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W. T. MILLER

3,288,060

IMPRESSION SYSTEM FOR GRAVURE PRESS

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FIG. 1

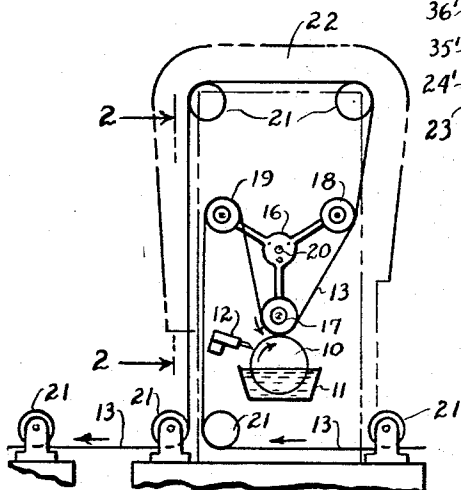


FIG. 2

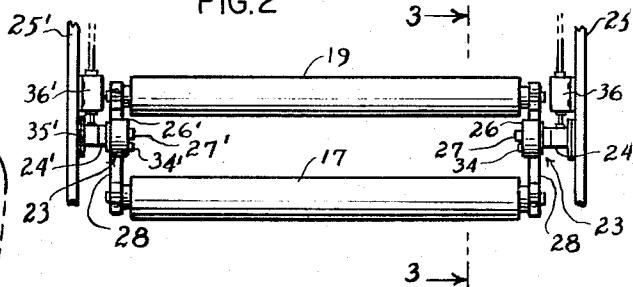


FIG. 4

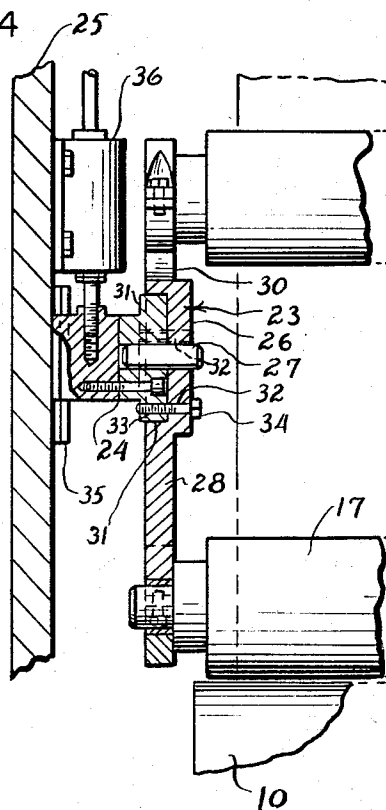
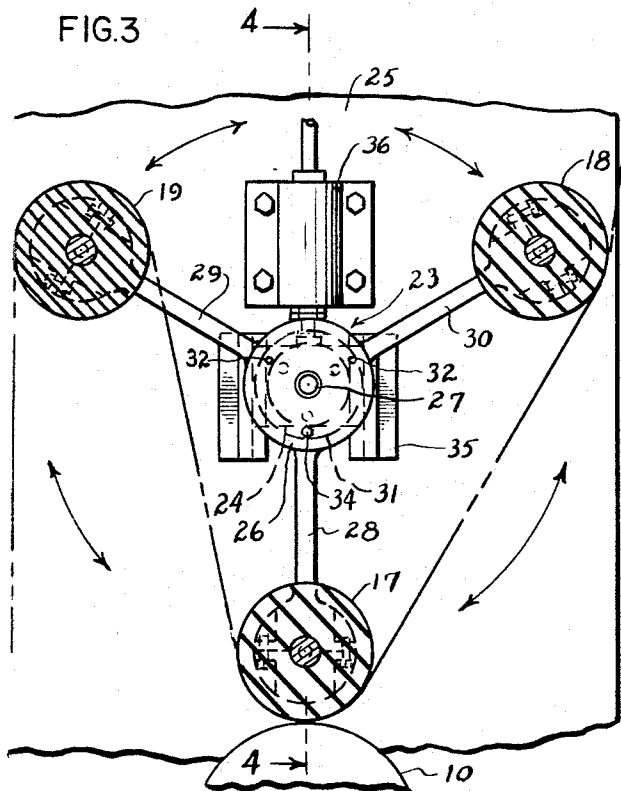


FIG. 3



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IMPRESSION SYSTEM FOR GRAVURE PRESS
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This invention relates to gravure printing and more particularly to a novel impression component for rotogravure presses.

Typical rotogravure presses are described in U.S. Patents 2,972,297 and 3,025,791. While the apparatus described in the patents contain several operatively associated gravure press units in a multicolor printing system, the individual units may be taken as illustrative of typical rotogravure presses. Essentially, there are five basic parts to a rotogravure press unit. The (1) engraved gravure printing cylinder which is the only power driven roller in the press, all other rollers, including the impression roller, are driven by or receive power through the moving web which is driven by the gravure printing cylinder; (2) the inking system; (3) the doctor blade or wiping system; (4) the impression system and (5) the drying system.

The web being printed upon passes between the printing cylinder which is conventionally made of a non-yieldable material such as steel and the impression cylinder which is made of a yieldable or compressible material such as rubber. The ability of the press to print upon particular substrates is dependent upon the rigidity or yieldability of the impression cylinder. Because there is a direct relationship between the yieldability or compressibility of the impression cylinder surface material and the nature of the surface of the stock being printed upon, in conventional presses, it is necessary to frequently change the impression cylinder to provide a cylinder having the most desirable compressibility for a particular substrate.

In conventional practice, the distribution of impression is so regulated that at the point of contact between the impression cylinder and the printing cylinder, a flat of about 1/2 inch is maintained. For cellophane, polyethylene film or other nonabsorbent stocks, a minimum printing pressure of approximately 25 pounds per linear inch is required and, therefore, a soft rubber covering is required on the impression roller to maintain the desired flat of 1/2 inch. Specifications for this rubber would be approximately 30 to 45 Shore Durometer Gauge "A" (90 Plastometer).

Coated paper or heavy calendered stocks, require 75 to 125 pound pressure per linear inch and, again to maintain the normal flat, a medium hard rubber roller approximately 70 Shore Durometer Gauge "A" (60 Plastometer).

For board or rough paper, a printing pressure of 125 to 200 pounds is desirable and, therefore, a hard rubber roller is necessary to hold the desired flat. This roller hardness would be approximately 85 to 90 Shore (40 Plastometer).

This changing of impression cylinders in conventional apparatus is a slow and cumbersome task. I have found that it requires two men working 30 to 45 minutes each to change the impression cylinder on each press unit. Furthermore, since a great number of existing rotogravure press systems are multi-unit of the type described in the above-mentioned patents, the man-hours consumed in changing impression cylinders become very large.

I have now invented a novel impression cylinder system for rotogravure presses which completely eliminates the need to remove and replace impression cylinders in the press. In accordance with my invention, I install into

a conventional rotogravure press such as those shown in the patents an impression cylinder component comprising a series of rotatable impression cylinders made of conventional yieldable materials, e.g., rubber coated impression cylinders, having selected varying compressibilities. The series are pivotally mounted so that any one of the series may be pivoted into peripheral engagement with the printing cylinder. Once in peripheral engagement, the component may be readily fixed against further pivoting while the press is in operation.

My invention will be more fully understood by referring to the specific embodiment shown in the drawings in which:

FIG. 1 is a side view of the press.

FIG. 2 is a front view of the impression cylinder system viewed from line 2—2 of FIG. 1.

FIG. 3 is a cross-section of the impression cylinder system along line 3—3 of FIG. 2.

FIG. 4 is a vertical section along line 4—4 of FIG. 3.

Referring to FIG. 1 in which a single press is shown, the unit consists of engraved gravure cylinder 10 which is rotated in the direction shown by conventional cylinder driving means (not shown) ink fountain 11, doctoring unit 12, web 13, impression cylinder system 16 comprising impression cylinders 17, 18 and 19. These cylinders have rubber surfaces of varying compressibilities. The entire impression cylinder system is pivoted about pivot 20 to bring either cylinders 17, 18 or 19 into engagement with gravure cylinder 10. Web 13 is guided through the press by a series of carrier rollers 21. Impression cylinders which are out of engagement with the gravure cylinder, in this case cylinders 18 and 19, function as carrier rollers, 19 guiding the web into the nip between engaged cylinders 10 and 17 while roller 18 guides the web away from the nip between said engaged rollers. Where the press shown is a one-unit press web 13 is drawn from a roll of web material, not shown, and is rolled up on a take-up roll, not shown. However, where the press unit is part of a multi-press system for multi-color printing, the web is fed from one press unit to the next unit. The press unit also contains oven 22 for drying the printed web as the web passes through it.

More detailed views of the impression cylinder system of this invention may be seen in FIGS. 2, 3 and 4. The system comprises impression cylinder carriage 23 which is mounted on a pair of pivots 24 and 24' which are attached to the frames 25 and 25'. Carriage 23 comprises a pair of pivot plates 26 and 26' which are respectively pivoted about shafts 27 and 27' of pivots 24 and 24' and three pairs of arms 28 and 28', 29 and 29' and 30 and 30'. Impression cylinders 17, 18 and 19 are respectively rotatably mounted in arm pairs 28 and 28', 30 and 30' and 29 and 29' by impression cylinder shafts which are carried in bearings formed in arm pairs. The impression cylinders are mounted equidistant from each other and from the pivot point. Arms 28, 29 and 30 form angles of 120° with each other as do arms 28', 29' and 30'. Pivots 24 and 24' have flanges 31 and 31' which respectively contact pivot plates 26 and 26'. Pivot plates 26 and 26' contain three apertures each, 32 and 32'. The apertures are aligned with the arms so that when a given pair of apertures in plates 26 and 26' are in registration with key holes 33 and 33' (one of which is in flange 31 and the other is in flange 31') the impression cylinder of which the supporting arms are aligned with the given pair of apertures will be in peripheral engagement with the gravure cylinder. Key screws 34 and 34', the threads of which are received by internal threads in key holes 33 and 33' are then used to lock the cylinder carriage in position.

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The structure shown in FIGS. 2 to 4 also includes a modification of the conventional hydraulic means for raising and lowering the impression cylinders with respect to the gravure printing cylinder. In the conventional means as shown in U.S. Patent 2,972,297, the hydraulic means is exerted against the impression cylinder while in the present invention, the impression cylinder carriage is raised and lowered. This is accomplished by having pivots 24 and 24' respectively slidably mounted for vertical movement in tracks 35 and 35' which are fixed to frames 25 and 25'. Hydraulic means 36 and 36' respectively act upon pivots 24 and 24' to raise and lower the pivots and impression cylinder carriage 23 which is mounted upon said pivots.

In changing from one impression cylinder to another, the following is the procedure: Key screws 34 and 34' are removed and the carriage 23 is pivoted by pushing the impression rollers until the pair of apertures 32 and 32' which correspond to the selected impression cylinder enters into registration with key holes 33 and 33'. Then the key screws are inserted to lock the carriage in the new position.

While there have been described what is at present considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A gravure press comprising a rotatable gravure printing cylinder of conventional non-yieldable material, a series of rotatable impression cylinders made of conventional yieldable materials having selected varying compressibilities, said series being pivotally mounted so that any one of the series of impression cylinders may be pivoted into peripheral engagement with the printing cylinder, means for fixing said pivoted impression cylinder in said position of engagement and means for guiding a web to be printed upon through the nip between the printing cylinder and the engaging impression cylinder, the impression cylinders which remain out of engagement with the printing cylinder forming at least part of the means for guiding the web through the nip.

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2. The gravure press of claim 1 wherein said series consists of three impression cylinders.

3. A gravure press comprising a rotatable gravure printing cylinder of conventional non-yieldable material mounted in said press, an impression cylinder carriage pivotally mounted within the press about an axis which is parallel to the axis of rotation of said printing cylinder, said carriage comprising three pairs of arms of equal length radiating from the axis of pivot, one arm of each pair being at each end of said axis of pivot and each of the arms at each end forming an angle of 120° with the other two arms at said end, three impression cylinders made of conventional yieldable materials having selected varying compressibilities, said three impression cylinders being respectively rotatably mounted on said three arms in positions substantially parallel to and equidistant from said axis of pivot, said frame being pivotal so that any one of the series of impression cylinders may be brought into peripheral engagement with the printing cylinder, means for fixing said impression cylinder carriage with the impression cylinder in such engagement and means for guiding a web to be printed upon through the nip between the printing cylinder and the engaging impression cylinder, said two impression cylinders which remain out of engagement with the printing cylinder form at least part of the means for guiding the web through the nip, the web passing over one of said remaining impression cylinders prior to passing through the nip and over the other remaining impression cylinder after passing through the nip.

4. The gravure press of claim 3 wherein said impression cylinders have rubber surfaces.

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