

Oct. 22, 1968

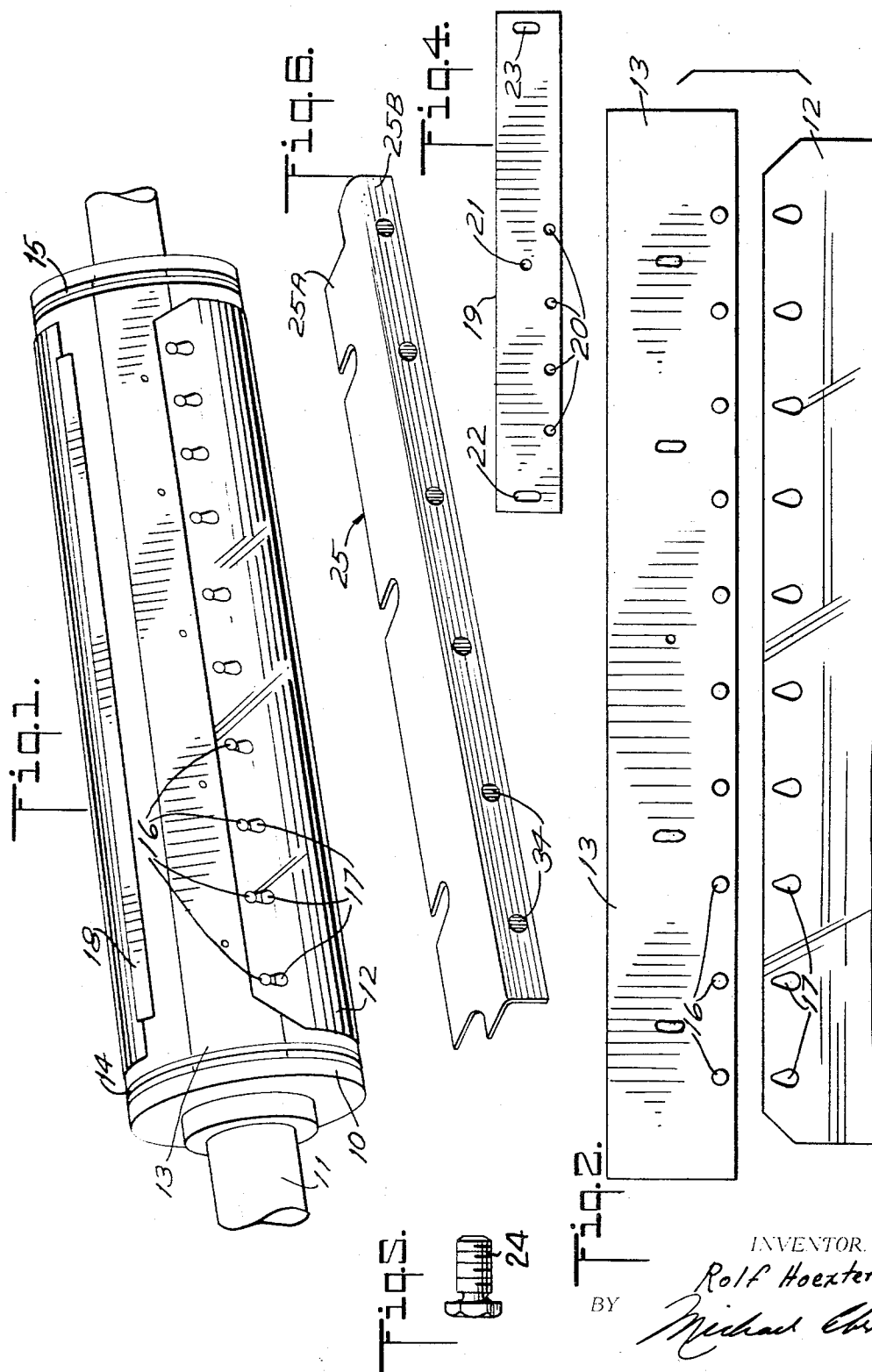
R. HOEXTER

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PRINTING PLATE CARRIER TRANSFER MOUNTING SYSTEM

Filed Jan. 31, 1967

2 Sheets-Sheet 1



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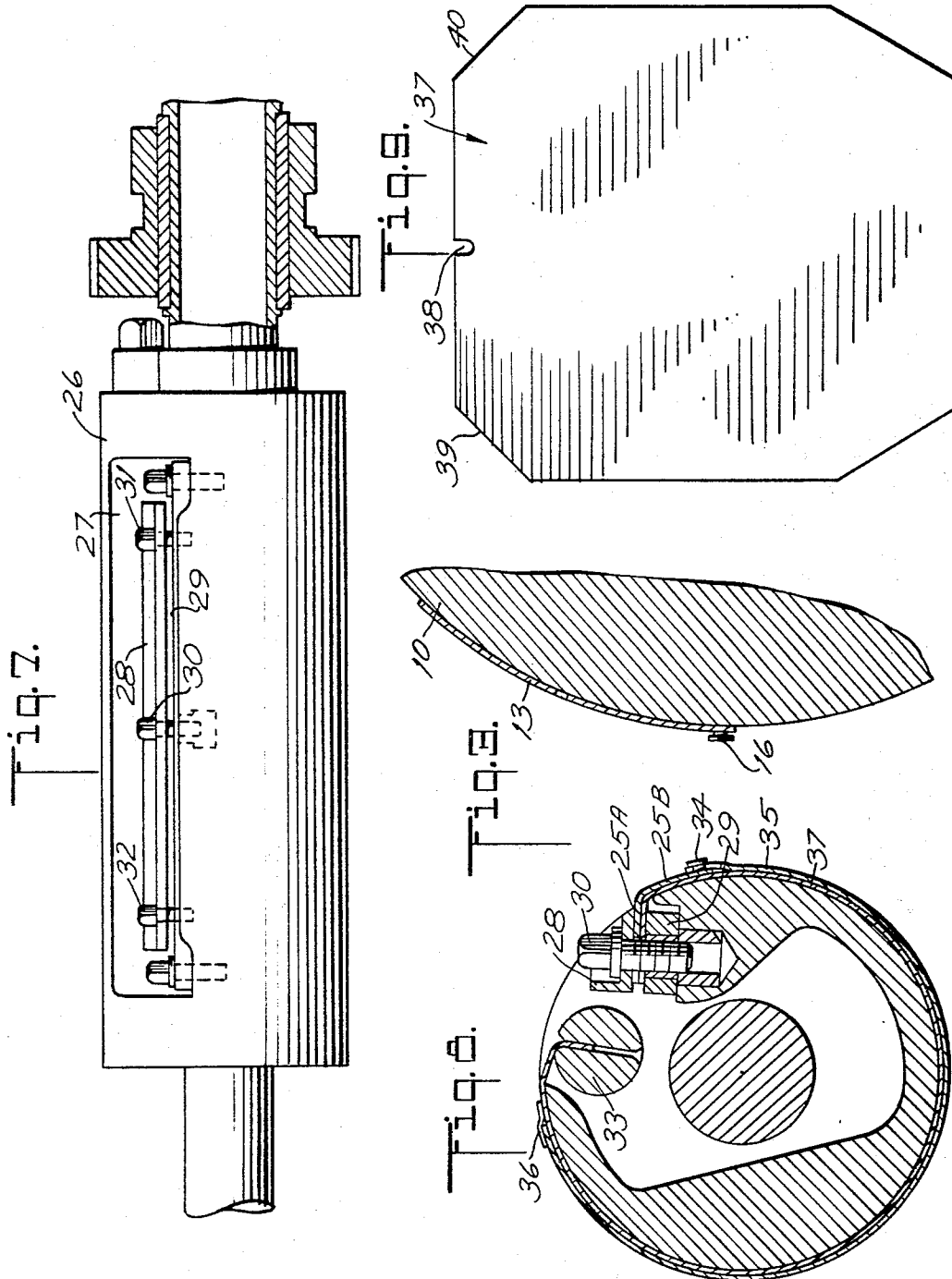
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2 Sheets-Sheet 2



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3,406,629 PRINTING PLATE CARRIER TRANSFER MOUNTING SYSTEM

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Filed Jan. 31, 1967, Ser. No. 612,845
9 Claims. (Cl. 101-415.1)

ABSTRACT OF THE DISCLOSURE

A carrier assembly for rubber printing plates, the assembly being usable with conventional plate cylinders in mounting and proofing machines and in flexographic presses, the assembly being constituted by an adapter bar attachable to the cylinder and provided with locating buttons to engage one end of a carrier sheet which is wrapped about the cylinder, whereby the carrier sheet onto which the printing plates are mounted may be readily attached or removed from the cylinder.

Related application

Copending application Ser. No. 439,575, now Patent No. 3,361,060, of Rolf Hoexter and T. M. Morris.

This invention relates generally to rubber or other flexible printing plate carriers for fixed and removable cylinder presses, and more particularly to a carrier assembly which is usable with a conventional cylinder and which is constituted by an adapter bar attachable to a cylinder and provided with locating buttons for engaging one end of a carrier sheet.

In the flexographic process, printing is effected by rubber printing plates mounted on cylinders, the paper to be printed being impressed on the inked printing plates. Ordinarily, after a printing job is completed, the press must be shut down while a new set of printing plates is positioned, registered, and made ready directly on the printing cylinder. In practice, the down-time can last as long as two to three hours.

In order to obviate the need to shut down the flexographic press, removable carriers have been developed which are readily attachable to a fixed cylinder in the press. The rubber printing plates are mounted on the carrier and the complete, ready-to-print setup is then transferred to the press cylinder. When a run is over, the operator simply removes the carrier from the press cylinder and replaces it with a carrier containing plates for the next job. By the use of such rubber plate carriers, a press may be kept running almost continuously.

One well-known form of removable carrier is that marketed under the trade name "Snap-Lok." This carrier is in the form of a flexible steel sheet which is usable only in conjunction with a special cylinder having a narrow groove cut along its face, the ends of the carrier being inserted in the groove and being locked therein by a cam bar mechanism.

Although the removable carrier does away with the necessity for shutting down the press while mounting the printing plates, it is still essential that the printing plates be positioned accurately on the carrier. This is a time-consuming operation heretofore carried out largely by measurement, and entailing a high order of skill. The difficulties encountered in seeking to properly position rubber printing plates on carriers are compounded in color-printing operations calling for two or more carriers and requiring color-to-color registration.

As a set-up aid for use with "Snap-Lok" and other removable carriers, machines have been developed for mounting rubber printing plates on a removable carrier and for obtaining proofs therefrom. One such mounting

and proofing machine is disclosed in copending application Ser. No. 439,575 of Hoexter and Morris, filed Mar. 15, 1965, entitled "Machine for Mounting and Proofing Rubber Printing Plates." A machine of this type employs a "Snap-Lok" mounting cylinder that is the counterpart of the plate cylinder included in the press and has an identical arrangement for holding the carrier in place. By mounting the rubber printing plates on carriers with a mounting and proofing machine, necessary corrections may be made before a job goes to press, thereby ensuring that the plates are ready to print and register when the carrier is secured to the printing cylinder.

While "Snap-Lok" carriers operate effectively they have the disadvantages of requiring special cylinders in the mounting and proofing machine and in the press, which are adapted to receive a "Snap-Lok" or similar type of removable carrier.

Accordingly, it is the main object of this invention to provide a carrier assembly for rubber printing plates which is usable with conventional plate cylinders in mounting and proofing machines and in flexographic presses.

Also an object of the invention is to provide a carrier assembly of the above-described type, which is inexpensive and which makes it possible to convert existing fixed-cylinder presses to carrier transfer operation for rapid change-over from one job to another.

More specifically, it is an object of this invention to provide a carrier assembly which is constituted by an adapter bar which may be banded, screwed, clamped or otherwise secured to a conventional cylinder, and which is provided with locating buttons for securing the leading edge of a carrier sheet onto the cylinder, the other edge being taped thereto, whereby the carrier sheet may be readily attached to or removed from the cylinder.

Yet another object of the invention is to permit the bar to be attached to a cylinder by screws, so that the bar lies in parallel alignment with the longitudinal axis of the cylinder or at an angle thereto for use with presses having skew-mounted printing plates, as is required in certain types of envelope printing operations.

Briefly stated, these objects are accomplished in a carrier assembly constituted by a thin curved bar whose radius corresponds or is made to conform to that of a conventional cylinder, the bar being provided with a series of equi-spaced locating buttons, the bar being attached by screws or other means to the cylinder. A carrier sheet is provided, having adjacent the leading edge thereof a series of pear-shaped openings at positions corresponding to those of the buttons, the carrier sheet thereby supported from the bar and being wrapped about the cylinder, the other end thereof being taped or otherwise held to the cylinder, rubber printing plates being mounted on the carrier sheet.

For a better understanding of the invention, as well as other objects and further features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a printing cylinder having a carrier assembly in accordance with the invention mounted thereon;

FIG. 2 is a plan view of the assembly, the adapter bar and carrier sheet being separated from each other;

FIG. 3 is a side view of the cylinder having the adapter bar installed thereon;

FIG. 4 is a plan view of an adapter bar in accordance with the invention;

FIG. 5 is a sectional view of a pivot screw for use with the pivoted bar;

FIG. 6 shows an angle-type adapter bar for a plate-cylinder incorporating a tympan or blanket claim and reel mechanism;

FIG. 7 is an elevational view of said plate cylinder; FIG. 8 shows the angle-type carrier assembly installed on the plate cylinder, and FIG. 9 is a shim jacket for use with the angle-type carrier assembly.

Referring now to FIG. 1, there is shown a conventional plate cylinder 10 supported for rotation on a shaft 11. In order to attach a removable carrier 12 to the cylinder, there is provided an adapter bar 13 whose function it is to hold the leading edge of the carrier onto the plate cylinder. It is to be understood that the same arrangement is usable with mounting and proofing machines having a mounting cylinder. By providing this mounting cylinder, which may be of standard design, with a removable carrier in accordance with the invention, the rubber printing plates may be mounted on this carrier in the machine and corrections made therein before the carrier is transferred to the plate cylinder in the rubber printing press.

The adapter bar 13 is preferably formed of a strip of thin, tempered stainless steel or other suitable spring steel material, the strip having a transverse curvature corresponding substantially to that of the cylinder to which it is attached, so that it lies flush thereagainst. The bar is placed longitudinally across the cylinder and is secured thereto by a pair of bands 14 and 15, encircling the cylinder adjacent the ends thereof. In practice, the bands may be of the commercial type, sometimes referred to as hold-down bands.

Alternatively, the user may drill, tap and countersink a number of holes into a standard cylinder and fasten the adapter bar thereto by flat-head screws. In this instance, the radius of curvature of the bar, which is of spring metal, may be made slightly smaller than the radius of the cylinder. When hold down by three or four screws, the bar is forced to conform to the cylinder. The bar, due to its width, is very rigid in the direction of curvature. Yet, because it is very thin (e.g., .031"), it has a small profile.

Adapter bar 13 is provided with a series of equi-spaced locating buttons 16 each having a disc-like head and a short shank connecting the head to the strip. The removable carrier 12 is in the form of a sheet of non-stretchable, flexible material of high tensile strength formed, for example, of polyester film, Mylar or metal. As is evident in FIG. 1, the width of the sheet is related to the length of the cylinder to provide a sufficient surface for the rubber printing plate to be mounted thereon, whereas the length thereof is somewhat shorter than the circumference of the cylinder. While the locating buttons project above the surface of the cylinder, they lie well below the surface of the rubber printing plates mounted on the carrier.

Carrier 12 has a series of pear-shaped holes 17 punched therein adjacent the leading edge of the sheet, the hole positions corresponding to those of the locating buttons 16 on the adapter bar. The diameter of the circular portion of each hole is sufficient to permit entry of the head of the related button therein whereas the dimension of the tapered portion is such as to accommodate the shank of the button therein, but insufficient for the head. Thus the leading edge of the carrier is attached to the bar by passing the buttons through the circular portions of the holes and then pulling the carrier down to cause the shanks to enter the tapered portions. The carrier is then wrapped about the cylinder and its trailing edge is secured by a pressure-sensitive removable strip of tape 18 to the surface of the cylinder.

Each adapter bar has the same function, namely, to hold the leading edge of the carrier sheet on its respective plate cylinder. Thus, if rubber printing plates for a three-color operation were mounted in a mounting and proofing machine using locating buttons on the plate cylinder, the locating buttons on each plate cylinder in the printing press will precisely maintain the same register.

In some instances, the use of hold-down bands at either

end of the adapter bar has certain drawbacks, for they may require an excessive bar width to achieve the required rigidity. This width is at the expense of the surface on the cylinder which is available for printing. Moreover, while these bands are useful for initial holding purposes, they may be considered by some users as inadequate for permanent attachment. Also, the bands may interfere with ink pan splash covers enveloping the cylinder at its ends.

In the embodiment shown in FIGS. 4 and 5, the curved adapter bar 19 is reduced in width, as compared to the band-held type of FIG. 1, and is held down on the cylinder by a screw arrangement which lends itself to angular adjustment of the bar relative to the longitudinal axis of the cylinder. Bar 19 is provided with a series of locating buttons 20 of the type disclosed in connection with FIGS. 1 to 3, the buttons lying at spaced positions along a common longitudinal axis.

Bar 19 has a round pivot hole 21 at its center and two slots 22 and 23 for receiving holding screws adjacent the ends. These holes serve to facilitate installation of the bar on existing cylinders by reducing the precision requirements which ordinarily exist when transferring holes from the bar to the cylinder. The arrangement is such as to permit mounting of a carrier parallel to the axis of the mounting cylinder in an off-press mounting and proofing machine, and then transferring the carrier to the press to print at a predetermined right-hand or left-hand small helix angle.

Center hole 21 is sized for close fit around the shank of a pivot screw 24 insertable in a bore in the cylinder. As shown separately in FIG. 5, the head of the screw has a height which is substantially less than that usually found in commercially available screws of the same large shank diameter, in order to minimize the protrusion of the head above the cylinder surface thereby to prevent interference with impression or inking cylinders. The relatively large shank diameter is intended to make installation easy, for in a printing press, access to the printing cylinder is very limited, and small drills and taps tend to break off when operating in a confined space.

Adapter bar 19 pivots about screw 24 in hole 21 to facilitate parallel alignment of the locating buttons 20 with the horizontal axis of the cylinder. The bar is securely held to the cylinder by means of suitable screws, preferably having a low profile hex head, which enter slots 22 and 23 and which, when tightened, force the spring metal of the bar into conformity with the surface of the cylinder. Such conformity is attained even when the bar is inclined at an angle in the range of 1° to 5° with respect to a plane extending through the longitudinal axis of the cylinder. The elongated slots 22 and 23 permit this adjustment, which is desirable under certain press conditions.

For certain types of printing operation, the adapter bar must be installed at a predetermined helix angle which corresponds to the helix angle of the feed, that is to say, the presentation of an envelope blank to the vacuum pickup point on the press impression cylinder and therefore to the printing plate on the carrier. Since this helix angle may vary slightly from press to press, the pivoted bar arrangement and the range of adjustment afforded by end slots 22 and 23 enable one to comply with the requirements of a particular press. On some presses, the feed angle varies with time during operation, but here the attitude of the printing plates on the carrier can be adjusted simply by shifting the axis of the row of buttons on the bar.

Slots 22 and 23 are generally rectangular in form. The length of the slots is such as to allow the maximum desired angular displacement of the bar as a function of its length. The width of the slots is sufficient to permit clearance between the edges of the slots and the threads on the attaching screws passing therethrough, and to still obtain engagement of the underside of the screw heads with the bar in all positions within the range of adjustment.

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Where the adapter bar is relatively long, it may require more than two hold-down slots and associated screws. In this instance, a series of spaced slots may be provided along the axial centerline at each end of the bar to facilitate alignment of the bar into parallelism as well as at a desired angle. For a wider range of angular adjustment, the slots, rather than being rectangular, may be arcuate in shape, the radius of curvature corresponding to the distance of the slot from the vertical centerline of the bar, which is also the center of the cylinder face width.

In order to facilitate field installation of the adapter bar and carrier assembly, a check-sheet may be provided with the assembly. This check-sheet serves to indicate to the mechanic making the installation whether the axis of the adapter bar and the parallel row of buttons thereon lie in parallel relationship to the axis of the cylinder, when such parallelism is desired. The check-sheet for this purpose is identical to a carrier sheet of the type disclosed in FIGS. 1 and 2, and is made of the same non-stretchable, flexible sheet material provided with a series of pear-shaped holes at the leading edge, save that it is more precisely cut and is longer.

In making the check-sheet, all of its long and short sides are cut parallel and perpendicular to each other with great precision, for the geometrical relationship of these sides is the reference from which the parallelism check is made. The length of the check-sheet is made such that when the leading edge thereof is hooked to the buttons on the adapter bar and the body of the sheet is wrapped about the cylinder, the trailing edge then overlaps the leading edge.

This permits a visual check of the alignment of the row of buttons on the adapter bar, for if the overlapping sides of the leading and trailing edges of the check-sheet do not perfectly coincide, this indicates that the button row and the bar are inclined at an angle to the axis of the cylinder. The amount of error is reflected in the extent to which such coincidence is lacking. The bar may then be properly aligned without difficulty, simply by loosening the attachment screws, rotating the bar into proper alignment and re-tightening the screws.

As pointed out previously, the wider the adapter bar, the less surface available on the cylinder for printing. For general applications requiring the maximum printing surface, the bar may be very narrow, say $\frac{3}{8}$ " wide, with a row of buttons welded thereon at spaced positions along a common longitudinal axis, with cylinder attaching holes positioned along the same axis between adjacent buttons. This bar may be made of .019" thick stainless steel.

In installing a narrow bar of this type, the bar is first located on the cylinder at its correct position, and holes are then drilled, tapped and countersunk into the cylinder, using the attaching holes in the bar as guides. Countersinking of the holes is effected to a depth sufficient to permit installation of the screws flush with the top surface of the bar.

In FIG. 6, there is shown an adapter bar 25 especially adapted for use with a plate cylinder of the type currently manufactured by Winkler and Duenebier. This type of cylinder 26, which is shown in FIG. 7, is provided with an open cavity 27 within which is mounted a set of clamping jaws 28 and 29 which are brought together or retracted by three threaded bolts 30, 31 and 32. Also located in cavity 27 is a slotted reel-up bar 33 (FIG. 8), provided with a ratchet mechanism (not shown) located at one end.

The adapter bar 25 is an angled strip of metal having a flat portion 25A with three notches therein to permit this portion to be received between the clamping jaws, the notches accommodating the bolts. The bent or angular portion 25B of the adapter rests against the curved surface of the cylinder, as shown in FIG. 8, and is provided with a series of locating buttons 34 for use with a

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carrier strip 35 having pear-shaped holes, the trailing edge of the carrier being attached to the cylinder by a tape 36. The alignment of the longitudinal centerline of adapter bar 25 is achieved by the flatness and parallelism of the clamping surfaces of the cavity and the tangency of the bar on the cylinder.

In some instances, it may be desirable to effectively increase the diameter of the cylinder for use with rubber printing plates of lesser thickness. To this end, a shim jacket 37 is provided, as shown in FIG. 9, the sheet having a notch 38 therein and chamfered corners 39 and 40 to permit the leading edge of the shim to be clamped between the jaws under the carrier sheet.

The trailing edge of shim jacket 37, which in practice may be made of .005" metal shim stock, is reeled up in slotted bar 33 in the cavity, to achieve perfect conformity to the ground steel cylinder, thereby to accommodate rubber printing plates of decreased thickness. To further increase the effective cylinder diameter, supplemental shims of rectangular shape and suitable thickness may be interposed between the shim jacket 37 and the cylinder. These supplemental shims are held in conformity to the cylinder by the reeled-up shim jacket.

In the arrangement shown in FIGS. 6, 7 and 8, the adapter assembly is constituted by separate adapter bar, carrier sheet, and shim jacket components. It is also possible to form an assembly in which the shim jacket and adapter bar are combined into an integrated unit, the row of locating buttons being spot-welded directly on a .005" thick stainless steel jacket. In this case, the leading edge of the unit is clamped between the bars in the cavity, whereas the trailing edge is held in the reel rod.

Three versions may be made of the combination unit, in the first of which the locating buttons are arrayed along the longitudinal centerline of the unit parallel to the cylinder axis. In the second configuration, the row of buttons is inclined at a predetermined right-hand helix angle to the cylinder axis, whereas in the third, a left-hand inclination is provided. The advantage of these arrangements is that the flexible metal jacket permits very small adjustments to the helix angle of the buttons during initial installation to accommodate the assembly to the peculiarities of a specific press.

Though pear-shaped holes have been shown on the carrier sheet, in the above-described embodiments, it will be appreciated that other shapes are also feasible, such as keyhole shapes, to permit the carrier to be placed over and held onto the locating buttons on the adapter bar.

While there have been shown and described preferred embodiments of printing plate carrier transfer mounting system in accordance with the invention, it will be appreciated that many changes and modifications may be made therein without, however, departing from the essential spirit of the invention as defined in the annexed claims.

What I claim is:

1. A removable carrier assembly for a printing cylinder, said assembly comprising:

(a) an adapter bar disposable longitudinally across the surface of the cylinder and having a curved portion of thin, sheetlike, flexible material conformable to the curvature of the cylinder, said curved portion being provided with a series of locating buttons along a common longitudinal axis, each having an enlarged head and a shank,

(b) means to attach the bar to the cylinder, and

(c) a flexible, non-stretchable carrier sheet having a series of holes adjacent the leading edge thereof at positions corresponding to said buttons, said holes having an enlarged portion to pass the heads there-through and a smaller portion to accommodate the shanks of the buttons, whereby the leading edge of the sheet is connectable to said adapter bar, the sheet being wrapped about said cylinder with its trailing

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edge secured thereto, said carrier sheet being adapted to have flexible printing plates mounted thereon.

2. An assembly as set forth in claim 1, wherein said attaching means is constituted by bands to secure the bar to the cylinder.

3. An assembly as set forth in claim 1, wherein said carrier sheet is formed of polyester film.

4. An assembly as set forth in claim 1, wherein said holes have a pear-shape.

5. An assembly as set forth in claim 1, wherein said adapter bar has a flat portion which may be clamped between jaws contained in a cavity in said cylinder.

6. An assembly as set forth in claim 1, further including a shim jacket which is insertable under said carrier sheet to raise the rubber printing plates mounted thereon.

7. An assembly as set forth in claim 1, wherein said adapter bar is provided at its center with a hole for receiving a pivot screw, and adjacent its ends with slots to receive hold-down screws, whereby the angular position of the bar on the cylinder is adjustable.

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8. An assembly as set forth in claim 5, wherein said cylinder further includes a reel-up bar within said cavity, and further including a shim jacket which is insertable under said carrier sheet, the leading edge of said jacket being clamped between said jaws and the trailing edge being held in said reel-up bar.

9. An assembly as set forth in claim 8, wherein said adapter bar and said shim jacket are combined into an integrated unit.

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