

[54] TINTING UNIT FOR OFFSET PRINTING PRESS

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[22] Filed: Aug. 29, 1973

[21] Appl. No.: 392,678

Related U.S. Application Data

[63] Continuation of Ser. No. 248,698, April 28, 1972,
abandoned.

[52] U.S. Cl. 101/219; 101/179; 101/247;
101/350; 118/46; 118/227

[51] Int. Cl. B41f 5/04; B05c 9/04

[58] Field of Search 101/178-182,
101/219, 220, 247, 350; 118/46, 224, 227,
228, 249, 250, 258

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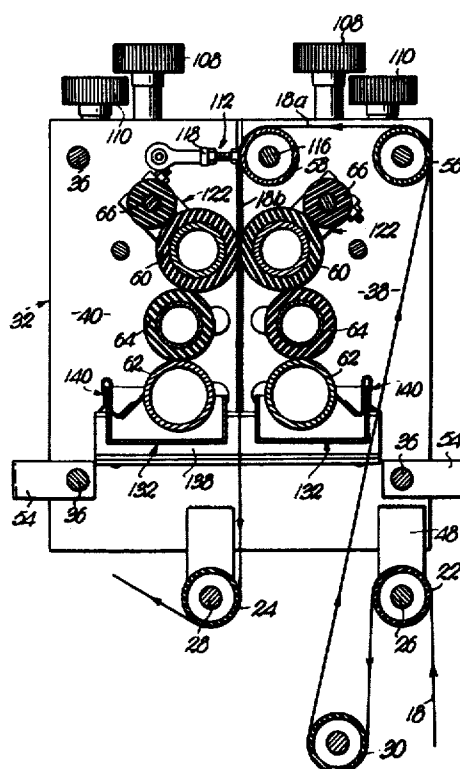
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Williams

[57] ABSTRACT

An "in-line" tinting unit is mountable directly upon the roll stand of a web-fed printing press to continuously tint the moving web of paper as the latter is advanced through the unit and the press by the web drive of the latter. The applicator rolls of the unit are driven by the web itself, and the option is provided to tint one or both surfaces of the web. Quick-mount lugs permit rapid installation and removal of the unit, and tinting fluid fountains for the applicator rolls are adapted for snap-fastening installation and removal.

6 Claims, 8 Drawing Figures



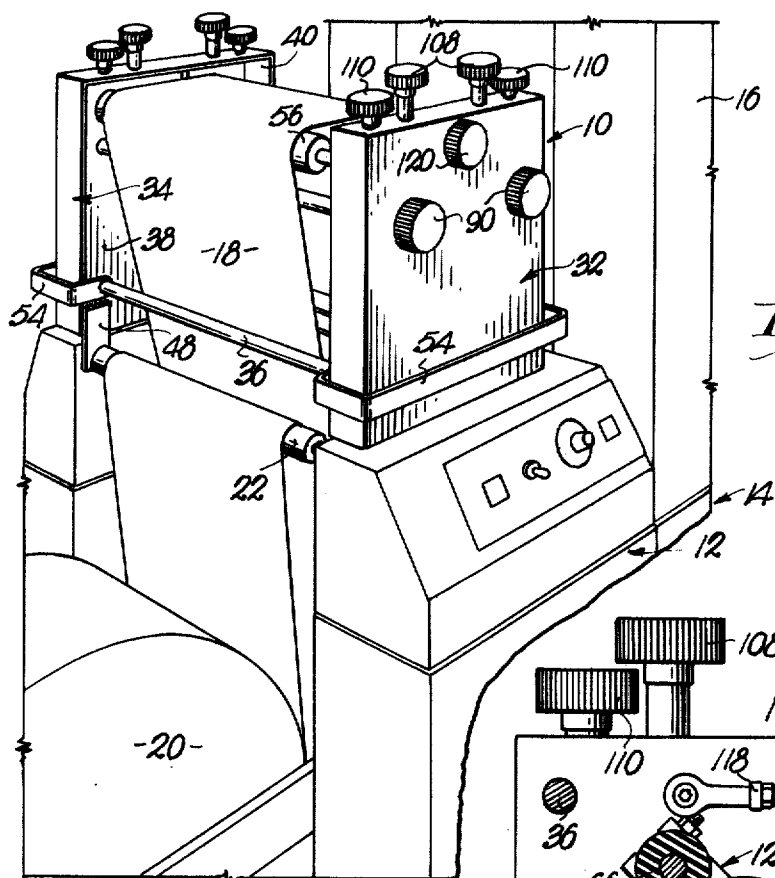
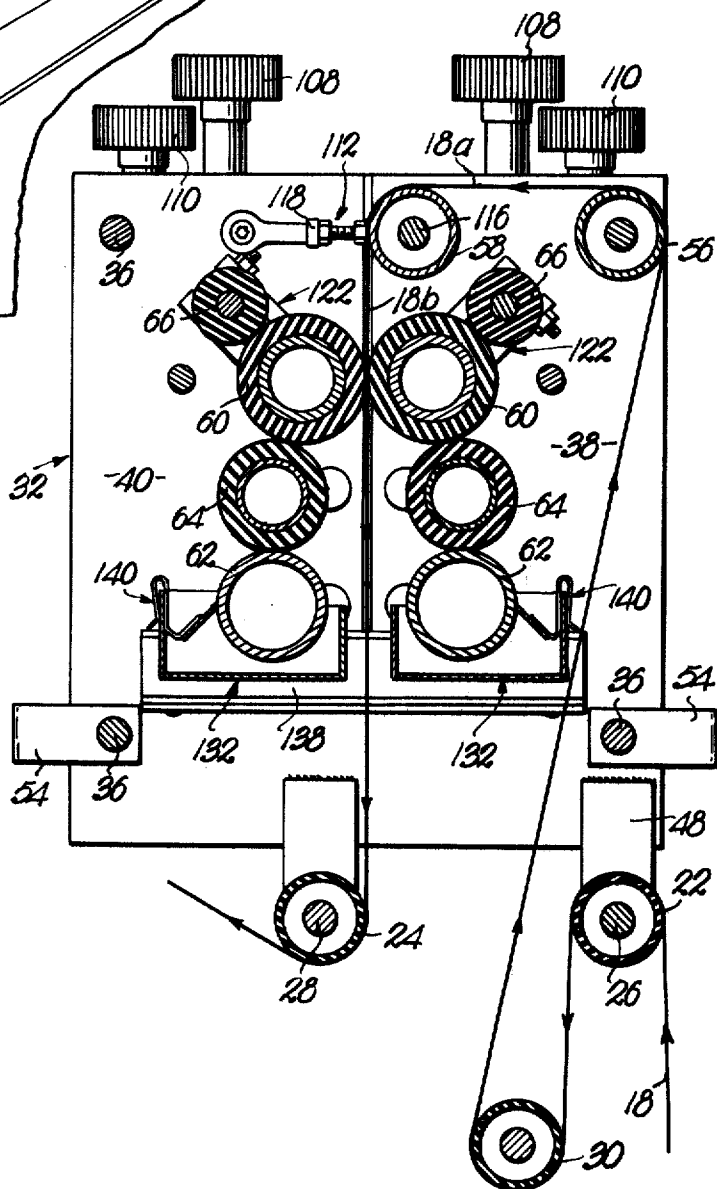


Fig. 1.

Fig. 6.



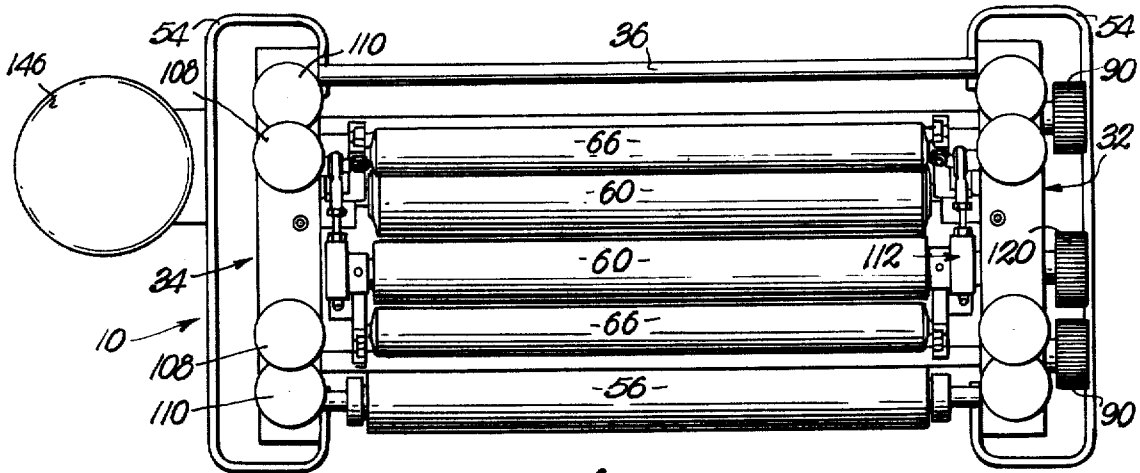


Fig. 2.

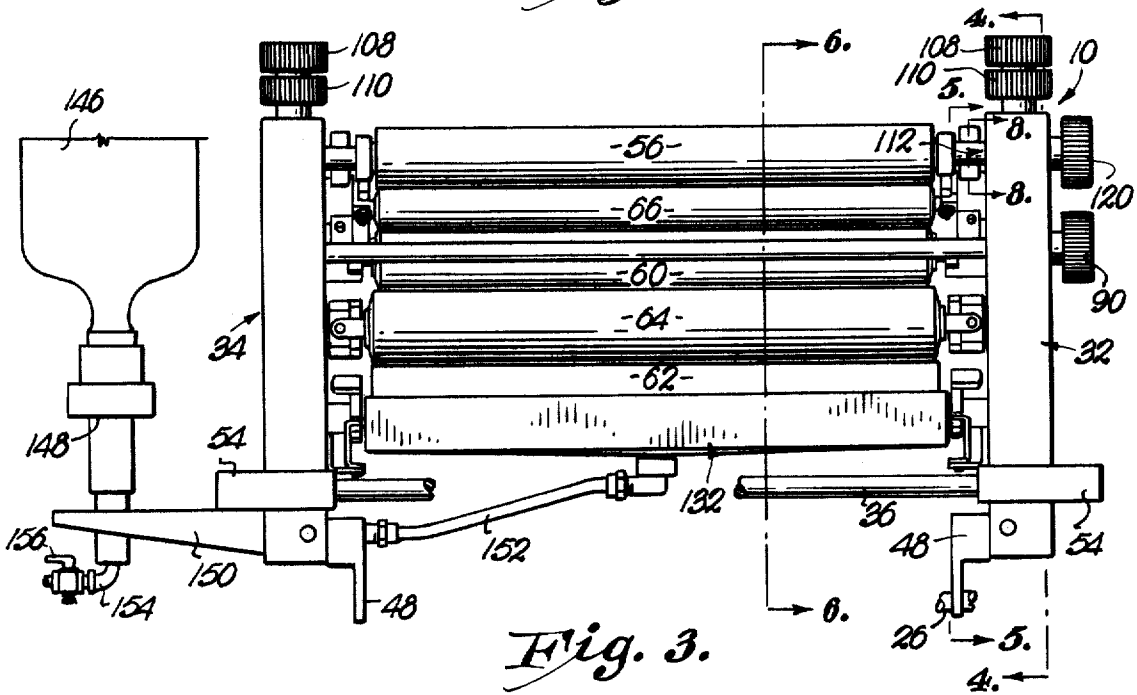


Fig. 3.

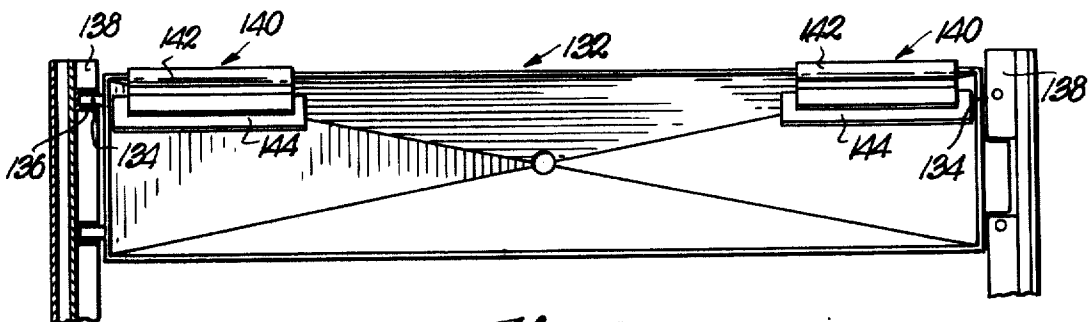


Fig. 7.

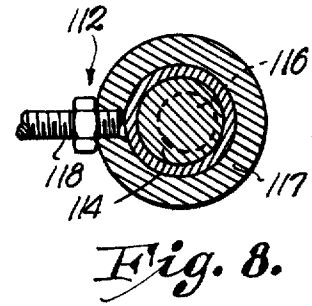
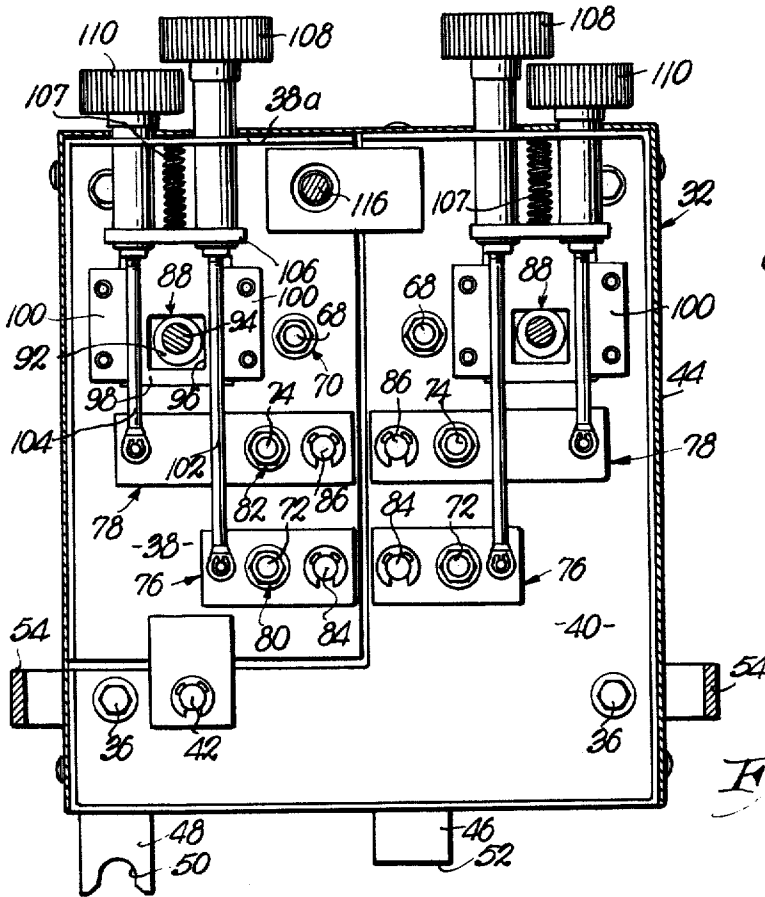


Fig. 4.

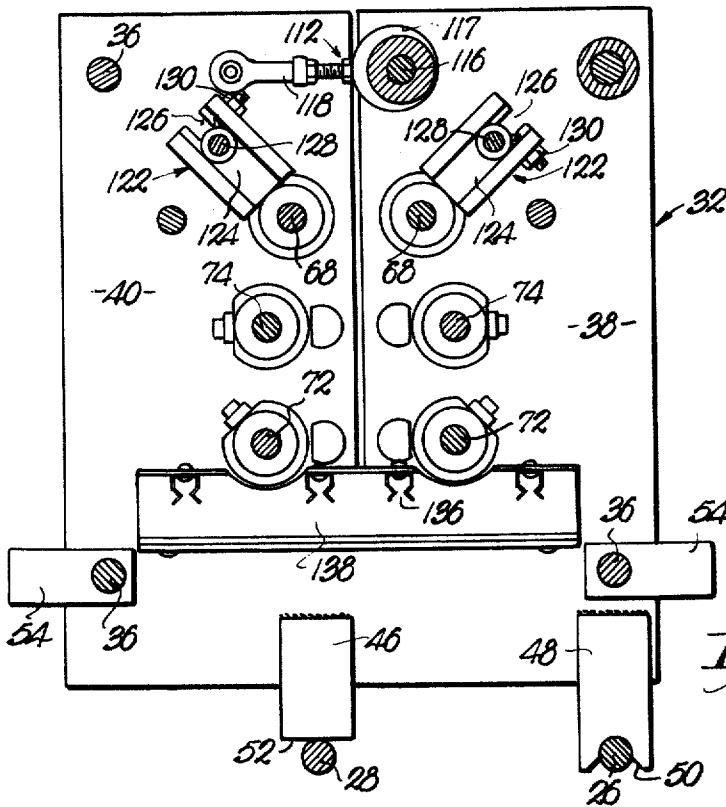


Fig. 5.

TINTING UNIT FOR OFFSET PRINTING PRESS

This is a continuation, of application Ser. No. 248,698, now abandoned, filed Apr. 28, 1972.

This invention relates to the field of web-fed printing and, more particularly, to a unit for effecting "in-line" tinting of the moving paper web as it advances continuously through a printing press.

The demand for colored backgrounds on printed materials as opposed to simply a basic white background has increased steadily in recent years. Accordingly, it has been necessary for the printer to keep a large inventory of colored paper stock in various shades in order to satisfy the diverse demands of his customers. This in itself is less than desirable because of the inherent costs associated with such large inventories and the need for frequent reordering of the colored stock. Perhaps even of greater importance is the fact that colored stock is necessarily more expensive than plain white stock and, in some instances, the cost may even be prohibitive. Moreover, the printer is always at the mercy of his supplier, leading to annoying and perhaps costly delays should the supplier be unable to fill the printer's order for specific colors, paper types, and roll widths in a timely manner.

For economic reasons, many presses are designed to use paper stock in roll form, continuously advancing the moving web through the press as various printing operations are performed thereon. Manifestly, when the size and bulk of such rolls are considered, it becomes clear that the storage, handling, and cost problems above mentioned are greatly magnified. In order to prepare the press for a new job requiring a different color than the previous job, it has been necessary to go through the cumbersome steps of removing the old roll, placing it in storage, removing a new roll from storage, and installing the new roll on the press. When this process is repeated many times over in a single day of operation, it is apparent that these problems are even further magnified.

Accordingly, it is an important object of the present invention to provide a tinting unit which performs in-line coloration of a web of paper stock as the latter advances through the printing press without causing a reduction in the production rate of the press or otherwise adversely affecting its operation, thereby effectively adding a "free" operation to the web while at the same time eliminating or at least substantially alleviating the aforementioned problems associated with colored stock.

As a corollary to the foregoing, an important goal of the invention is to effect color changes by simply replacing tinting fluid of one color with fluid of a newly selected color while using the same relatively low-cost, plain white paper roll, instead of substituting one paper roll for another every time a color change is desired.

A further important object of the present invention is to provide a unit for in-line tinting which is entirely self-contained, with the applicator rolls thereof driven by the moving web itself as the latter advances through the press, thereby eliminating the need for special drive mechanism for the unit or means for coupling the rolls thereof to the drive of the press.

Another equally important object of this invention is the provision of a self-contained, in-line tinting unit which may be quickly and easily installed or removed from the press it services, or moved from one press to another.

An additional important object of the instant invention is to provide a tinting unit as aforesaid which is selectively capable of tinting one or both surfaces of the advancing web, depending upon the particular job requirement.

A still further important object of the instant invention is to provide a tinting unit as aforesaid having applicator, distributor, and pickup rolls which may be shifted relative to one another into and out of tangential engagement therewith to permit adjustment of the pressure contact therebetween, as well as to allow the rolls to be separated from one another if the press is to be idle for a substantial period, thereby preventing the creation of flat spots on the rolls.

A still further important object is to provide precise metering and leveling of tinting fluid applied to the web through the provision of special rolls which ride with variable pressure on the respective tint applicator rolls.

Yet another important object is to provide a tinting unit having easily removable tint fluid fountains to facilitate periodic cleaning thereof.

Other important objects include providing the ability to produce special or unusual tints not readily available from the paper supplier, and the ability to produce tints of different colors on opposite sides of the web.

In the drawings:

FIG. 1 is a fragmentary perspective view of a tinting unit constructed in accordance with the teachings of the present invention mounted upon an offset printing press;

FIG. 2 is a slightly enlarged, top plan view of the unit;

FIG. 3 is a fragmentary, side elevational view thereof;

FIGS. 4, 5 and 6 are enlarged, vertical cross-sectional views of the unit taken along lines 4—4, 5—5 and 6—6 respectively of FIG. 3;

FIG. 7 is an enlarged, top plan view of one of the fluid fountains of the unit, parts of the supporting structure for the fountain being fragmentarily shown and in cross-section for clarity; and

FIG. 8 is an enlarged, fragmentary cross-sectional view taken along line 8—8 of FIG. 3 of an eccentric assembly for controlling nip pressure between the applicator rolls of the unit.

As shown in FIG. 1, the tinting unit 10 is designed for installation upon the roll stand 12 of an offset printing press 14 directly ahead of the first printing station 16. Press 14 is adapted for advancing the web 18 of roll 20 continuously through station 16 and any other subsequent tinting stations in the usual manner, and stand 12 is provided with a plurality of idler rolls for web 18 (FIG. 6), including the two top idler rolls 22 and 24 which are rotatably mounted on stand 12 by shafts 26 and 28 respectively, and a lower idler roll 30.

Unit 10 has a basic structural frame which includes a pair of opposed, spaced-apart supports 32 and 34 interconnected by a plurality of rigid rods 36. Supports 32 and 34 are adapted to be disposed on opposite sides of web 18 and each comprises a pair of separate plate sections 38 and 40 (shown best in FIG. 4), the plate 40 being generally L-shaped in configuration having the rods 36 rigidly affixed thereto, while plate 38 is swingably coupled to plate 40 by virtue of a pivot 42.

A housing 44 for each set of supports 32 and 34 covers the outer faces and side edges thereof while being sufficiently spaced from plate 38 along its edge extremities to permit slight shifting thereof within housing 44. A pair of downwardly projecting, rigid mounting lugs

46 and 48 on the lower leg of each plate 40, serve to mount unit 10 on shafts 26 and 28 of roll stand 12, with each lug 48 having a locating and retaining notch 50 therein for shaft 26, while each lug 46 has a flat, lower extremity 52 adapted to rest upon the upper arcuate surface of shaft 28. A pair of U-shaped handles 54 are rigidly secured to respective rods 36 at the fore-and-aft ends of unit 10 to facilitate installation and removal of the latter.

Plates 38 and 40 support a number of rotatable rolls in spanning relationship to web 18, including a pair of upper idler rolls 56 and 58 on plates 38. Each set of plates 38 and each set of plates 40 also carries its own set of rolls for applying tinting fluid to web 18, including an upper rubber applicator roll 60, a lower metal, fluid pickup roll 62, and a rubber distributor roll 64 interposed between rolls 60 and 62. Each group of rolls 60-64 also has a small, fluid metering and leveling roll 66 for the corresponding applicator roll 60.

Referring to FIG. 4, the shiftable mounting system for each set of rolls 60-66 may be most easily seen. Rolls 60-66 are supported on plates 40 in the same manner as the corresponding rolls carried by plates 38 and, accordingly, only the mounting details for the rolls of plates 38 will be described in detail. The shaft 68 for applicator roll 60 is fixed against other than rotational movement relative to plates 38 by a nut and washer assembly 70 at each end of shaft 68. However, the shafts 72 and 74 of rolls 62 and 64 respectively, are shiftable relative to plates 38 by virtue of swingable mounting bars 76 and 78 respectively, to which shafts 72 and 74 are affixed by nut and washer assemblies 80 and 82. Bars 76 and 78 swing about pivots 84 and 86 respectively, and both are driven by a common eccentric assembly 88 having an operating knob 90 outside of housing 44 on the vertical face thereof.

Each assembly 88 includes a cam 92 eccentrically fixed to the knob shaft 94 for rotation within a rectangular opening 96 in a plate-like member 98 reciprocable vertically within guides 100 and plate 38. A pair of rigid links 102 and 104 pivotally connected with bars 76 and 78 operably couple the same to a crossbar 106 on member 98 for swinging bars 76 and 78 in unison in response to rotation of cam 92 against the upper margin of opening 96. A compression spring 107 interposed between crossbar 106 and an upper, outstanding flange 38a on plate 38, yieldably biases member 98 in a downward direction. Mounting bar 76 is shorter than corresponding mounting bar 78. Further, the connection of link 102 with bar 76 is closer to pivot 84 and shaft 72 than the corresponding spacing with link 104, shaft 74 and pivot 86. Therefore, equal linear travel of links 102 and 104 results in transmission of greater arcuate movement to shaft 72 than to shaft 74, even though shafts 72 and 74 are shifted in unison by the common drive assembly 88. Links 102 and 104 may also be shifted independently of one another for fine adjustment through control knobs 108 and 110, respectively, which threadably receive links 102 and 104 and project upwardly beyond the uppermost face of housing 44.

The position of applicator rolls 60 relative to one another is determined by a control assembly 112 (FIGS. 5 and 8) for each pair of supports 32 and 34 respectively and includes an eccentric 114 fixed to the shaft 116 of upper idler rolls 58 and rotatable within a collar 117 concentric with eccentric 114. An adjustable link-

age 118 connects collar 117 to plate 40 such that plate 38 is shifted toward and away from plate 40 in response to rotation of shaft 116 and eccentric 114. Shaft 116 serves as a common drive for both assemblies 112 and has a hand knob 120 affixed thereto outside of housing 44 along the vertical face thereof.

Leveling rolls 66 are each adjustably mounted for movement toward and away from their respective applicator rolls by virtue of identical mounting brackets 122 (FIG. 5) at opposite ends of each roll 66. Each bracket 122 includes a block 124 rigidly affixed to the inner face of its mounting plate 38 and 40 and has an elongated adjusting slot 126 therein which shiftablely receives the shaft 128 of the corresponding roll 66. The beveled end of a setscrew 130 projecting into slot 126 bears against shaft 128 in variable amounts to control the position of the latter within slot 126.

Tinting fluid is supplied to the pickup rolls 62 by a pair of open-top fluid reservoirs or fountains 132 which are adapted to partially receive the corresponding rolls 62. Each fountain 132 is adapted for quick installation and removal by virtue of a pair of mounting pins 134 at each end thereof which snap into spring clips 136 carried by an angle bracket 138 on the corresponding support 32 or 34. Wipers 140 for each fountain 132 may be provided to control the amount and location of fluid picked up by the corresponding roll 62. Each wiper 140 has a metal spring-clip portion 142 which snaps over the upstanding edge of its fountain 132 for vertical, as well as horizontal, adjustment thereon, and a wiping pad 144 of neoprene or a like material which bears against the surface of its roll 62. Preferably, a wiper 140 is provided at each end of its fountain 132 for clearing fluid from those areas of the corresponding roll 62 which are disposed outside of the normal width of web 18.

Tinting fluid is supplied to the fountains 132 under pressure through an inverted fluid supply bottle 146 supported by a vertically adjustable holder 148 which is, in turn, carried by a bracket 150 affixed to support 34. A supply line 152 for each fountain 132 respectively communicates the latter with bottle 146, and a drain line 154 for holder 148 has a valve 156. The vertical position of holder 148 relative to its support bracket 150 controls the level of tinting fluid maintained in fountains 132.

OPERATION

Unit 10 may be placed in use by setting the mounting lugs 46 and 48 in their proper positions on idler shafts 28 and 26. No other adjustments or manipulations of fasteners or the like are necessary in order to properly locate unit 10 and stabilize the same for operation. Web 18 is trained around the various idler rolls of stand 12 and unit 10 in the manner shown in FIG. 6 such that web 18 is provided with a horizontal stretch 18a across the tops of rolls 56 and 58, and a vertical, downwardly moving stretch 18b passing between applicator rolls 60. Rotation of the impression control knob 120 in a clockwise direction, viewing FIG. 1, causes eccentrics 114 to press rolls 60 into tangential engagement with one another to present a nip for web stretch 18b.

If both surfaces of web 18 are to be tinted, fluid from fountains 132 must be supplied to both of the applicator rolls 60. Thus, using the knobs 90 and their attendant eccentric assemblies 88, each set of rolls 60-64 is brought into tangential engagement with one another

so that fluid picked up by lower roll 62 is transferred to intermediate roll 64 and thence to applicator 60. Should a tint of only one surface of web 18 be desired, only that set of rolls 60-64 which corresponds to the surface to be tinted should be brought into tangential engagement with one another, those of the other set remaining spaced apart. During such adjustment of rolls 62 and 64, it is to be appreciated that eccentric assemblies 88, actuated by knobs 90, provide major adjusting of rolls 62 and 64, while knobs 108 and 110 are used for fine adjustment thereof. Note that while rolls 62 and 64 swing in unison upon rotation of the appropriate knob 90, such rolls also move relative to one another by virtue of the variation in moment arms effected by the specially positioned connections of links 102 and 104 with their corresponding mounting bars 76 and 78.

As the web 18 is advanced in the direction indicated in FIG. 6, its frictional, pressure contact with applicator rolls 60 causes the latter to rotate in unison, thereby driving rolls 62 and 64 to supply tinting fluid to rolls 60. As fluid is transferred to rolls 60 by rolls 64, the fluid is smoothed and leveled to provide an even tint on web 18 by virtue of the riding relationship of leveling rolls 66 with their corresponding applicator rolls 60. Thus, it may be seen that unit 10 is driven by web 18 itself, eliminating the need for mechanical power connections of any kind. The power required to effect rotation of rolls 60 is insignificant and little noticeable web tension increase is evident.

When a run of one color has been completed and a new run of different color is desired, it is only necessary to remove the old fluid bottle 146, drain the fluid from fountains 132 through valve 156, and place a new fluid bottle 146 of the selected color on holder 148. When web 18 is once again actuated, rolls 60 begin applying a new color to stretch 18b such that a color change has been effected without ever handling roll 20. Color changes can normally thus be accomplished in less than two minutes.

Note that in addition to tinting one or both sides of the web 18, two entirely different colors may be applied to opposite sides by simply adding an extra fluid bottle 146 and connecting each bottle 146 to only one of the fountains 132 instead of to both. In this manner web 18 simultaneously receives two different colors as it passes between rolls 60.

It should now be apparent that the in-line tinting performed by unit 10 affords many advantages over previous methods. The tinting operation carried on by unit 10 is "free" in the sense that no more time is required to complete a printing cycle than with colored rolls and, as heretofore mentioned, the additional power requirement for unit 10 is negligible. Moreover, one great advantage with unit 10 is that it allows the least expensive, basic white paper stock to be used for all jobs instead of requiring a large inventory of higher priced, colored stock in order to meet diverse customer demands. Moreover, it will be appreciated that substantial savings are also effected in terms of time and effort in that it is no longer necessary to go through the cumbersome task of substituting one bulky roll 20 for another each time a new color is required.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a printing press having a web of paper stock associated therewith, means for advancing

the web through the press and at least one printing station, an in-line paper web tinting unit comprising:

a pair of opposed, spaced-apart supports mounted on the press on opposite sides of the path of travel of said web adjacent said printing station;

a pair of applicator rolls each having a continuous, web-tinting periphery;

means mounting said rolls on said supports for free rotation thereon about their longitudinal axes in spanning relationship to the supports and for lateral movement toward and away from contacting disposition to locations in spaced relationship;

means adjustably squeezing said rolls together along their lengths and their peripheries pressing against opposite faces of said web for driving of the applicator rolls solely by movement of the web therebetween;

means for continuously supplying a sufficient quantity of tinting fluid to said rolls to completely and evenly tint both faces of the paper simultaneously with said fluid as the web is pulled by said advancing means to thereby effect said web drive of the rolls in unison;

said fluid supply means for each applicator roll respectively including an open top fluid reservoir and a rotatable pickup roll adapted for partial submersion in tinting fluid contained in a corresponding reservoir;

separate elongated wiper means adjacent opposed ends of each of the pickup rolls and extending inwardly from the outermost ends thereof a substantial distance toward the central area of a respective pickup roll; and

means mounting the wiper means for independent movement relative to a corresponding pickup roll and allowing selective adjustment of the spacing thereof longitudinally of the same toward and away from the proximal surface of a corresponding pickup roll to permit selective control of the amount and location of fluid picked up by each of said pickup rolls.

2. The combination as claimed in claim 1, wherein said fluid supply means for each applicator roll respectively includes a rotatable distribution roll interposed between and in tangential engagement with said pickup roll and a corresponding applicator roll associated therewith, each pair of pickup and distribution rolls being mounted for driving rotation thereof by a respective applicator roll associated therewith.

3. The combination as claimed in claim 2, wherein is provided means removably holding said reservoir in position for receiving said pickup roll therewithin.

4. The combination as claimed in claim 1, wherein said means mounting the rolls on the support includes a pair of relatively shiftable sections movable toward and away from one another and each supporting an end of one of said applicator rolls, and wherein said squeezing means comprises mechanism operably interconnecting each pair of sections respectively for effecting said relative movement of the sections to thereby adjust the position of said applicator rolls with respect to one another.

5. The combination as claimed in claim 4, wherein said mechanism includes an eccentric rotatable on one of said sections and linkage coupling said eccentric with the other of said sections.

6. The combination as claimed in claim 1, and wherein is provided a rotatable leveling roll for each said applicator roll respectively tangentially engaging the corresponding applicator roll for smoothing tinting fluid thereon.

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