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E. R. UPDEGRAFF

3,170,245

METHOD AND APPARATUS FOR PREPARING PIN-BAR PLATES FOR
USE ON OFFSET PRINTING PRESSES

Filed Aug. 1, 1962

3 Sheets-Sheet 1

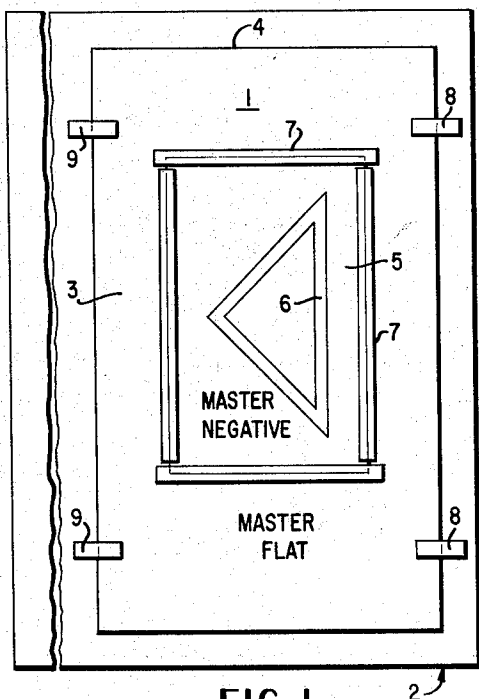


FIG. 1

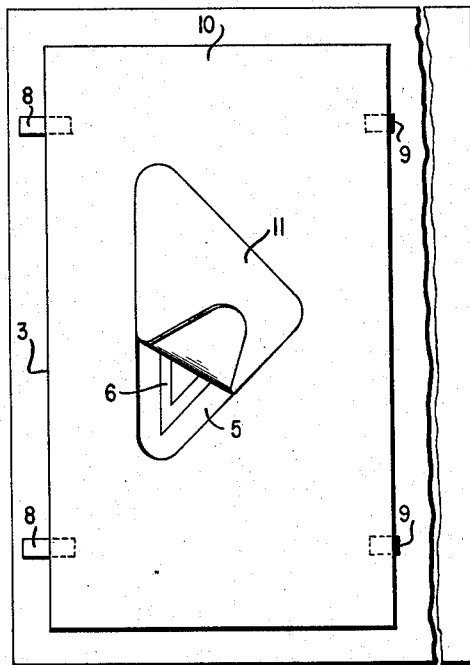


FIG. 2

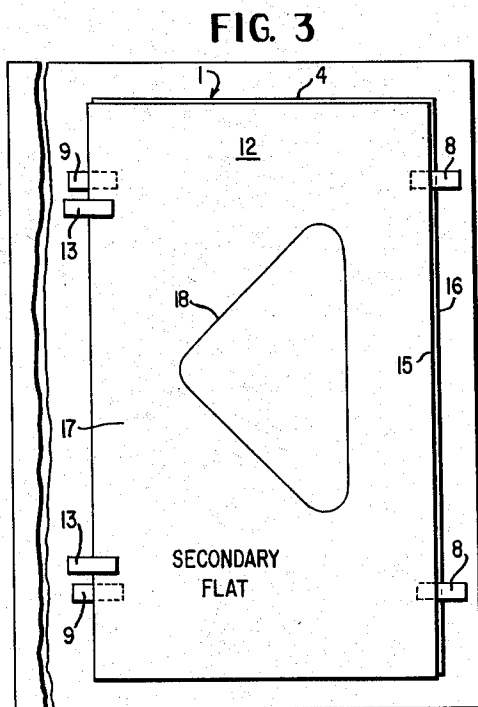
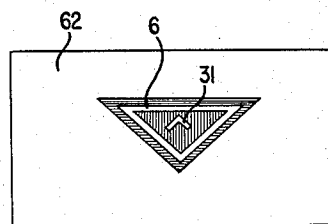


FIG. 3

FIG. 12



INVENTOR
EDWARD R. UPDEGRAFF

BY
Broune, Schuyler & Beveridge
ATTORNEYS.

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E. R. UPDEGRAFF

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3 Sheets-Sheet 2

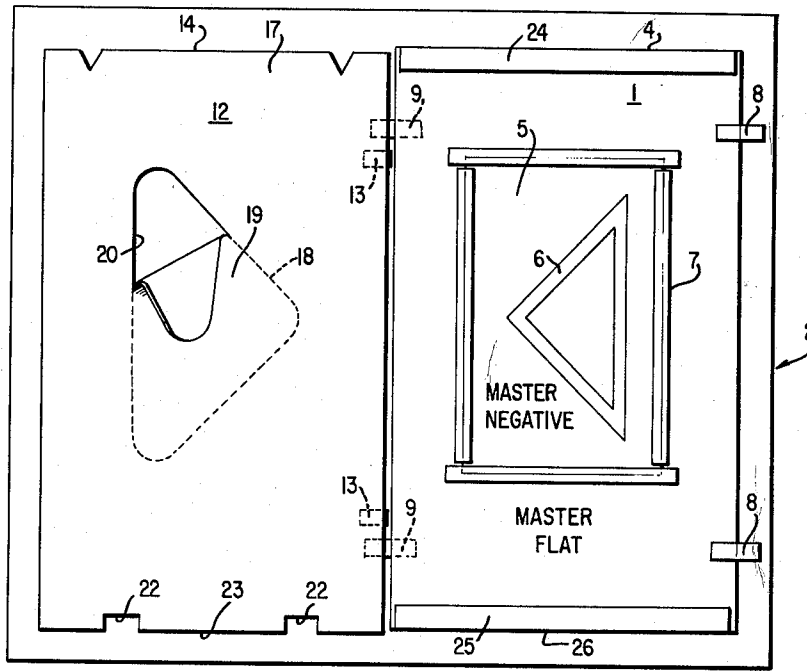


FIG. 4

FIG. 5

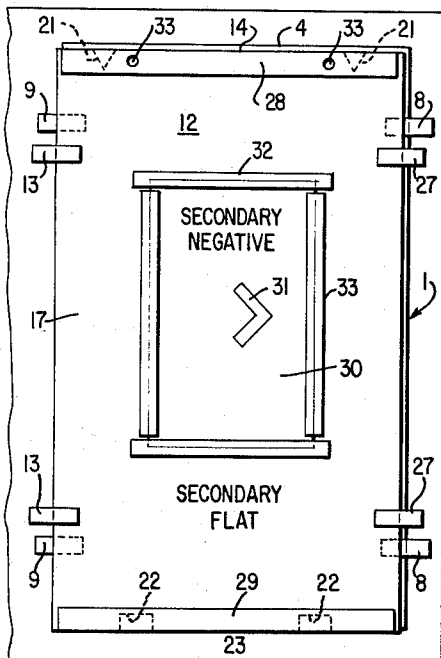
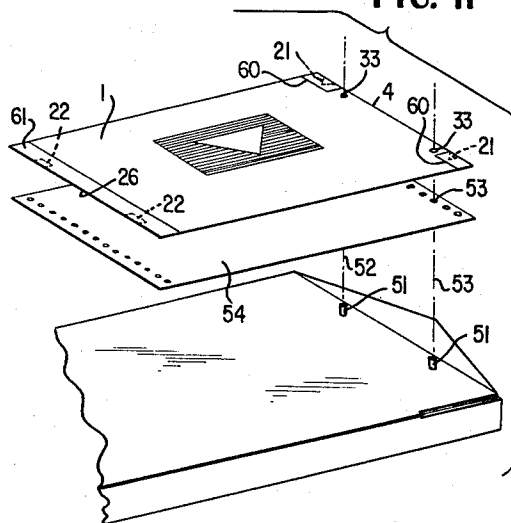


FIG. II



INVENTOR
EDWARD R. UPDEGRAFF

BY

Browne, Schuyler & Beveridge
ATTORNEYS

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E. R. UPDEGRAFF
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FIG. 6

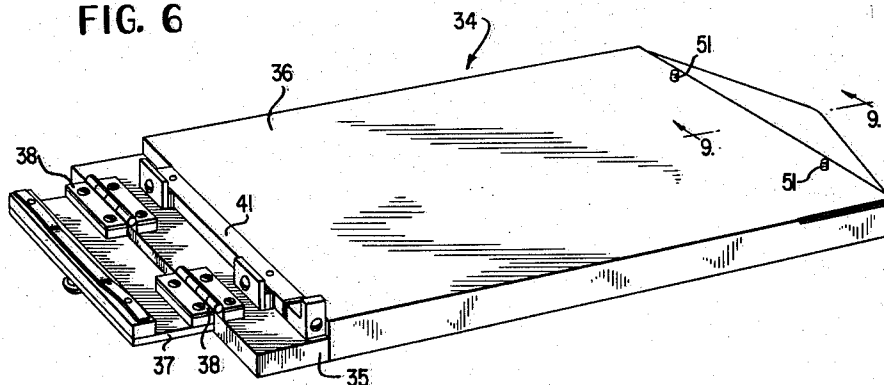


FIG. 7

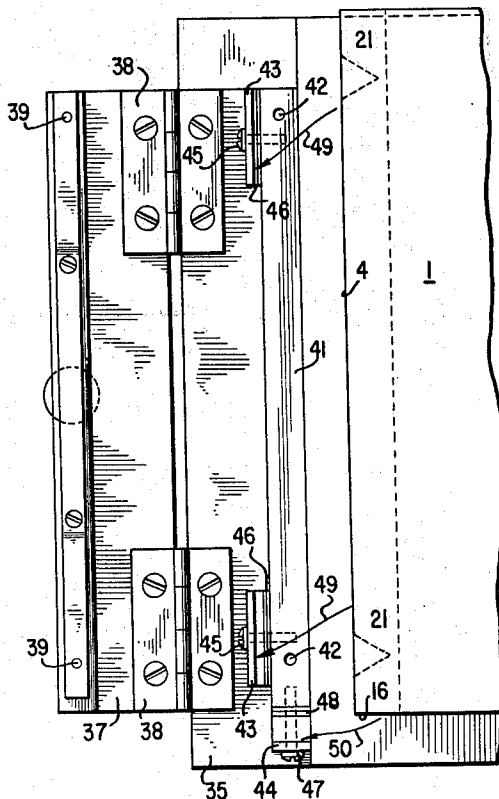


FIG. 8

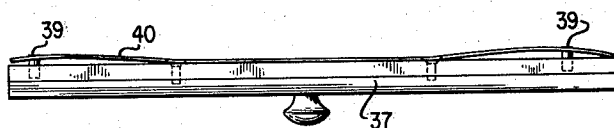


FIG. 9

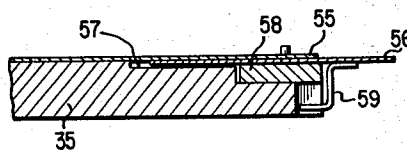
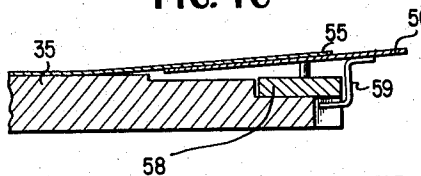


FIG. 10



INVENTOR.
EDWARD R. UPDEGRAFF

BY

Browne, Schuyler & Beveridge
ATTORNEYS.

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METHOD AND APPARATUS FOR PREPARING PIN-BAR PLATES FOR USE ON OFFSET PRINTING PRESSES

Edward R. Updegraff, 4611 Harvard Road,
College Park, Md.

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8 Claims. (Cl. 33—184.5)

This invention relates to a method and apparatus for preparing pin-bar plates for use on one-color or multi-color offset printing presses and, more particularly, for use in multi-color or multi-form printing on such presses.

In order to use offset printing presses for multi-color printing, for example, it is conventional to prepare a plurality of pin-bar plates, each plate containing an image of only that portion of the total subject represented by one particular color. On one-color presses, one of the individual color image plates is then installed on the plate cylinder of the press and a press run is made on the paper, printing only the image representing this particular color. If the multi-color press is used, individual color image plates are installed on each one of the separate plate cylinders of the press, after which the run of these color images is made on the paper.

This procedure is repeated, using different plates for each one of the color images, until all of the colors have been printed and the subject is complete on the paper. In such a printing operation it is necessary that each color image of the total subject carried on each one of the individual plates be in perfect registration with each other after all of these have been printed on the paper.

The conventional method of attaining perfect registration of each subsequent subject color image with the first one, after it is printed on the paper, involves manipulating adjustable paper guides, at the lead edge and at the side of the sheet, which control the sheet as it passes through the press, such adjustment being made with respect to subsequent trial sheets until the desired registration is obtained. This is a time consuming operation irrespective of whether one-color or multi-color presses are involved. Also, some offset presses in general use are engineered to make paper guide adjustments only at the side of the sheet. Any color image position change on the sheet in the direction of movement of the sheet through the press can be achieved only with an exactly parallel movement of the plate cylinder. On such presses, it is not possible to make any necessary twist, or off-angle movement of individual color images on the paper. When this twist type of position movement is necessary, an average compromise to the proper color image position on the paper is the best that can be achieved.

Efficient production of multiple form printing (consisting of variations of a basic form, each of which is printed on a separate sheet of paper) also requires perfect registration of the forms printed on all of the various forms that constitute one job and are printed on separate sheets of paper. Here again, perfect registration is conventionally achieved by the same time consuming operations described in the production of color printing. Also, on offset presses which do not have a paper lead edge adjustment device, it is not possible to make a twist movement of the image position on the paper, and a compromise to the desired position is the only result obtainable.

As is known to those skilled in the offset printing art, an individual pin-bar plate is conventionally prepared by first making a flat for each color involved in the over-all printing job, utilizing lithographic negatives. A master flat is prepared on a light table by first making a master layout on a sheet of light opaque paper, the layout involv-

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ing positioning lines located in properly spaced relationship to the lead edge of the paper. The master lithographic negatives are then secured in the correct positions on the layout by suitable means, such as pressure sensitive tape, and the paper is cut away where it is necessary for the light to penetrate the transparent areas of the lithographic negatives to form images on the light sensitive surface of the pin-bar plate.

Subsequent flats for the remaining colors are then prepared individually by aligning the lead edge of another sheet of light opaque paper with the lead edge of the master flat and, using a light table, carefully positioning the second set of negatives in perfect registration with respect to the master flat, and securing the second set of negatives in place on the second flat paper by suitable means, such as pressure sensitive tape. The second flat paper is then cut away in the areas where it will be necessary for the light to penetrate the second set of lithographic negatives. If third, fourth, etc., flats are required, they are prepared successively in the aforementioned manner.

In some instances, it is necessary to make two or more flats to create a one-color image on a pin-bar plate. A common example of this is where solid type is placed on top of a tone, or screened, background; another example is a photograph reproduction with solid type placed on top of it; and still another example is using a complicated flat from a former printing run, blanking out a certain portion of this, and making a new flat consisting only of alterations for the blanked out portion of the original flat. In the offset printing art, where two flats are involved in producing one image on a plate, this procedure is known as "double-burning" and requires hairline accuracy in positioning the second flat on the plate to exactly match the first "burn" or exposure. This is conventionally accomplished by applying pressure sensitive discs at appropriate points on the pin-bar plate. While the flats were being created in exact registration on the light table, both were equipped with opaque squares of a tough material having holes the circumference of which fit exactly around the discs. This procedure is time consuming and, in the event a large image is being produced on a small press, often presents the problem of the availability of an area on the flat sufficiently large to accommodate the installation of the holes and discs that is not occupied by the image to be printed.

In the past it has been conventional practice to separate the flats prepared as described above, and place them separately on a pin-bar plate, the lead edge of the flat being aligned visually, with the lead edge of the plate. The image is then developed on the plate by exposure to light and the application of chemicals in a manner well known in the art. Theoretically, this procedure should assure the ultimately printed image being in perfect registration and properly oriented with respect to the horizontal and vertical edges of the paper upon which it is printed. However, in practice, many things can, and do, upset this theory. Examples of such things are (1) the lead edges of the flat and plate are not always perfectly aligned during exposure with respect to each other or with respect to the holes in the pin-bar plates, (2) the alignment of the pin-bar holes in the pin-bar plate is not always parallel with the lead edge of the plate, (3) the pin-bar unit in the plate cylinder of the printing press is not always perfectly aligned, e.g. parallel, with respect to the axis of rotation of the cylinder, and/or (4) on those presses with no paper lead edge adjustment device, the paper stop fingers may not be perfectly parallel with the axis of rotation of the plate cylinder.

It is, therefore, an object of the present invention to provide a new and improved method for preparing pin-

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bar plates for use on offset printing presses whereby the conventional time consuming press adjustments now necessary for obtaining perfect registration of the various color images printed on the same sheet of paper, and/or, a multiplicity of images printed on separate sheets of paper, are eliminated.

It is another object of the present invention to provide such a method whereby the position of the image when printed on the paper can be exactly predetermined and controlled and eliminate the necessity for any paper guide adjustments and/or plate cylinder movements.

It is another object of the present invention to provide for those offset presses whereon twist movements of the image position on the paper are not now possible, a new and improved method for preparing pin-bar plates which eliminates the necessity for this kind of image position movement, or any other kind of image position movement.

It is another object of the present invention to provide a new and improved method for preparing pin-bar plates for use on offset presses whereby multiple "burns" or exposures can be prepared more rapidly than by the present conventional method employed and, more particularly for small plates, positive registration control method that is not dependent upon the availability of any blank areas anywhere on the printing area of the pin-bar plate so that maximum size images can be produced smoothly and efficiently on maximum size sheets.

It is a further object of the present invention to provide a new and improved apparatus for preparing pin-bar plates for use on offset printing presses whereby the conventional time consuming press adjustments now necessary for obtaining perfect registration of the various color images printed on the same sheet of paper, and/or a multiplicity of images printed on separate sheets of paper, are eliminated.

It is another object of the present invention to provide a new and improved apparatus for preparing pin-bar plates whereby the position of the image when printed on the paper can be exactly predetermined and controlled, and which eliminates the necessity for any paper guide adjustments and/or plate cylinder movements.

It is still another object of the present invention to provide a new and improved apparatus for preparing pin-bar plates for use on those offset presses whereon twist movements of the image position on the paper are not possible, which eliminates the necessity for this kind of image position movement, or any other kind of image position movement.

It is still another object of the present invention to provide a new and improved apparatus for preparing pin-bar plates for use on offset presses whereby multiple "burns" or exposures can be prepared and made with increased speed and efficiency over the present conventional method now generally employed in the printing industry.

A preferred practice of the present invention for multi-color printing comprises first making a flat for each color involved, utilizing lithographic negatives in a manner well known to those skilled in the art. Assuming, simply by way of example, that only two colors are involved in the finished job, the first (master) flat is prepared on a light table, and a second flat is superimposed on the first flat in perfect registration, e.g. so that the respective portions of the finished job which are to be printed by pin-bar plates made from the two flats will be in perfect registration. The two flats are then releasably secured together in the aforementioned superimposed relation.

The next step involves the use of the punch apparatus but, before the punch may be used, it is necessary that the punch guides be initially and finally adjusted for the particular offset press upon which the pin-bar plate is to be used. The prescribed method for adjusting these guides is to first draw a maximum press size image with fine lines on copy paper or board suitable for photographing. A lithographic negative is made of this copy and a flat $\frac{1}{4}$ " wider than the pin-bar plate is created. The

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layout line representing the lead edge of the press sheet and the lead edge of the flat should be perfectly parallel with each other. The distance between these two parallels, of course, will be determined by the size of the particular pin-bar plate and the offset press being used. The lead edge guides on the apparatus are then adjusted equally by use of shims so that, after holes have been punched in the flat, the distance between these holes and the image will correspond to the distance between the holes and the plate and the point on the plate where the lead edge of the image should appear in order to be in proper transfer position to the blanket cylinder. The side guide shims are then adjusted so that the distance from the nearest hole in the punch will be $\frac{1}{8}$ " more than distance from the corresponding hole in the pin-bar plate to the edge of the plate. The flat is now punched at the lead edge, attached to the pin-bar plate accurately by use of the two metal dowels located on the apparatus at the end opposite the punch segment, exposed, and developed.

The offset press should now be set up for running maximum press size sheets. The pin-bar plate is installed and a few sheets are run, making certain of perfect press registration by running these sheets through twice on the same side of the sheet. After perfect press registration has been assured, a few of the sheets are run through on both sides, using the same lead edge for both sides. The lead edge printed line is then checked for perfect parallel, and the side lines are checked for perfect right angle and side center by stabbing the sheets with a sharp knife or point, or by looking through the sheets with a magnifying glass on a light table. Next, a few sheets are run and printed on both sides, using the tail of the sheets as the lead edge on the second side. These sheets are checked for image center on the length of the sheet.

The three guide shims of the punch apparatus may now be adjusted in the amounts necessary to compensate for discrepancies of image parallel, right angle to the lead edge, or center on the sheet. After these adjustments have been made, the flat lead edge is removed and a new edge accurately attached with light opaque tape. This new edge is then repunched. A new pin-bar plate is made, and sheets are run and backed up as before. When this maximum press size image has been checked out as properly positioned on the sheet, no further adjustments of the punch guide shims are necessary, and the apparatus is now ready for use in production jobs.

Returning to the description of a two-color job, while the two flats are secured together in perfect registration, a pair of holes are punched simultaneously through both flats at the lead edge. These holes correspond exactly in diameter and spacing to two of the pin-bar plate holes which are in a row of such holes in conventional pin-bar plates used on offset printing presses.

After the two flats have been punched as just described, they are separated and each is releasably secured to a separate pin-bar plate, or to two sides of a pin-bar plate which is sensitized on both sides. In order to position the two images in perfect registration with each other in relation to the holes in each of the pin-bar plates, the fixture means on the apparatus is employed. Then, the associated flats and plates are exposed to a suitable light source following which the flat is removed and the exposed surface, or surfaces, of the pin-bar plate is treated with suitable chemicals to develop the image thereon in a manner well known to those skilled in the art.

Because the two holes punched in one flat were punched simultaneously with the punching of those in the other flat; and since the two flats were being held in perfect registration with each other during the punching operation and since those pin-bar plate holes and the holes in the flats have a common diameter and spacing, and further since the row of pin-bar holes in one pin-bar plate corresponds in size and spacing to the row of pin-bar holes in the other plate, the foregoing method produces the result that the respective flats are so oriented with respect

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to the pin-bar plate holes that the portion of the total job developed on one plate must be in perfect registration with respect to the portion of the total job developed on the other plate, or on the other side of the same plate. This means that the respective portions of the job are in perfect registration with each other in their relation to the holes in the pin-bar plate and, subsequently, in their respective positions on the plate cylinder after the plates have been installed thereupon.

A preferred apparatus according to the present invention is a punch device made up of a generally rectangular plate-like member having a flat upper surface of sufficient size to readily accommodate the various sizes of pin-bar plates. A punch bar is pivotally connected along one edge of the plate-like member, and this bar has two punch projections extending therefrom each of a size and shape corresponding to the standard size and diameter of the holes in a particular pin-bar plate. Also, these two punch projections are spaced apart in exact accordance with the spacing between a predetermined two of the number of pin-bar plate holes conventionally provided in a pin-bar plate. The punch device has adjustable lead edge guides and a side guide associated therewith.

The two lead edge guides and the side guide are provided with individual spacing shims, and each one of the three guides is held individually and firmly in position by individual screw means. The purpose of the spacing shims and the individual screws is to permit permanent and firm adjustment of the individual guides in order to compensate for parallel imperfections between the pin-bar unit in the plate cylinder, the plate cylinder, and fixed position paper stop fingers on some offset presses. Since these imperfections are constant and fixed characteristics of a printing press, the adjustment of these guides is an initial or one-time operation that need not be repeated after having once been properly performed. Obviously, for efficient production, one such apparatus can be adjusted to only one one-color press, or to one plate cylinder of a multi-color press.

The other end edge portion of the plate-like member is provided with two metal dowel members each identical in diameter and shape to accommodate snugly the holes in the pin-bar plate and the holes punched in the lead edges of the flat. These two metal dowel members are exactly spaced apart in accordance with the spacing of the punch projections at the other end of the plate-like member. Consequently, after a pair of flats have been punched simultaneously, they will be disengaged from the other. A pin-bar plate will be mounted on the two metal dowels; a flat will be mounted on the metal dowels also, and the flat will be attached to the plate by finger pressure at the V and square notches which expose the adhesive of the tape to the plate surface. A spring sheet member is provided to facilitate ready removal from the metal dowels of the plate with the attached flat. This procedure is repeated with another pin-bar plate, and the second flat.

If a two-sided sensitized pin-bar plate is used, one flat is first mounted on the metal dowels with the exposed adhesive side of the tape away from the apparatus, the plate will next be mounted on the metal dowels, and the other flat will then be mounted on the metal dowels with the exposed adhesive tape toward the pin-bar plate. Finger pressure on top of the three mounted components at the V-notch and square notch points will attach a flat to each side of the pin-bar plate.

Other objects and advantages of the present invention will become more apparent from the following detailed description taken in conjunction with the attached drawings, in which:

FIG. 1 is a top plan view showing a master layout and a master lithographic negative positioned on a light table as an initial procedure in preparing the master flat;

FIG. 2 shows the master flat of FIG. 1 turned over with a portion of the flat paper shown being cut away to

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enable easy visibility for positioning secondary flat negatives in exact registration with those installed on the master flat end, subsequently to permit exposure light to penetrate the negative;

FIG. 3 is a top plan view similar to FIG. 1 showing a secondary flat positioned on top of the master flat;

FIG. 4 is a view similar to FIG. 2 and shows a secondary flat turned over and a portion of the secondary flat paper being cut away to enable easy visibility for positioning the secondary flat negative in exact registration with the master flat negative and subsequently to permit exposure light to penetrate the negative;

FIG. 5 is a top plan view similar to FIG. 3 showing the secondary flat returned to position on top of the master flat and attached in exact registration thereto;

FIG. 6 is a perspective view of the apparatus of this invention;

FIG. 7 is an enlarged plan view of the left end portion of the apparatus of FIG. 6 showing the master and secondary flats being placed in the apparatus for simultaneous punching;

FIG. 8 is an end view of the punching element of the apparatus shown in FIG. 6;

FIG. 9 is a partial section taken on line 9—9 on FIG. 6;

FIG. 10 is a view similar to FIG. 9 showing alternate positions of some of the elements;

FIG. 11 is a perspective view showing the apparatus of the invention being used to position a flat on a pin bar plate;

FIG. 12 illustrates a two-color printing job completed in accordance with the teachings of this invention.

Referring to FIG. 1 of the drawings, a master flat 1 is shown as being positioned on a light table indicated generally by the reference numeral 2. Master flat 1 comprises a sheet 3 of light opaque paper having a lead edge 4. A master negative 5 is placed on sheet 3 emulsion side up, the image 6 of the negative being carefully aligned with suitable guide lines put onto sheet 3 in a manner well known to those skilled in the art. Negative 5 is secured in place on sheet 3 by suitable means, such as pressure sensitive tape 7. Sheet 3 is secured to the light table by suitable means, such as pressure sensitive tape strips 8 and 9 shown in FIG. 1.

After the master negative 5 has been placed correctly onto sheet 3 as described above, tape strips 8 are loosened and the master flat 1 is turned over using tape strips 9 as hinges so that the opposite surface 10 of sheet 3 is exposed, as shown in FIG. 2. A suitably sized portion 11 of sheet 3 is cut away as indicated in FIG. 2 utilizing any suitable instrument such as a sharp blade member, not shown. The portion 11 which is cut away is large enough to enable easy visibility for positioning secondary flat negatives in exact registration with those now installed on the master flat and, subsequently, to permit exposure light to penetrate the negative.

Master flat 1 is then returned to the position shown in FIG. 1 and tape strips 8 are again pressed down onto the surface of light table 2 to hold the master flat in position. A secondary flat 12 is then placed on top of master flat 1, the secondary flat being secured to light table 2 by suitable means such as pressure sensitive tape strips 13 so that, as shown in FIG. 3, the lead edge 14 of the secondary flat is spaced slightly inwardly with respect to the lead edge 4 of the master flat and the right edge 15 of the secondary flat is spaced slightly inwardly with respect to the right edge 16 of the master flat. As is explained in greater detail hereinafter, the purpose of this is to assure that the lead and right edges of the secondary flat do not interfere with the master flat resting flush against the punch apparatus guides hereinafter described.

Like master flat 1, secondary flat 12 comprises a sheet of light opaque paper 17, and this sheet is suitably marked as indicated by marking line 18 for cutting to provide an exposure opening for the secondary negative.

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Referring to FIG. 4, secondary flat 12 is then turned over, using tape strips 13 as hinges. A portion 19 is then cut out of sheet 17 of secondary flat 12 to provide an opening 20 sufficiently large to permit easy visibility for positioning the secondary flat negative in exact registration with the master flat negative, and, subsequently to permit exposure light to penetrate the required portions of the secondary negative. V notches 21 are cut in the lead edge 14 of secondary flat 12 while square notches 22 are cut in the tail edge 23 of the secondary flat. Lengths 24 and 25 of pressure sensitive tape are applied substantially across the entire width of master flat 1 adjacent the lead and tail edges 4 and 26, respectively, as shown in FIG. 4.

Referring to FIG. 5, secondary flat 12 is then returned to its original position on top of master flat 1, and the secondary flat is secured to the light table by suitable means such as pressure sensitive tape strips 27. Lengths 28 and 29 of pressure sensitive tape are then applied substantially across the entire width of secondary flat 12 adjacent the lead and tail edges 14 and 23 as shown in FIG. 5. When tape lengths 28 and 29 are so applied, they extend across the V notches 21 and square notches 22 wherefore the sticky side of the tape lengths engages tape lengths 24 and 25 which were applied to master flat 1 and thus attach secondary flat 12 with respect to master flat 1.

With the secondary flat thus attached with respect to the light table and with respect to master flat 1, the secondary negative 30 is positioned onto sheet 17 of secondary flat 12 so that the image 31 of the secondary negative is correctly positioned with respect to image 6 of the master negative 5 so that these respective image portions will be in correct position, e.g. registration, when the finished job is produced. Having secured secondary negative 30 to achieve the desired image position, the secondary negative is then secured onto sheet 17 by suitable means such as strips 32 of pressure sensitive tape.

Tape strips 8, 9, 13 and 27 are then cut free both of master flat 1 and secondary flat 12 so that they can be lifted from light table 2. Of course, the flats are secured with respect to each other at the locations of V notches 21 and square notches 22. A pair of holes 33 are then punched simultaneously through both flats adjacent the lead edges 4 and 14 thereof, these holes corresponding exactly in size and spacing to a selected pair of holes in a conventional pin-bar plate. This punching is accomplished using the apparatus of the present invention described below. Prior to punching these holes, the master and secondary flats are turned over from the position shown in FIG. 5 so that edge 16 of master flat 1 is on the left and the emulsion sides of master and secondary negatives 5 and 30 are down.

After the respective flats have been punched simultaneously as just described, the portions of tape lengths 24, 25, 28 and 29 extending across V notches 21 and square notches 22 are cut out, so that the respective flats are freed from one another and may be handled individually. The respective master and secondary negatives are then opaqued on the emulsion side in a manner known to those skilled in the art. Thereafter, lengths of transparent pressure sensitive tape are applied adjacent the lead and tail edges of the respective flats on the sides of sheets 3 and 17 opposite from the sides having tape lengths 24, 25, 28 and 29 thereon, these additional tape lengths being applied so as not to cover holes 33 punched in the respective flats. With this accomplished, each flat is now ready to be attached to a pin-bar plate, utilizing apparatus according to the present invention.

A preferred apparatus according to this invention, shown in FIGS. 6-10, comprises a punch device indicated generally by reference numeral 34 having a generally rectangular base member 35, with a flat upper surface 36 of sufficient size to readily accommodate a conventional pin-bar plate. A punch plate 37 is pivotally connected to

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one end of base member 35 by a suitable means, such as hinges 38 shown in FIGS. 6 and 7. Punch plate 37 carries a pair of cylindrical punch projections 39 (see FIG. 8), each having a diameter and size corresponding to the diameter and size of a pin-bar hole in a conventional pin-bar plate. Projections 39 are spaced apart a distance equal to the distance between a predetermined pair of pin-bar holes conventionally provided in a pin-bar plate. A resilient stripping member 40 is mounted on punch plate 37 to automatically strip the punched flats from punch projections 39 when the punch plate is released.

A die bar 41 having a pair of holes 42 of diameter and spacing adapted to snugly receive punch projections 39 is mounted on base member 35 for cooperative engagement with punch projections 39 whereby a pair of holes may be punched simultaneously in the flats. A pair of individually adjustable lead edge guides 43 and an adjustable side edge guide 44 are mounted on die bar 41 to facilitate the proper location of the punched holes in the flats with respect to the guide edge of the flats. Referring particularly to FIG. 8, lead edge guides 43 are adjustably mounted with respect to die bar 41 by screw members 45, shim members 46 being utilized as required to provide the proper adjustment of the lead edge guides with respect to the die bar. Side edge guide 44 is similarly mounted by suitable means such as screw member 47 and spacing shims 48, as required.

As shown in FIG. 7, arrows 49 indicate that in using the punch apparatus of the present invention, lead edge 4 of master flat 1, with secondary flat 12 attached thereto, is abutted against lead edge guides 43, and arrow 50 indicates that side edge 16 of the master flat is abutted against side edge guide 44. As has been described above, the respective side and edge guides have been properly adjusted for the particular printing press involved, and the abutment of the lead and side edges of the master flat is accomplished prior to the actual punching operation. This punching is, of course, accomplished while the master and secondary flats are attached to each other as shown in FIG. 5, the punching being accomplished while the attached flats are turned over from the position shown in FIG. 5.

Referring to the right end portion of the apparatus shown in FIG. 6, a pair of cylindrical projections or dowels 51 project from the upper surface 36 of punch apparatus 34. These projections 51 have a diameter and spacing corresponding to that of punch projections 39. This means that the holes 33 punched adjacent the lead edges of the flats will receive projections 51 snugly as will, of course, the corresponding pair of holes in a conventional pin-bar plate with respect to which punch projections 39 and table projections 51 were correlated initially in regard to size and spacing. Thus, referring to FIG. 11, dot-dash lines 52 indicate the correlation in size and spacing in regard to table projections 51, a corresponding pair of holes 53 in a pin-bar plate 54, and holes 33 which have been punched adjacent the lead edge of master flat 1.

From FIG. 11 it is apparent that, after holes 33 have been punched simultaneously in the respective flats, and the flats then separated, an individual flat may then be mounted with respect to an associated pin-bar plate 54 by placing both the pin-bar plate and the flat onto projections 51. Having been correlated in proper position in the manner just described, the associated flat and pin-bar plate are then secured with respect to each other by suitable means, such as lengths 60 and 61 of pressure sensitive tape which extend across the width of the rear surface 10 of master flat 1 adjacent the lead edge 4 and tail edges 26 thereof as shown in FIG. 11. It will be recalled that V notches 21 and square notches 22 had been cut off when the master and secondary flats were separated. Hence, the tape lengths 60 and 61 extending across the width of the surface 10 of master flat 1 will extend across

the cutout spaces at the V notches and the square notches. Therefore, when the master flat is placed on top of pin-bar plate 54, the adhesive portions of the tape lengths which are exposed at the V and square notches will adhere to the pin-bar plate surface and thus secure the flat with respect to the pin-bar plate. Of course, as has been mentioned above, tape length 60 is stopped so that it does not cover the punched holes 33, this being shown in FIG. 11, whereby the master flat may be placed onto dowels 51 in the manner described. After the flat and pin-bar plate have been secured together as described, they are removed from apparatus 34 for further processing, in a manner known to those skilled in the art, to develop the image onto the pin-bar plate.

To facilitate such removal, the upper surface 36 of punch apparatus 34 is preferably a thin sheet of metal 55 having sufficient resiliency so that the sheet can be flexed to clear the upper edges of projections 51. This structure is illustrated in FIGS. 9 and 10 where sheet member 55 is shown as being provided with a second sheet member 56 located beneath sheet 55 and extending into a cutout portion of 57 of base member 35. Projections 51 extend from base portion 58 and, of course, extend through aligned openings in sheet members 55 and 56 so that sheet 55 can be flexed in the manner shown in FIG. 10 to lift the associated flat and pin-bar plate off of sheet member 56 to limit the extent to which sheet 55 will be flexed.

After the pin-bar plate has been prepared in the manner described above, it is then installed onto the plate cylinder of a printing press, and the press run to print the color image portion carried by the particular pin-bar plate. Once this is accomplished, this particular pin-bar plate is removed from the plate cylinder and another pin-bar plate mounted thereon, the other pin-bar plate carrying a different color image portion. The sheets having the first image portion printed thereon are then run through the press again and the second image portion is printed onto the sheets in perfect registration with the first image portion. If a two-color printing job is involved, this completes the printing but, of course, if more than two colors are involved, then subsequent pin-bar plates are mounted on the plate cylinder, in succession, and successive runs made until all of the color portions of the image are printed. Where front and rear surfaces of a pin-bar plate are utilized instead of only one surface, then instead of mounting a separate pin-bar plate on the cylinder, the same plate will be turned over and used to print the second color or form.

FIG. 12 is a showing of a finished product for a two-color job showing image portions in accordance with FIGS. 1-5. Thus, referring to FIG. 12, it is noted that sheet 62 carries color image 6 which is in perfect registration with respect to color image 13, these respective color images being those which were produced by negatives carried by the master and secondary flats respectively as described above.

For purpose of convenience and ease of description, the apparatus of this invention has been described as having only two punch projections 39, holes 42, and dowels 51. However, it may be desirable to provide a greater number of these elements, particularly if large flats and pin-bar plates are used, and it is considered within the scope of this invention to provide any greater number of these elements.

While I have described and illustrated preferred embodiments of my invention, I wish it to be understood that I do not intend to be restricted solely thereto, but that I do intend to cover all embodiments thereof which would be apparent to one skilled in the art and which come within the spirit and scope of my invention.

I claim:

1. A method of preparing pin-bar plates for use in multi-color or multi-form printing, said method comprising the steps of preparing a flat for each color or form

appearing in the finished printing job by securing a photographic negative to a sheet of light blocking material and removing a portion of the sheet where it is desired for light to penetrate the negative, superimposing said flats in perfect registration on a light table, and simultaneously punching a plurality of holes through said flats adjacent a corresponding edge of each flat while said flats are maintained in said perfect registration, said holes corresponding in size and spacing to selected pin-bar holes in a pin-bar plate with which said flats are adapted to be used, separating said flats, releasably securing each flat to a separate pin-bar plate with said punched holes in said secured flat being in registry with said selected holes in said pin-bar plate, and then transferring the image carried by said flat to said pin-bar plate for subsequent development thereon.

2. A method of preparing pin-bar plates for multi-color or multi-form printing, said method comprising the steps of preparing a master flat for one color or form used by securing a photographic negative to a sheet of light blocking material and removing a portion of the sheet where it is desired for light to penetrate the negative, said master flat having guide lines thereon, preparing a secondary flat for each other color or form used by securing a photographic negative to a sheet of light blocking material and removing a portion of the sheet where it is desired for light to penetrate the negative, superimposing said secondary flats in precise registry onto said master flat, simultaneously punching a plurality of holes through all of said flats adjacent a corresponding edge of said flats while said flats are maintained in said superimposed relation, said holes corresponding in size and spacing to selected pin-bar holes in a pin-bar plate, separating said flats, and releasably securing each flat to a separate pin-bar plate to transfer the image from said flat to its associated pin-bar plate, said punched holes in said flat being in registry with said selected holes in said pin-bar plate.

3. A method of preparing pin-bar plates for multi-color or multi-form printing, said method comprising the steps of preparing a master flat for one color or form used by securing a master photographic negative to a sheet of light blocking material and removing a portion of the sheet where it is desired for light to penetrate the negative, said master flat having guide lines thereon and, said master negative being positioned in relation to said guide lines and containing the image to be represented by said one color or form, preparing a secondary flat for each other color or form used by securing a secondary photographic negative to a sheet of light blocking material and removing a portion of said sheet where it is desired for light to penetrate the negative, each secondary negative containing the image to be represented by one of said other colors or forms, superimposing said secondary flats onto said master flat using a light table to register the images of said secondary negatives with the image of said master negative, simultaneously punching a plurality of holes through all of said flats adjacent a corresponding edge of said flats while said flats are maintained in said superimposed relation, said holes corresponding in size and spacing to selected pin-bar holes in a pin-bar plate, separating said flats, and releasably securing each flat to its associated pin-bar plate, said punched holes in said flat being in registry with said selected holes in said pin-bar plate.

4. A method of preparing pin-bar plates for multi-color or multi-form printing, said method comprising the steps of preparing a master flat by constructing guide lines on a sheet of light blocking material, securing a master negative to said sheet with reference to said guide lines, removing the portion of said sheet required to permit light to penetrate the transparent portion of said negative, preparing a secondary flat for each other color or form used by placing a second sheet of light blocking material over said master flat, securing a second negative to said second sheet with the image on said second negative in registry with the image on the master negative, removing the por-

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tion of said second sheet required to permit light to penetrate the transparent portion of said second negative, superimposing said secondary flats in precise registry with said master flat on a light table, simultaneously punching a plurality of holes through said flats adjacent a corresponding edge of each flat while said flats are maintained in said superimposed relation, said holes corresponding in size and spacing to selected pin-bar holes in a pin-bar plate with which said flats are adapted to be used, separating said flats, releasably securing each flat to a separate pin-bar plate with said punched holes in said secured flat being in registry with said selected holes in said pin-bar plate, and then transferring the image carried by said flat to said pin-bar plate for subsequent development thereon.

5. A device for preparing flats used in the preparation of pin-bar plates for multi-color or multi-form printing, said device comprising a base member having a substantially planar surface, die means adjacent one edge of said base having a plurality of apertures of equal diameter and spacing as selected apertures in a pin-bar plate, punch means adapted to co-operate with said die means to simultaneously punch a plurality of holes adjacent one edge of flats positioned on said die means, and guide means for positioning said flats on said die means.

6. A device for preparing flats used in the preparation of pin-bar plates for multi-color or multi-form printing, said device comprising a base member having a substantially planar surface, die means adjacent one edge of said base having a plurality of apertures of equal diameter and spacing as selected apertures in a pin-bar plate, punch means adapted to co-operate with said die means to simultaneously punch a plurality of holes adjacent one edge of

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flats positioned on said die means, a pair of stops positioned to engage said one edge of said flats and mounted for adjustment perpendicular to said one edge of said base, and a stop positioned to engage a second edge of said flats mounted for adjustment parallel to said one edge of said base.

7. A device for preparing flats used in the preparation of pin-bar plates for multi-color or multi-form printing comprising a base member having a substantially planar surface, die means adjacent one edge of said base having a plurality of apertures of equal diameter and spacing as selected apertures in a pin-bar plate, punch means adapted to co-operate with said die means for punching a plurality of holes adjacent one edge of flats positioned on said die means, guide means for accurately positioning said flats with respect to said die means, fixture means mounted on said base member and having a plurality of dowel members of equal diameter and spacing as said apertures, said dowel members extending above said planar surface of said body member, and stripping means for removing assemblies from said fixture means.

8. A device for preparing pin-bar plates for multi-color or multi-form printing comprising a base member having a substantially planar surface, fixture means adjacent one edge having a plurality of dowel members of equal diameter and spacing as selected apertures in a pin-bar plate, said dowel members being parallel and extending above said planar surface, stripping means surrounding said dowels and movable axially thereof, and means for moving said stripping means to strip assembled flats and pin-bar plates from said dowels.

No references cited.