing couple 16 and the fountain thereof by means of rollers 52 and passes upwardly over the transfer roller 26 and continues in a like manner through the remainder of the press. This backing web is always between the printed web 10 and the surface of the transfer roller so that it will prevent any marking material from contacting the surface of said roller. It will be noted, however, that the angle at which the web 50 approaches and leaves each transfer roller is such that said web does not contact the printed web 10 until it reaches the line of contact between the transfer roller and an adjacent pressure roller. If desired, a separate backing web may be used in connection with each transfer roller rather than having one continuous web for all of the transfer rollers. With such a change, only one guide roller 52 would be needed beneath each transfer roller.

By means of any of the arrangements which I have described above, a textile web may be effectively printed with a plurality of colors at speeds of from about four hundred to six hundred feet per minute, whereas the textile presses now in use generally cannot be successfully operated at more than about two hundred fifty feet per minute. In addition to the great increase in speed that can be obtained by means of my simplified and improved construction, more sharply defined markings can be produced and better register attained.

It will be understood that the first and last transfer drums may be omitted if desired and that any of said drums may be heated, cooled, or otherwise treated to aid in the drying or conditioning of the web. Moreover, if desired, the axes of the various impression cylinders could be arranged on a curve instead of a horizontal or vertical line as described above. Various other changes may be made in the construction and certain features employed without others, without departure from my invention or sacrificing any of its advantages.

This application is a continuation-in-part of

my copending application Serial No. 215,078 filed June 22, 1938.

I claim:

1. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each couple including an impression cylinder and a printing cylinder; transfer rollers disposed between said printing couples in operative contact with the impression cylinders of each adjacent printing couple, said transfer rollers having a continuous and uninterrupted supporting surface for the web; and means for guiding a backing web over each transfer roller and beneath the adjacent printing couple.

2. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each couple including an impression cylinder and a printing cylinder; and transfer rollers disposed between said printing couples in operative contact with the impression cylinders of each adjacent printing couple, each of said transfer rollers having a continuous and uninterrupted supporting surface which includes means for preventing objectionable transfer of marking material thereto.

3. A multi-color press for printing webs of textile fabrics, comprising first and second spaced printing couples, each printing couple including an impression cylinder and a printing cylinder; and a transfer roller disposed between said printing couples in operative contact with said impression cylinders; said transfer roller having a continuous and polished supporting surface.

4. A multi-color press for printing webs of textile fabrics, comprising first and second spaced printing couples, each printing couple including an impression cylinder and a printing cylinder; and a transfer roller disposed between said printing couples in operative contact with said impression cylinders, said transfer roller having a continuous and uninterrupted supporting surface which is roughened so as to prevent objectionable transfer of marking material thereto.

5. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including a printing cylinder, an impression cylinder, and means for applying marking material to said printing cylinder; and means for maintaining a continuous, positive and moving support for the web between said printing couples, said supporting means being adapted to move at the same speed as the web and including means for preventing objectionable transfer of marking material thereto.

6. A multi-color press for printing webs of textile fabrics, comprising first and second printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; a transfer roller disposed between said printing couples in operative contact with said impression cylinders; and means associated with said transfer roller for maintaining the surface thereof in a substantially clean condition.

7. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including a printing cylinder, an impression cylinder, and means for applying marking material to said

printing cylinder; means for maintaining a continuous positive and moving support for the web between said printing couples; and means associated with said web supporting means for maintaining the web contacting surface thereof in a substantially clean condition.

8. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; means for maintaining a continuous, positive and moving support for the web between said printing couples, such supporting means being adapted to move at the same speed as the web and having a web contacting surface; and means for cleaning said web contacting surface.

9. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; a transfer roller disposed between said printing couples in operative contact with said impression cylinders; and means for cleaning the web contacting surface of said transfer roller.

10. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; means for maintaining a continuous, positive and moving support for the web between said printing couples, such supporting means being adapted to move at the same speed as the web and having a web contacting surface; and means for cleaning said web contacting surface, said cleaning means including means for applying to said web contacting surface a liquid which is adapted to soften any marking material that may be on said web contacting surface.

11. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; a transfer roller disposed between said printing couples in operative contact with said impression cylinders; and means for applying to the web contacting surface of said transfer roller a liquid which is adapted to soften any marking material that may be on said web contacting surface.

12. A multi-color press for printing webs of textile fabrics, comprising a plurality of spaced printing couples, each printing couple including an impression cylinder, a printing cylinder, and means for applying marking material to said printing cylinder; a transfer roller disposed between said printing couples in operative contact with said impression cylinders; and means for cleaning the web contacting surface of said transfer roller, said cleaning means comprising a liquid applying roller disposed in operative contact with the exposed web contacting surface of said transfer roller, and means for removing liquid and marking material from the web contacting surface of said transfer roller.

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