

United States Patent

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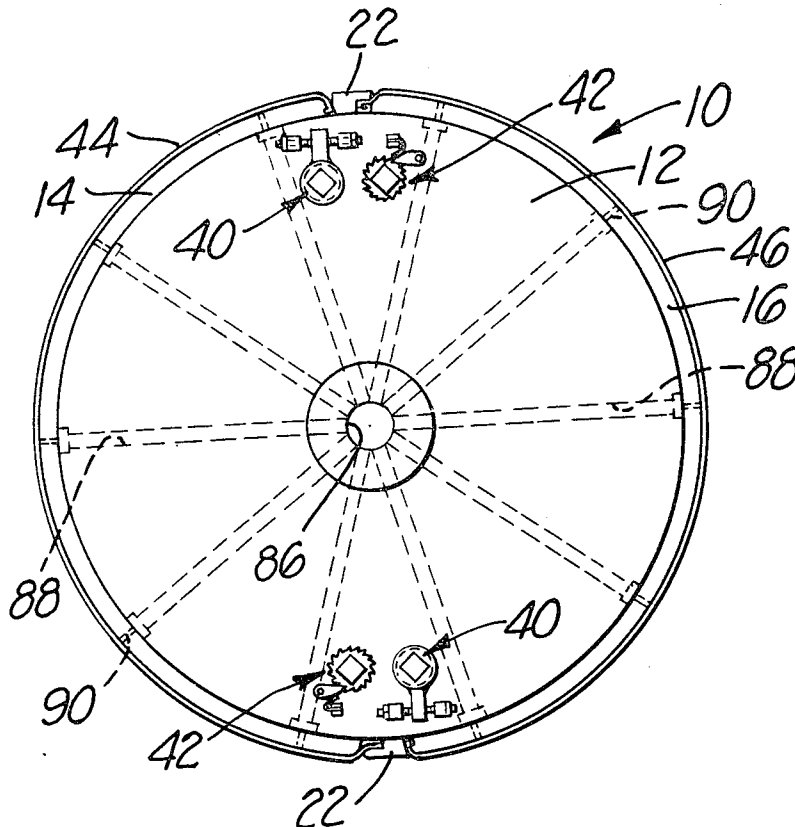
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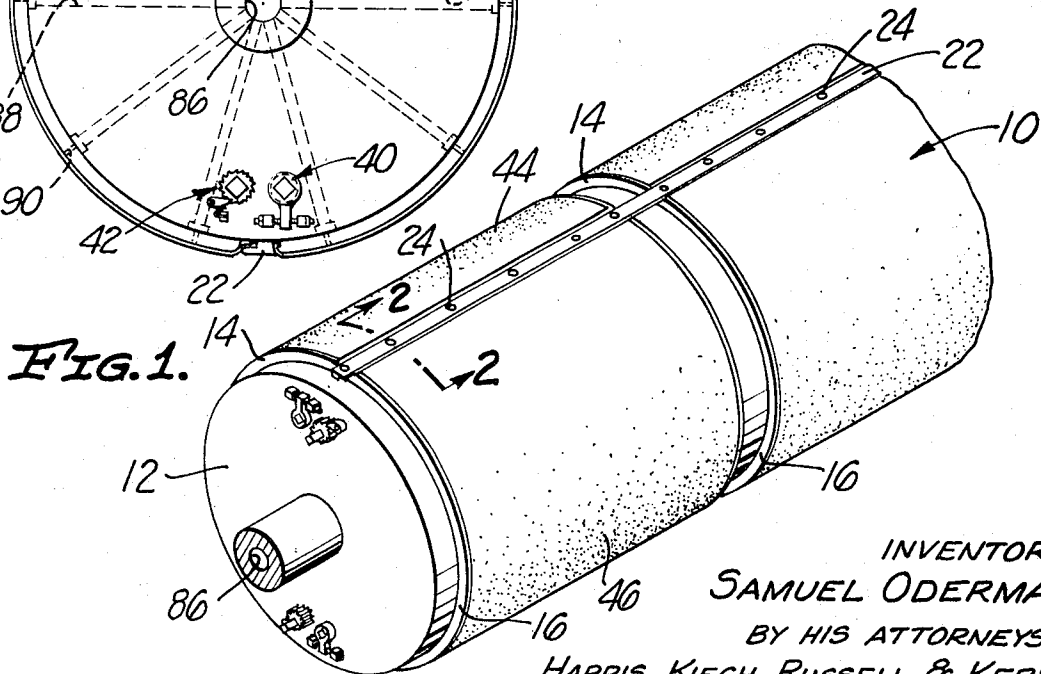
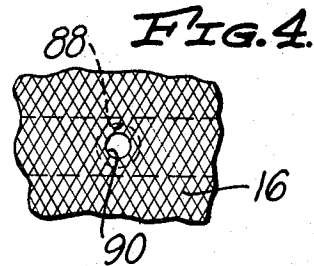
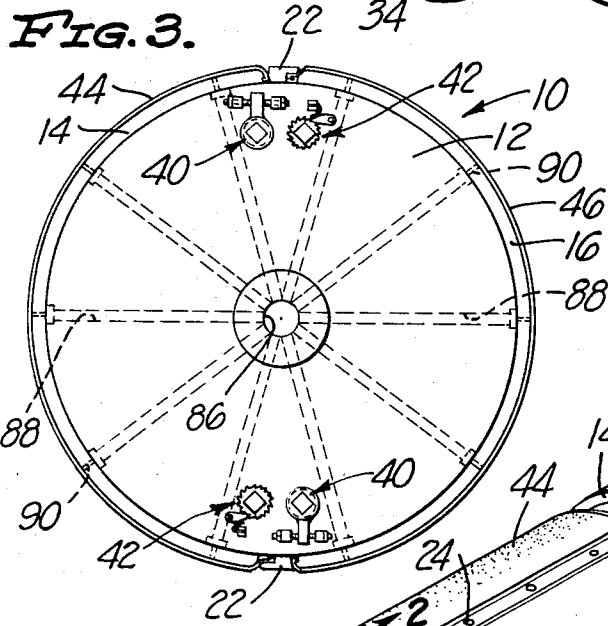
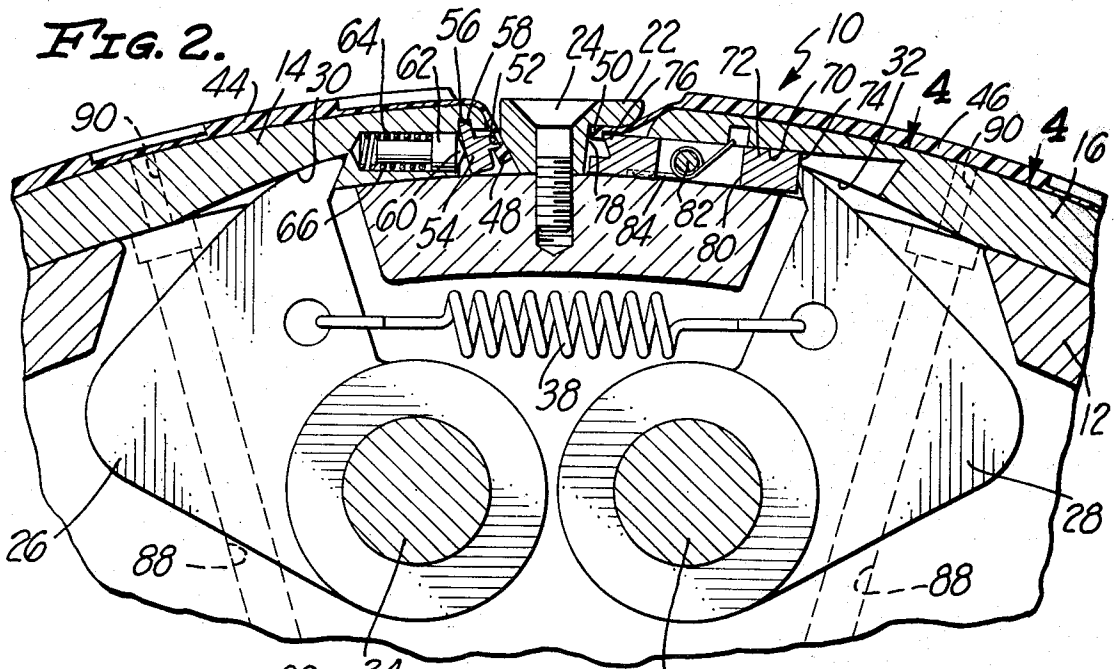
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- [54] PRINTING PRESS CYLINDER WITH
MECHANICAL AND VACUUM HOLDING MEANS
FOR FLEXIBLE PRINTING PLATES
1 Claim, 4 Drawing Figs.**

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| [52] | U.S. Cl. | 101/415.1 |
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B41f 27/12 |
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378, 382(MV) |

ABSTRACT: A printing press cylinder for use with a flexible printing plate, preferably a plastic printing plate. The cylinder is provided with mechanism engageable with circumferentially spaced edges of the printing plate for circumferentially tensioning the plate. The cylinder is also provided in its surface with channels connectible with a vacuum source to secure the printing plate to the cylinder.





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PRINTING PRESS CYLINDER WITH MECHANICAL AND VACUUM HOLDING MEANS FOR FLEXIBLE PRINTING PLATES

SUMMARY AND OBJECTS OF THE INVENTION

The present invention relates in general to a printing press cylinder and, more particularly, to flexible-printing-plate holding means for securing a flexible printing plate to a printing press cylinder. Preferably, the flexible printing plate is formed of a plastic material such as polypropylene, polyvinyl chloride, polyethylene, and the like.

One primary object of the invention is to provide means connecting the flexible printing plate to the press cylinder for maintaining the printing plate in tension circumferentially of the cylinder.

Another primary object of the invention is to provide means for applying a vacuum between the flexible printing plate and the press cylinder to secure the printing plate to the cylinder.

Another object of the invention is to provide a flexible-printing-plate holding means of the foregoing character wherein the circumferential tensioning means is engageable with circumferentially spaced edges of the printing plate. More particularly, an object in this connection is to provide a tensioning means which includes circumferentially spaced gripping means respectively engageable with the circumferentially spaced edges of the printing plate, and which includes means for displacing one of the gripping means circumferentially of the cylinder away from the other to tension the printing plate.

A further object is to provide a vacuum applying means, for developing a vacuum between the flexible printing plate and the cylinder, which includes numerous small vacuum channels in the surface of the cylinder, and radial vacuum passages in the cylinder which communicate with the vacuum channels in the surface thereof. The radial vacuum passages may be connected to a central, axial vacuum manifold.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the printing press art in the light of this disclosure, may be achieved with the exemplary embodiments of the invention described in detail hereinafter and illustrated in the accompanying drawing.

DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary perspective view of a printing press cylinder which embodies the invention;

FIG. 2 is an enlarged, fragmentary sectional view taken as indicated by the arrowed line 2-2 of FIG. 1;

FIG. 3 is an end view of the printing press cylinder, on a somewhat larger scale than FIG. 1; and

FIG. 4 is an enlarged, fragmentary elevational view of the surface of the printing press cylinder, taken as indicated by the arrowed line 4-4 in FIG. 2.

DESCRIPTION OF EXEMPLARY EMBODIMENTS OF THE INVENTION

In the drawing, the printing press cylinder of the invention is designated generally by the numeral 10 and, in the particular exemplary construction illustrated, includes a cylindrical core 12 carrying longitudinally spaced pairs of circumferentially spaced saddles 14 and 16 each having an angular extent of substantially 180°. Although each group of saddles is shown as comprising two circumferentially spaced saddles 14 and 16, each group may include more than two, e.g., three or four, circumferentially spaced saddles. Also, while the saddles 14 and 16 of each group are shown as separate from the cylindrical core 12, such saddles may be formed integrally with or permanently secured to the core.

The pairs of circumferentially spaced saddles 14 and 16 are all identical and the parts respectively associated therewith are all identical. Consequently, only the pair of saddles 14 and 16 adjacent the end of the cylinder 10 shown in FIG. 1, and

the parts respectively associated therewith, will be considered herein.

Adjacent longitudinal edges of the respective saddles 14 and 16 are circumferentially spaced apart sufficiently to receive therebetween longitudinally extending lock up bars 22 which are suitably secured to the cylindrical core 12, as by longitudinally spaced screws 24 extending through the lock up bars and threaded into the core. It will be noted that, with the paired arrangement of saddles 14 and 16 shown, there are two of the lock up bars 22 spaced 180° apart. The relationships between the respective lock up bars 22 and the adjacent longitudinal edges of the saddles 14 and 16 are identical. Consequently, only the relationship between the lock up bar 22 and the saddle edges shown in FIG. 2 will be described herein, with the understanding that the same description applies to the opposite lock up bar and saddle edges.

As is conventional, the saddles 14 and 16 are secured to the cylindrical core 12 by tension hooks 26 and 28 respectively inserted into recesses 30 and 32 in the saddles 14 and 16 adjacent the longitudinal edges thereof which confront the intervening lock up bar 22. Although only one hook 26 is shown, it will be understood that there are several such hooks spaced apart longitudinally of the core 12, the same being true of the hook 28. The respective hooks 26 and 28 are spaced apart longitudinally of and fixedly connected to longitudinal shafts 34 and 36 suitably rotatably mounted in the core 12. The hooks 26 and 28 of each pair are interconnected by a tension spring 38 which biases them into their respective recesses 30 and 32.

The hooks 26 are fixed hooks which are locked in a predetermined angular position by a suitable locking means 40, FIGS. 1 and 3, interconnecting the corresponding shaft 34 and the cylindrical core 12. The hooks 28 are pivotable hooks which may be pivoted by a suitable pivoting means 42 interconnecting the corresponding shaft 36 and the core 12. The locking and pivoting means 40 and 42 shown are illustrative only and any suitable means for the respective purposes indicated may be utilized.

Overlying the respective saddles 14 and 16 are flexible printing plates 44 and 46, preferably formed of plastic as hereinbefore outlined. The longitudinal edges of the printing plates 44 and 46 which are adjacent the lock up bar 22 are provided with longitudinal ribs 48 and 50 by means of which the respective printing plates are mechanically held in place and circumferentially tensioned, as will be described hereinafter.

The longitudinal edge of the printing plate 44 is inserted between the corresponding longitudinal edge of the saddle 14 and the lock up bar 22, being engageable with a surface 52 of the lock up bar which makes an acute angle with the adjacent portion of the cylindrical core 12. The corresponding rib 48 is engaged by longitudinally spaced hooks 54, only one of which is shown. Each hook 54 is provided with a tab 56 inserted into a socket 58 in the saddle 14, the tab 56 being retained in its socket 58 by engagement of the inner end of the hook 54 with the surface of the cylindrical core 12. Each hook 54 is biased toward the lock up bar 22 by a conical nose 60 of an actuator 62 slidable in a bore 64 in the saddle 14, the actuator 62 being urged toward the lock up bar by a compression coil spring 66 in the bore 64. As will be apparent, the spring-biased actuators 62 maintain the hooks 54 in engagement with the rib 48 of the printing plate 44, and also cause the corresponding longitudinal edge of the printing plate 44 to be clamped between the hooks 54 and the inclined surface 52 of the lock up bar. With this construction, the longitudinal edge of the printing plate 44 having the rib 48 thereon is securely held in place.

The flexible printing plate 44 is circumferentially tensioned by a circumferential force applied to the opposite longitudinal edge thereof, as will now be described in connection with the corresponding longitudinal edge of the flexible printing plate 46.

Considering the manner in which the flexible printing plate 46 is circumferentially tensioned, the saddle 16 is provided ad-

jacent the lock up bar 22 with longitudinally spaced, circumferential guide grooves 70 for tensioning blocks 72, only one of which is shown. Each tensioning block 72 has an end 74 engageable by the corresponding pivoted hook 28 to urge such block toward the lock up bar 22. The opposite end of each tensioning block 72 is provided with a hook 76 engageable with the longitudinal rib 50 on the flexible printing plate 46 to urge the corresponding longitudinal edge of this printing plate into a recess 78 defined by at least substantially perpendicular walls of the lock up bar 22. When the tensioning block 72 is in the position shown in FIG. 2, there is insufficient clearance between it and the lock up bar 22 to permit withdrawal of the rib 50, the same relationship existing between the hooks 54, the lock up bar and the rib 48 on the printing plate 44.

Each tensioning block 72 is provided therein with a cavity 80 traversed by a pin 82 carrying a rattrap spring 84 the arms of which act on the block 72 and the saddle 16 in a manner to retract the block upon retraction of the tensioning hook 28.

Considering the operation of the foregoing mechanical holding and tensioning means for the flexible printing plates 44 and 46, the printing plates are positioned on the saddles 14 and 16 as shown in the drawing, and particularly as shown in FIG. 2 thereof, with the pivoted tensioning hooks 28 in their retracted positions. The hooks 54 automatically grip the longitudinal edge of the printing plate 44 bearing the rib 48, and the diametrically opposed hooks corresponding to the hooks 54 grip the corresponding longitudinal edge of the printing plate 46. Then, the pivoted tensioning hooks 28 are displaced into the positions shown in FIG. 2, utilizing the pivoting means 42, to displace the tensioning blocks 72 into the positions shown in FIG. 2. This results in tensioning of the flexible printing plate 46, the other flexible printing plate 44 being tensioned in the same manner. Thus, the two flexible printing plates 44 and 46 are mechanically locked in place in circumferential tension.

The flexible printing plates 44 and 46 are also held in place by developing vacuums between them and the corresponding saddles 14 and 16. The saddles 14 and 16, inwardly of the peripheries thereof, are roughened, as suggested in FIG. 4, to provide them with numerous small vacuum channels. The peripheries of the saddles 14 and 16 are smooth to provide peripheral vacuum seals.

The small vacuum channels in the surfaces of the saddles 14 and 16 formed by appropriately roughening such surfaces are connected to a central, axial vacuum manifold 86 by radial vacuum passages 88 and 90 in the cylindrical core 12 and the saddles, respectively. It will be understood that the radial

passages mentioned are spaced from any cavities in the inner surfaces of the saddles 14 and 16. Also, they are sufficiently closely spaced to provide substantially uniform vacuum distribution throughout the small surface channels formed by roughening the outer surfaces of the saddles 14 and 16 inwardly of the peripheries thereof.

With the foregoing construction, the flexible printing plates 44 and 46 are mechanically held in place in circumferential tension, and are also held in place by the vacuums developed between the printing plates and their corresponding saddles 14 and 16. The net effect is to positively hold the flexible printing plates 44 and 46 in place against the forces tending to displace the flexible printing plates radially outwardly upon rotation of the printing press cylinder 10.

Although exemplary embodiments of the invention have been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiments without departing from the spirit of the invention as defined by the claim which follows.

I claim:

1. In combination:

- a. a printing press cylinder;
- b. a flexible printing plate engageable with said cylinder;
- c. tensioning means connecting said printing plate to said cylinder for maintaining said printing plate in tension circumferentially of said cylinder;
- d. said tensioning means including circumferentially spaced gripping means respectively engageable with circumferentially spaced edges of said printing plate, and including means for displacing one of said gripping means circumferentially of said cylinder away from the other to tension said printing plate;
- e. said cylinder being provided with longitudinally spaced, circumferential guide grooves adjacent one of said circumferentially spaced edges of said printing plate;
- f. said one gripping means of said tensioning means including tensioning blocks slidable circumferentially in said guide grooves and having hooks engageable with said one circumferentially spaced edge of said printing plate;
- g. said displacing means of said tensioning means including tensioning hooks engageable with said tensioning blocks for urging same circumferentially in a direction to tension said printing plate; and
- h. means for applying a vacuum between said printing plate and said cylinder to secure said printing plate to said cylinder.