April 30, 1968 R. D. MUSGRAVE 3,380,381

ROTARY PRESS PRINTING CYLINDER FOR CLAMPING FLEXIBLE PLATES

Filed Aug. 6, 1965 3 Sheets-Sheet 1

Fig. 1

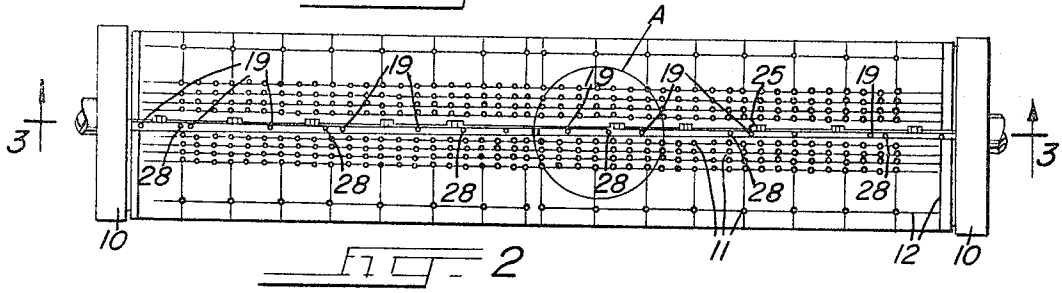


Fig. 2

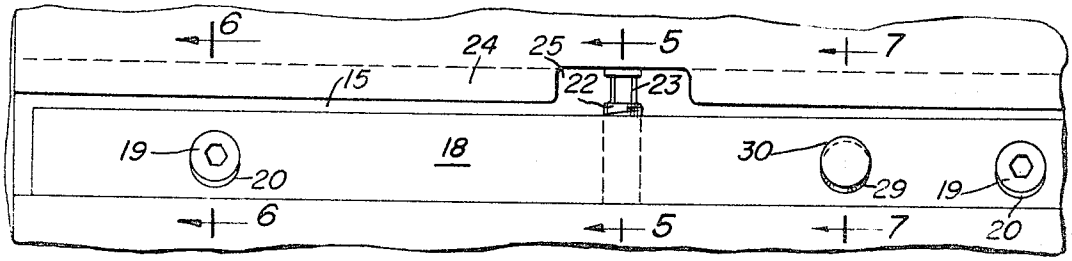
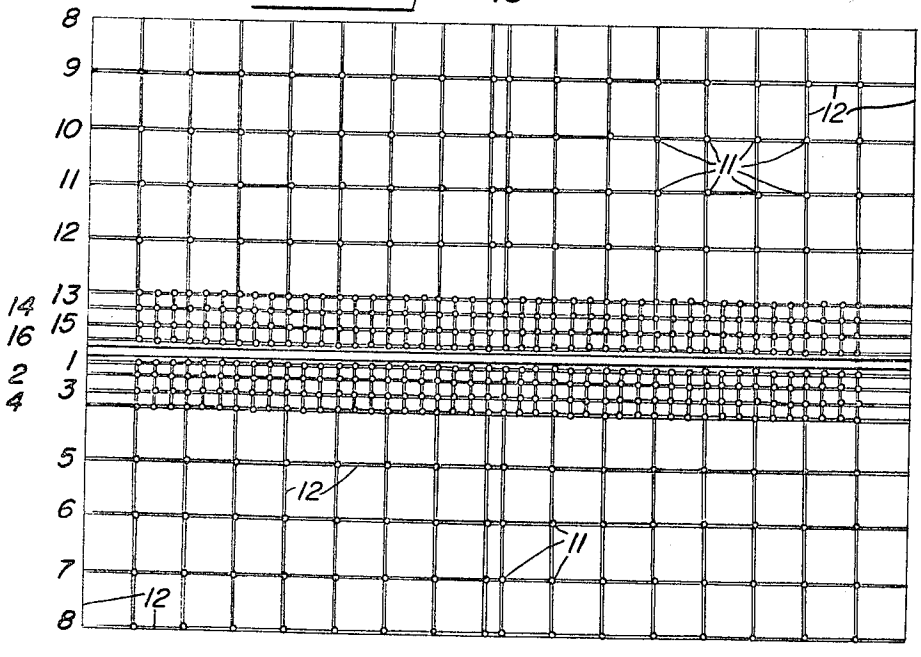


Fig. 10



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ROTARY PRESS PRINTING CYLINDER FOR CLAMPING FLEXIBLE PLATES

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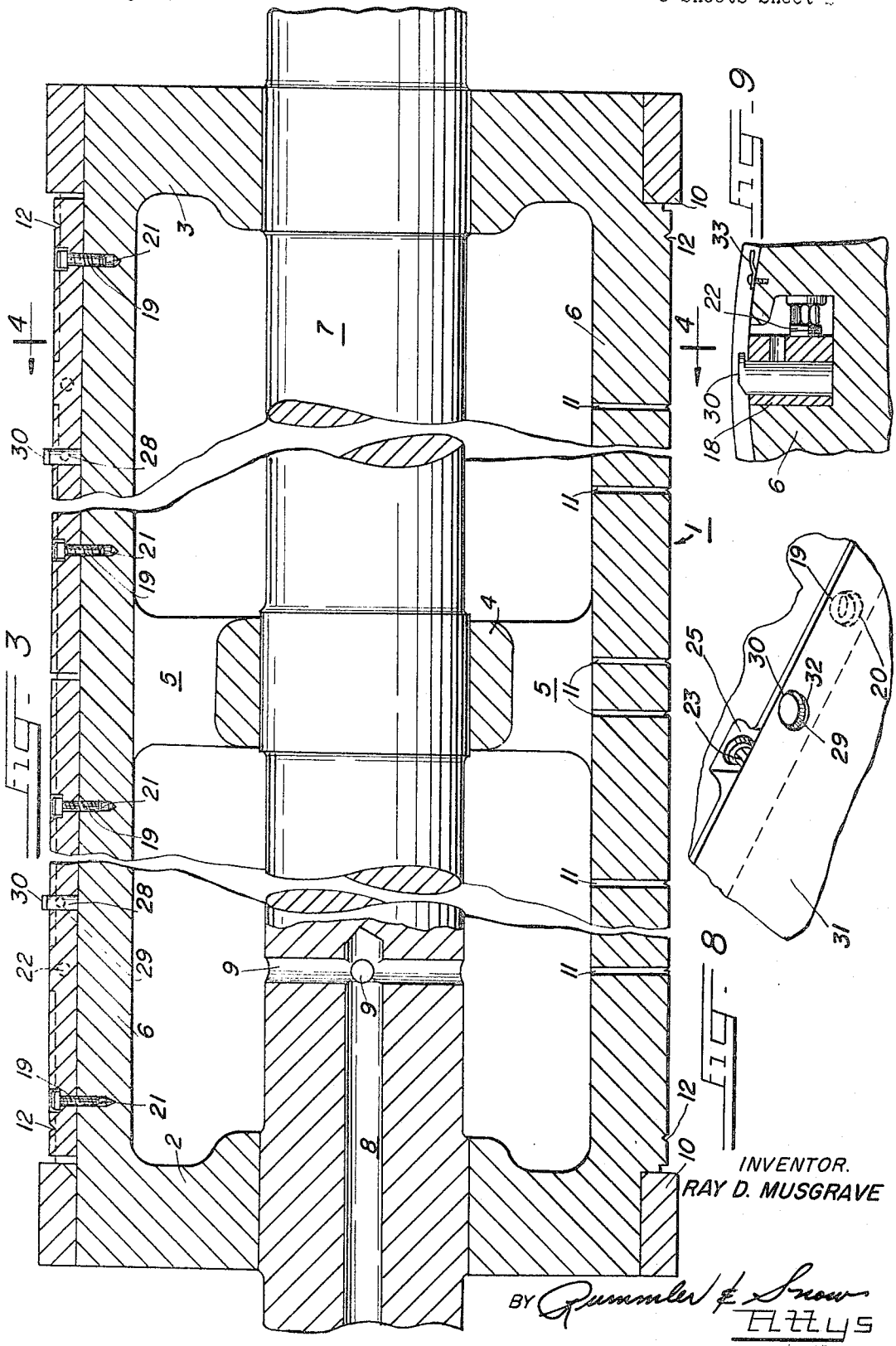

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ROTARY PRESS PRINTING CYLINDER FOR CLAMPING FLEXIBLE PLATES

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FIG. 4

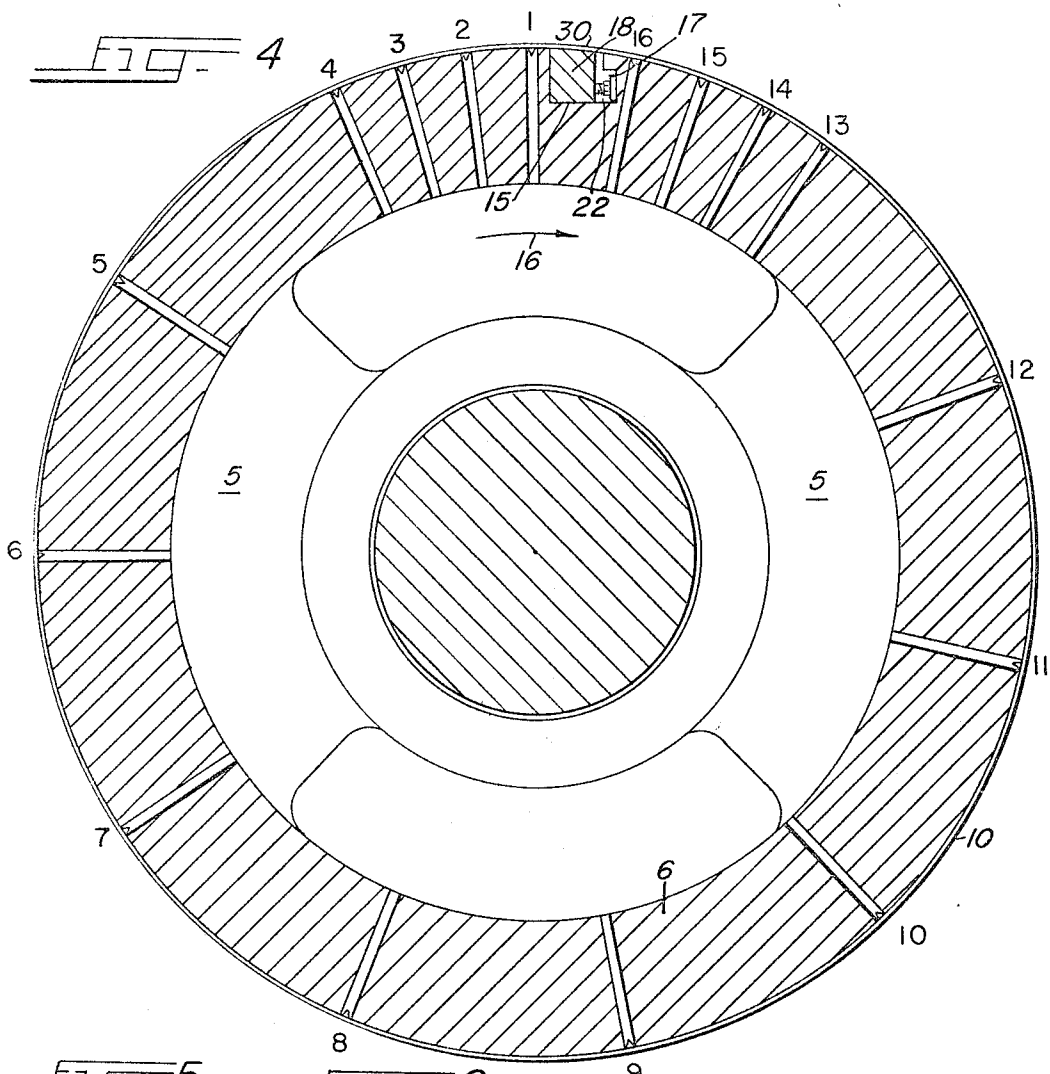


FIG. 5

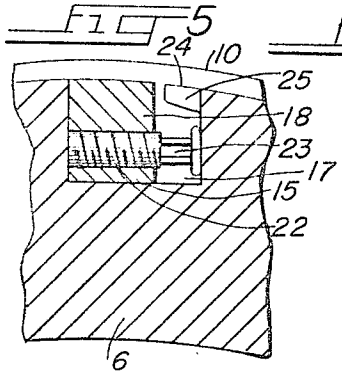


FIG. 6

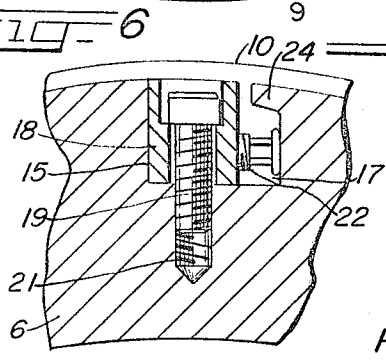
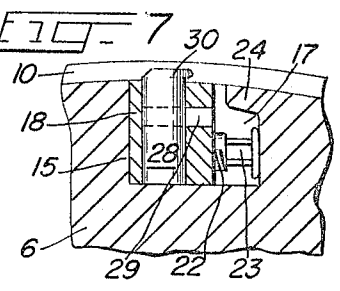


FIG. 7



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ROTARY PRESS PRINTING CYLINDER FOR CLAMPING FLEXIBLE PLATES

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3 Claims. (Cl. 101—415.1)

ABSTRACT OF THE DISCLOSURE

A plate cylinder for rotary printing presses wherein a plate holding bar is disposed lengthwise in an axially extending channel in the cylinder surface, the bar being of less width than the channel and adjustable transversely thereof by means of screws spaced lengthwise of the bar and extending through the bar from side to side of the channel, characterized by having a recess in a wall of the channel to receive the head of each of said screws, and an opening in the surface of the cylinder above the head of each screw for access thereto to turn the same. Said plate cylinder being further characterized by being hollow and having angularly spaced axially extending rows of perforations opening from the interior of the cylinder to the surface thereof, and by having means for exhausting air from the interior of the cylinder.

In vacuum cylinder mounting of flexible plates, the thin metal or plastic backing sheets, which are wrapped around the cylinder and carry the printing plates or elements, are usually secured at their ends by a clamp bar seated in an axially extending channel formed in the cylinder surface, the body of the backing sheet being held in close contact with the surface of the cylinder because of the vacuum maintained at the interior of the cylinder and acting on the sheet through appropriate passages leading to the cylinder surface.

Commonly the wrap-around plate is a sheet of thin steel or a dimensionally stable film such as Mylar, the DuPont brand of polyester film, and often the sheet will break at the sharp bend or crease formed at the clamp bar. This allows the sheet to come loose from the cylinder, in spite of the vacuum within the cylinder, and when that happens it means a shut-down of the particular run. Invariably the printing plates or elements mounted on the backing sheet will be bent and ruined and in the case of electrotypes there is serious danger of the press being wrecked before the operator can shut it down.

Thus, the main objects of this invention are to provide an improved vacuum cylinder construction for mounting flexible or wrap-around printing plates; to provide such a device which will obviate the need for any creases or sharp bends in the wrap-around plate at the places where it is mechanically secured to the cylinder; to provide a vacuum cylinder having improved means for securing the wrap-around plates; to provide such a device having improved means for adjusting the register of wrap-around plates; and to provide an adjustable means for securing wrap-around plates onto a vacuum cylinder and perfecting the register of such plates without distortion.

A specific embodiment of this invention is shown in the accompanying drawings in which:

FIGURE 1 is a plan view of the improved vacuum cylinder showing the mounting means for the wrap-around printing plates,

FIG. 2 is an enlarged fragmentary view of the same showing the portion of the plate mounting means within the circle A of FIG. 1,

FIG. 3 is an enlarged sectional view of the vacuum cylinder, partly broken away, showing its construction,

FIG. 4 is a sectional view of the same, as taken on line 4—4 of FIG. 3,

FIG. 5 is an enlarged fragmentary sectional detail of the vacuum cylinder, as taken on line 5—5 of FIG. 2, showing the adjusting means for the plate mounting and register bar,

FIG. 6 is a similar view, as taken on line 6—6 of FIG. 2, showing the manner of securing the plate mounting and register bar onto the vacuum cylinder,

FIG. 7 is a similar view, taken on line 7—7 of FIG. 2, showing the arrangement of the hook pins on the plate mounting and register bar for securing the ends of the wrap-around plate,

FIG. 8 is a fragmentary perspective view showing the manner with which a pre-punched wrap-around plate is engaged with the hook pins on the mounting and register bar,

FIG. 9 is a fragmentary sectional view like FIG. 7, showing an arrangement of spring clip means for mechanically securing the tail end of the wrap-around plate, and

FIG. 10 is a view showing a development of the vacuum cylinder surface to illustrate a preferred arrangement of the holes leading from the outer surface of the cylinder to the hollow interior thereof.

The primary concept of this invention is to provide a vacuum cylinder for rotary printing presses with a simple micrometrically adjustable attachment bar wherewith flexible or wrap-around plates can be readily and securely mounted without any line of break or weakening due to sharp bends and at the same time be easily adjusted for register after being firmly attached to the vacuum cylinder.

As shown in the drawings, the vacuum cylinder **1** is a hollow body having relatively heavy solid end walls **2** and **3** and a central hub **4** from which a pair of oppositely disposed spokes **5** extend to the cylindrical wall **6**, the spokes **5** being of about 90 degree in width in the angular direction to provide ample support for the relatively thick and heavy wall **6**. The end walls **2** and **3** and the hub **4** are axially bored to receive a support and drive shaft **7**, which extends through the respective bores in press-fit relation, and the shaft **7** is provided with an axial passage **8** leading from one end to the hollow interior of the cylinder **1** where communication with the interior of the cylinder is afforded by cross bores **9**.

A bearer ring **10** is fixedly mounted at each end of the cylinder **1** to extend radially beyond the exterior surface thereof, as shown in FIGS. 1 and 3, and the side wall of the cylinder between the bearer rings is provided with a plurality of holes **11** drilled through to the interior of the cylinder. These holes **11** are arranged according to a predetermined pattern, as indicated in FIG. 1, and on the outer surface of the cylinder wall the holes are all interconnected by means of shallow grooves **12**. A preferred pattern for the drilled holes **11** is shown by FIG. 10, which is a development of the surface area of the cylinder between the circumferential grooves adjacent the bearer rings **10**.

As is conventional with devices of this kind, the work mounted on the cylinder is held firmly against the surface of the cylinder by atmospheric pressure acting against a vacuum created between the work and the supporting cylinder surface and for this purpose the interior of the hollow cylinder **1** is exhausted by means of a suitable vacuum pump, not shown, connected with the axial pas-

sages 8 and 9 in the cylinder drive shaft 7. The grooves 12, which connect the several holes 11 in the cylinder wall, serve to extend the vacuum effect over the cylinder surface.

As shown, the cylinder 1 is also provided with an axially extending channel 15 in its exterior surface and the leading side of this channel, in the direction of cylinder rotation indicated by the arrow 16 in FIG. 4, is undercut, as at 17, for a purpose to be hereafter described. A plate mounting and register adjustment bar 18 is disposed in the channel 15 and is secured therein by means of socket head cap screws 19 which extend through drilled and counter bored holes 20 in the bar 18, and into suitably tapped holes 21 in the cylinder wall (see FIGS. 3 and 6).

The holes 20 in the register bar 18 are counterbored sufficiently to fully receive the heads of the capscrews 19 and each hole is elongated in the angular direction of the cylinder as shown in FIG. 6, to admit of limited movement of the said bar in that direction. In the form shown in FIG. 1, the channel 15 extends the entire length of the cylinder 1, between the bearer rings 10, and two of the mounting and register bars 18 are disposed in end to end relation in the channel, each bar being approximately one-half the length of the channel. It will be understood, however, that a single bar extending the length of the channel, may be employed if desired, or there may be more than two, depending upon the size and length of the cylinder.

Adjustment of the mounting and register bars 18, transversely of the channel 15 is afforded by a plurality of adjusting screws 22 extending from side to side of the channel through suitable threaded bores in the bars 18. In the arrangement shown in FIG. 1 there are five of these adjusting screws 22 uniformly spaced lengthwise along each bar and as shown in FIGS. 2 and 5 the adjusting screws are disposed adjacent the bottom of the bar so as to extend into the undercut portion 17 of the channel 15 where the shank of the screw is cut to a square or hexagonal cross-section, as at 23, to permit its being turned by means of a suitable wrench. To provide for access to the adjusting screw shank, the overhanging lip 24, above the undercut portion 17 of the channel 15, is cut away, as at 25, above each screw. Thus, because of the threaded engagement of the adjusting screws 22 with the register bar 18 and the screws bearing on each side of the channel 15, turning of the screws will move the bar 18 one way or another across the width of the uppermost channel opening. With this arrangement each register bar can be adjusted back and forth, either parallel with the cylinder axis or at an angle therewith within the space afforded by the width of the channel beyond the width of the bar.

The primary function of the plate mounting and register bar 18 is to provide a micrometrically adjustable means for mechanically attaching a flexible, wrap-around printing plate onto the vacuum cylinder and for that purpose the bar 18 is provided with a plurality of "hook-pins" 28 which, as shown in FIG. 7, are fixedly secured in the bar 18 by means of dowel pins 29. Each of these "hook-pins" 28 has a forwardly off-set, eccentric head 30 which is of substantially the same diameter as the shank of the pin and which is spaced above the bar 18 a distance slightly greater than the thickness of the plate to be mounted. Also, as shown in FIGS. 3 and 7, the total height of the pins 28 above the bar 18 is less than the height of the bearer rings 10 above the surface of the cylinder 6, the top surface of the bar 18 being flush with the surface of the cylinder.

The flexible or wrap-around plates for use with the improved vacuum cylinder will be made of a size that has a width approximately equal to the length of the vacuum cylinder between the bearer rings 10, so as to fully span the drilled area, and of a length substantially equal to the circumference of the cylinder. Also the leading end margin of the said plates will be precisely punched, with respect to the side and leading edges, to provide holes of substantially exact size to fit over the "hook-pins" on the mounting and register bar 18. As shown in FIG. 1, there are six "hook-pins," uniformly spaced across the length of the vacuum cylinder, there being three pins on each of the bars 18, and the flexible sheet comprising the wrap-around plate will have six holes in its leading edge, of the same size and spacing as the six "hook-pins" and located rearwardly of the leading edge so that when the plate is mounted its leading edge will substantially coincide with the leading edge of the bar 18. This is shown in the perspective view of FIG. 8 and it will be seen that to mount the plate 31 the holes 32 in its leading edge are first passed over the offset heads 30 of the respective hook-pins and then onto the shank portion of the pins so that the leading margins of the said holes will be engaged under the forwardly overhanging lip provided by the offset heads 30. The flexible plate is then wrapped around the cylinder with its trailing edge overlying the last row of drilled holes adjacent the lip 24 at the leading side of the channel 15. The cylinder is then evacuated by suitable means connected to the passage 8 in the shaft 7 and the resulting vacuum, reaching to the under surface of the plate through the drilled holes 11 and the surface channels 12 in the cylinder wall 6, will cause the entire area of the plate to be firmly held to the cylinder.

Conventionally, the printing elements carried by the flexible wrap-around plate are secured thereto in precisely determined position relative to each other and the leading and side edges of the plate, the printing elements being mounted by means of "sticky-back" strips or sheets of double faced adhesive coated material. Often, however, it is necessary to make slight adjustments of the plate to correct register of printed areas on the printed sheets and with the improved mounting means this can readily be accomplished by adjustment of mounting bar 18, by means of the adjusting screws 22, as heretofore described.

In some cases, particularly when the flexible sheet or plate carrying the printing elements is heavily loaded, it may be desirable to provide a mechanical hold-down means for the trailing or tail end of the sheet in addition to the atmospheric pressure resulting from the vacuum in the cylinder 1. In such a case a relatively thin spring metal clip 33, extending the length of the channel 15, may be mounted on the cylinder wall immediately ahead of the channel 15 with its leading edge free to permit the tail end of the sheet to be inserted or tucked thereunder as shown in FIG. 9. This spring clip may be quite narrow, for example ⅜ to ½ inch, and with such an arrangement the printing elements may be mounted very close to the edge of the tail end of the sheet or wrap-around plate, without danger of the sheet pulling away from the cylinder under the effect of centrifugal force generated by high speed rotation of the cylinder. Also, with the spring clip arrangement greater security is afforded for cases where the plastic or thin metal plate employed is not as smooth as Mylar and, to insure that an irregular surface would lay flat at the leading edge, the number of "hook-pins" may be increased.

Particular advantages of this invention reside in the fact that sharp bends or creases in the sheet or plate, required by clamp bars, which weaken or break the sheet, are completely obviated; in the ease and rapidity with which the wrap-around sheets or plates are securely attached to the cylinder; and in the fact that the mounted plate can be readily adjusted for register without any uneven pull on the plate and without any distortion of the plate

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A rotary press printing cylinder comprising,

(a) a cylindrical body adapted for rotation about its axis and having
  (1) a coaxial bearer ring adjacent each end projecting radially beyond the surface of the body, and
  (2) an outwardly opening channel in the surface of the body extending axially between said bearing rings,
(b) a plate holding bar mounted lengthwise in said channel and substantially flush with the surface of the body,
  (1) said bar being of less width than said channel and mounted for adjustment in the direction transversely thereof,
(c) a plurality of radially projecting hook pins mounted on and spaced lengthwise of said bar for engaging in preformed perforations in the leading margin of a flexible printing plate wrapped around said cylindrical body, and
(d) a plurality of screws spaced apart lengthwise of the bar and extending transversely through the bar from side to side of said channel,
  (1) each of said screws having threaded engagement with the bar whereby rotation of the screws will cause relative movement of the bar transversely of the channel,
(e) the wall of said channel on the leading side thereof in the direction of cylinder rotation having a recess below the surface of the said body to receive the forward ends of said screws,
  (1) said screws extending to and bearing against the radial wall of said recess, and
  (2) the surface of said body having an opening into said recess above each of said screws for access to the screw to turn the same.

2. A rotary press printing cylinder comprising,
(a) a hollow cylindrical body adapted for rotation about its axis, the side wall of said body having
  (1) an outwardly opening axially extending channel therein, and
  (2) a plurality of angularly spaced axially-extending rows of perforations, opening from the outer surface of the body to the hollow interior thereof,
(b) means for exhausting air from the interior of said hollow body,
(c) an axially extending plate holding bar mounted in said channel substantially flush with the outer surface of said body,
  (1) said bar being of less width than said channel and mounted for adjustment in the direction transversely thereof,
(d) a plurality of screws spaced apart lengthwise of the bar and extending transversely therethrough from side to side of said channel, each of said screws having threaded engagement with the bar

whereby the rotation of the screws will cause relative movement of the bar transversely of the channel,
(e) a plurality of radially projecting hook pins spaced lengthwise of and mounted on said bar for engaging in preformed perforations in the leading margin of a flexible printing plate wrapped around said cylindrical body,
(f) the wall of said channel on the leading side thereof in the direction of cylinder rotation having a recess below the surface of the cylindrical body to receive the forward ends of said screws, said screws extending to and bearing against the radial wall of said recess, and the surface of said body having an opening into said recess above each of said screws for access to the screw to turn the same.

3. A rotary press printing cylinder comprising,
(a) a hollow cylindrical body adapted for rotation about its axis and having an axially extending outwardly opening channel in its surface,
(b) a plate holding bar mounted lengthwise in said channel below the surface of said body,
  (1) said bar being of less width than the channel and mounted for adjustment in the direction transversely of the channel,
(c) a plurality of hook pins mounted on and spaced lengthwise of said bar for attaching to said bar the leading margin of a flexible printing plate wrapped around said cylindrical body, and
(d) means for adjusting the position of said bar transversely of said channel and holding the bar fast at any adjusted position in the channel,
(e) said cylindrical body being closed at each end and having axially extending parallel rows of perforations in its sidewall spaced apart angularly around the body and opening from the interior thereof,
  (1) a plurality of said rows of perforations being more closely spaced both angularly and axially in a predetermined circumferential area of the said body on each side of the said channel, and
(f) means for exhausting the interior of said body.

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