Oct. 27, 1964 H. FISCHER 3,154,012

MEANS FOR REGISTERING PRINTING PLATES

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FIG.2.

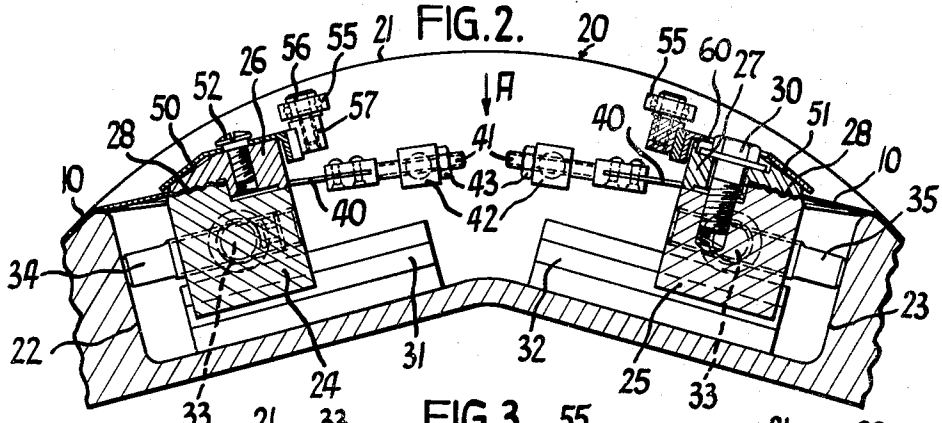


FIG.3.

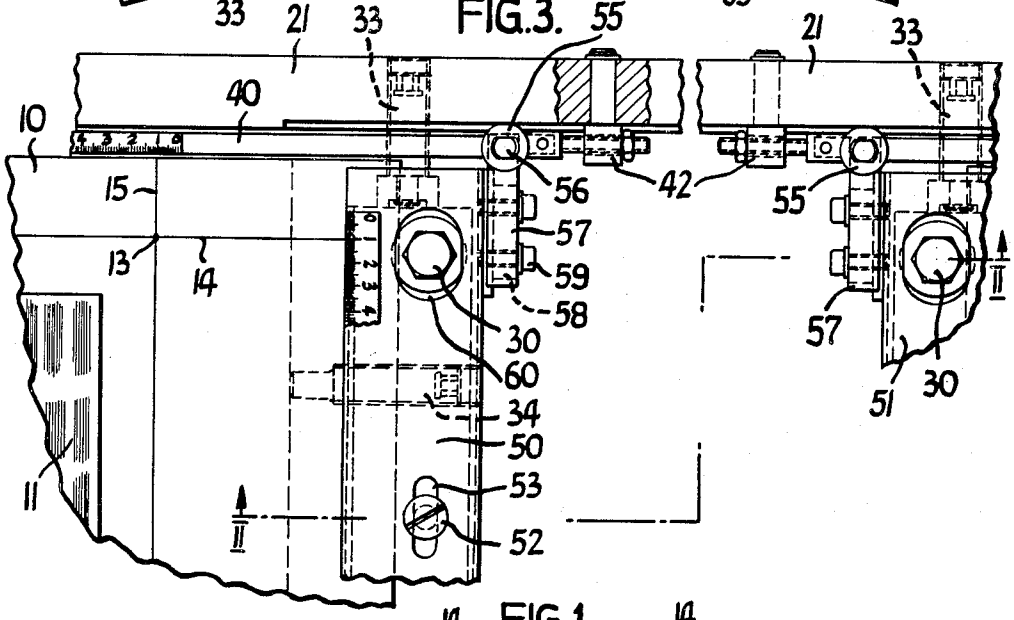
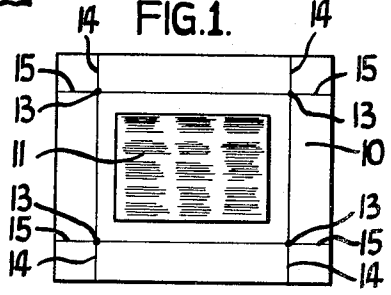


FIG.1.



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MEANS FOR REGISTERING PRINTING PLATES

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This invention relates to the placement and adjustment of printing plates on the plate cylinders of printing presses and, more particularly, to the exact positioning and registering of a plurality of plates on several plate cylinders of multi-color printing presses so that sequential printing impressions from all the plates will be in proper register one with the others on the paper or other material being printed.

In multi-color printing whereby a plurality of printing impressions are produced and superimposed sequentially on the same piece of paper from a plurality of different printing plates at a similar plurality of different printing stations on the printing press, some arrangement is necessary to make sure that each printing impression is "in register" or precisely positioned and aligned and congruent with respect to the other superimposed impressions so as to produce the desired final result. As will be understood, perhaps the most significant aspect of providing such color registration in multi-color printing is the very precise adjustment and positioning of each printing plate (e.g., one for each different color to be printed) on its respective printing press plate cylinder so that, as the paper comes through the press, each successive impression thereon by each successive printing plate will be precisely positioned longitudinally and transversely with respect to the other printing impressions and within tolerances of tiny fractions of an inch in order that the various sequential impressions will cooperate to form the desired final colored effect.

Also as will be understood, because of inevitable variations in the manufacture of the printing plates themselves and other factors, such final precise positioning of the plates on the various plate cylinders is achieved by individual adjustment of the plates on each cylinder of the printing press so that the various images on each plate will print in the proper position on the paper. Especially with cylinder or rtoary presses and large press runs where the various printing plates may be mass produced photographically or mechanically, however, it may be literally impossible to form the printing image portion on each plate precisely positioned with respect to the edge of the plate. Thus, in clamping the several plates onto their respective press plate cylinders, it is the printing image area of each plate which must be precisely and congruently positioned, rather than the edges of the printing plates themselves.

To this end, generally, the respective cooperating printing plates as produced include color guide or register marks on the face of each plate, usually in the form of crosses, whereby, if the various plates are positioned on their respective plate cylinders so that the register marks on each plate all coincide on the paper being printed as it passes through the press, then the respective printing images or areas of all the plates will be properly and precisely positioned with respect to each other.

There is therefore presented the task, when placing the separate plates on the several press plate cylinders, of positioning each plate on each plate cylinder so that the register marks will coincide with other register marks on other plates during the printing, although the edges of each plate may be somewhat differently positioned, both axially and circumferentially, on each cylinder. Especially with large printing presses and under circumstances where press time and labor are expensive, it is desired that such precise positioning and adjustment of each of the printing plates be accomplished with a minimum of time and trial and error attempts to achieve the proper axial and circumferential positioning of each plate on each separate plate cylinder.

If it is attempted to accomplish such precise congruent positioning of the register marks on a plurality of plates on a plurality of different plate cylinders by calibrated axial rulers or angular position indicators successively applied to each plate cylinder for the purpose of positioning the register marks on all the plates accurately with respect to the ends of the plate cylinders and angularly thereon, such expedients may be found to be excessively cumbersome or time consuming in use and/or involve the application of apparatus to the plate cylinder which may cause damage if the worker forgets to remove it after adjustment of each plate, as well as, perhaps adding unnecessary extra expense or complication to the manufacture of the cylinder especially if complex positioning or registering devices are included within the cylinder mechanism. Even the provision of permanent calibrations around or along the plate cylinders do not provide complete or satisfactorily simple and accurate arrangements, especially in the absence of means for finely adjusting the position of the plate and of correlating somehow among the various plate cylinders the particular calibrations with respect to which the register mark on each different plate is to be aligned axially and angularly to accommodate the individual impression and rotation provided by each cylinder on the paper.

In any event, such arrangements may require an undesirably detailed cooperation between the man making the printing plate and the printer who is to position it on the press to an extent inconsistent with the economical desires of mass produced printing plates for large press runs, frequently occurring in different printing plants (as with the printing of mass circulation weekly magazines, etc.), nor do such arrangements include automatic compensation or accommodation of inevitable structural or performance characteristic variations between plate cylinders on different printing presses or even as among the several plate cylinders on a single press. Similar disadvantages may be experienced if the registering of the plates is attempted to be provided by registering pins on the cylinders to be aligned in registering holes on the printing plates, in addition to the further disadvantages of the extra expense involved in such arrangements and the possibility that further error may actually be introduced with the manual application of such mechanical expedients to the plate itself.

According to this invention, by contrast, there is provided for the simple and rapid registering adjustment of a plurality of printing plates on a plurality of plate cylinders, both axially and angularly of the cylinder, for the precise positioning of register marks and printing image on the plate to register when printed notwithstanding variations in the precise placement of the printing image on the plate and/or minor variations in structure or performance among the various plate cylinders, and of achieving such precise registering with even mass produced printing plates where particular individual minor variations in each plate cylinder were not taken into account or required in the production of the plates as by individually producing each plate especially for its respective individual plate cylinder. In accordance herewith, circumferential and axial scales or calibrations are permanently provided on the various plate cylinders and the plate clamping means thereof, and in a manner for individual adjustment to coordinate any particular idiosyncrasies of one cylinder with the operation of all the others, and

whereby circumferential and axial scales may each be independently adjusted for the individual plate cylinder, and the plate clamping mechanism with the plate clamp therein may be adjusted individually both circumferentially and axially to position the plate in precise register with each of the scales notwithstanding that the axial scale or calibrations may be mounted on the plate clamping mechanism and permanently adjusted with respect to the plate cylinder.

With the foregoing and additional objects in mind, this invention will be described in more detail, and other objects and advantages thereof will be apparent from the following description, the accompanying drawing, and the appended claims.

In the drawing:

FIG. 1 is a somewhat diagrammatic or schematic view of a printing plate for use in accordance herewith;

FIG. 2 is a partial transverse section through a portion of a printing press plate cylinder and mechanism therein embodying and for practicing this invention, taken along the line II—II of FIG. 3; and

FIG. 3 is a partial top plan view, with parts broken away, of the arrangement of FIG. 2 generally in the direction indicated by arrow A.

Referring to the drawings, in which like reference characters designate like parts throughout the several views thereof, there is indicated a printing plate 10 having on the surface thereof an ink-receiving printing image 11 for printing on paper or other material to form on the paper a single color impression portion of a multi-color image to be printed. Image 11 may be impressed upon plate 10 in the illustrated embodiment by conventional photoengraving or photolithographic techniques. Also, a plurality of plates 10 may be conveniently and conventionally produced with a plurality of absolutely identical images 11 for use in a plurality of printing presses for simultaneously printing in a magazine or other material to be printed on a plurality of presses for a large volume press run. A similar plurality of other and different printing plates are produced, as will be understood, with other printing images thereon each for printing other single colors to be superimposed on the image areas of the paper being printed to provide the final multi-color result desired.

When the images 11 are applied to the plates 10 by direct photographic or similar means, precise collocation and correlation of the various images for each of the various colors may be achieved quite readily since, for example, all the plate-making negatives will have been produced from a single multi-color master of whatever lettered copy or illustrative material is to comprise the desired multi-color reproduction. Similarly, if a plurality of sets of plates is produced for simultaneous use on a plurality of printing presses (or for sequential use on a single press) for a large print order, all the images 11 for a single color (for example yellow) can actually be identical on all the yellow plates, having all been produced from the same photographic negative, while all the images to print the color red can similarly be identical on all the red plates. Nevertheless, although all the images for one color may actually be identical and all the multi-color images precisely correlated, the exact and precise placement of each image on each plate may be subject to manufacturing variations or inaccuracies, either because the plates are not precisely the same size or because, during exposure of the plate to impress the image thereon photographically, some minute inaccuracy in the placement of the image on the plate surface occurs—all with the result that perfect registry of all the multi-color printing impressions on the paper after printing to form the desired composite image may not accurately be obtained merely by positioning each plate on its respective plate cylinder with the edges of the plate aligned axially and circumferentially with the edges of other printing plates on other plate cylinders.

Accordingly, during the manufacture of the printing plate and the impressing of the image 11 thereon, there are also impressed on the surface of the plate 10 a plurality of register marks, indicated at 13, which are usually in the form of crosses and are positioned in portions of the plate surface beyond that area of the printed paper to be occupied by the composite multi-color image. Such register marks 13 may be impressed photographically at the same time as the image 11 is impressed on plate 10 and with precisely the same exactitude and accuracy, so that precise registering of all the register marks 13 on each of the multi-color plates 10 will indicate the desired registering of the multiple images 11 printed therefrom. Thus, if the several single color plates are all positioned on the respective successive plate cylinders so that the register marks 13 on each plate will successively print on the same spots of the surface of the paper being printed, then accurate registering and superimposition of the various differently colored successive printing impressions will be achieved to provide the desired composite multi-color printed result.

In accordance herewith, then, each printing plate 10 is to be positioned and precisely aligned on its respective plate cylinder so that the register marks 13 will contact the paper being printed, as the plate cylinder rotates, at exactly the same point as the paper is contacted by the register marks 13 on other plates 10 on other plate cylinders. As an aid to such positioning, and as explained in more detail hereafter, the register marks 13, particularly if they are in the conventional form of crosses, are extended clear to the edges of the printing plate 10, as by longitudinal lines 14 and transverse lines 15, which may be merely simple pencil lines drawn on the surface of the plate prior to the positioning thereof on the plate cylinder.

As indicated more particularly in FIGS. 2 and 3, a portion of a plate cylinder 20 is illustrated as a generally conventional plate cylinder adapted for the mounting of plate 10 therearound to make successive impressions on paper to be printed as the plate cylinder rotates and the paper comes in contact with the surface of printing plate 10 on the cylinder. As will be understood, cylinder 20 is somewhat longer than the maximum width of the one or more plates 10 intended to be placed therearound, thus including end portions 21 forming circumferential surfaces at either end of cylinder 20 beyond the lateral extent of the printing plates 10 thereon. Similarly as conventional, cylinder 20 includes one or more axially extending recesses defined by axial shoulders 22 and 23 for accommodating mechanism for clamping the opposite ends of plate 10 around cylinder 20 and with such clamping mechanism depressed within the recess between shoulders 22 and 23 so as not to protrude outwardly beyond the circumferential surface of the cylinder.

Within such recess are mounted and accommodated axial clamping rails 24 and 25 with which are associated clamping bars 26 and 27 forming clamping jaws (preferably serrated as indicated at 28) for the clamping engagement therebetween of opposite axial edges of printing plate 10 to hold the printing plate around cylinder 20. Such clamping is effected, in known manner, as by providing a plurality of clamping bolts 30 through clamping bars 26 and 27 and threadably engaged with clamping rails 24 and 25 for urging these members together clamping plates 10 therebetween.

Mechanism is also provided in accordance herewith for moving plate 10 both axially and circumferentially over the surface of cylinder 20 after the plate is clamped by clamping bars 26 and 27, for the purpose of achieving the final fine or precise positioning of image 11 and register marks 13 with respect to the surface of cylinder 20. Such mechanism includes, in the illustrated embodiment, guide and mounting bars or blocks 31 and 32 on which are mounted, respectively, clamping rails 24 and 25 for limited sliding movement both axially and circumferentially with

respect thereto. Clamping rails 24 and 25 are slightly shorter than the axial distance between the opposite end portions 21 of the cylinder.

Axial adjusting screws 33 are provided threadably engaged through end portions 21 of cylinder 20, with the inner ends of screws 33 engaging opposite ends of each of the clamping rails 24 and 25, whereby, as will be understood, adjustment of screws 33 will move and position clamping bars 24 and 25 axially of cylinder 20, and will similarly axially position plate 10 on cylinder 20 as clamped between the respective sets of clamping rails 24 and 25 and clamping bars 26 and 27.

For positioning the plate 10 in a circumferential direction around the surface of cylinder 20, there is provided a plurality of adjusting screws 34 along clamping rail 24 and threadably engaged therewith, with the protruding end of screws 34 engaging shoulder 22, whereby adjustment of the screws 34 will displace clamping rail 24 circumferentially with respect to shoulders 22 of cylinder 20 and thus move plate 10 around the surface of cylinder 20 within the limits of the adjustment. A similar plurality of adjusting screws 35 is threadably engaged through clamping rail 25 and bearing against axial shoulder 23 for similarly and cooperatively adjusting and positioning the opposite axial edge of plate 10 around cylinder 20.

At each end of cylinder 20 and disposed in a groove therearound beyond the area to be covered by printing plates 10 is arranged a calibrated scale 40, which may satisfactorily be a calibrated metal strip adapted to slide around cylinder 20 and with the opposite ends thereof being affixed to bolts 41 engaging blocks 42 fixed to end portions 21 of cylinder 20. Thus, adjustment of nuts 43 on bolts 41 moves and positions and adjusts calibrated scale 40 at various positions around cylinder 20. In this manner, all the various calibrated scales 40 on all the plate cylinders of a multi-color printing press (or a plurality thereof) can be precisely adjusted so that the same calibration on each of the scales 40 precisely indicates the same angular point on the surface of all the cylinders which will contact the paper to be printed at each printing unit, regardless of minor dimensional variations in some of the structural parts of the various different printing cylinders. That is, by threading nuts 43 more or less along bolts 41, all the scales 40 on all the several plate cylinders 20 of a multicolor printing press (or on all the plate cylinders of a plurality of printing presses) can be adjusted so that a particular calibration on each scale indicates the angular point on each printing cylinder which will contact the paper to be printed in the same spot as all the points indicated by the same calibration on all other plate cylinders.

As will be apparent from the foregoing, there is thus provided for the completely precise and simple adjustment of the printing plates 10 to the proper angular registering position around the plate cylinders 20. The scales 40 are first adjusted or calibrated to coordinate all the plate cylinders 20 (which adjustment, of course, need not be made repeatedly each time the printing press is reused), and the printing plates 10 are placed around the cylinders 20 with the opposite axial edges of plates 10 clamped by clamping bars 26 and 27 by tightening the various bolts 30 securely. Thereafter, it is only necessary to adjust the adjusting screws 34 and 35 so as to move the printing plates around the plate cylinders sufficiently to bring the guide lines 15, and the register points 13 indicated thereby, to a particular calibration on preset scale 40, as indicated in FIG. 3. Since the points 13 have been originally impressed on all the printing plates 10 at coincident positions with respect to the images 11, positioning guide lines 15 on each of the printing plates at the same calibration on each of the preset scales 40 on each of the printing cylinders automatically and precisely positions all the images 11 on all the printing plates 10 so they will be positioned angularly with respect to the cylinders 20 to strike the paper at the proper place as it passes through the printing press.

To accommodate the precise and coordinated placement of all the printing plates 10 and the register points 13 thereon axially of all the plate cylinders 20, additional mechanism is provided in accordance herewith. Such mechanism includes axially extending calibrated scales 50 and 51 which, in the illustrated embodiment, overlie and are carried by clamping bars 26 and 27 and are mounted thereon for limited free axial sliding movement with respect thereto. Thus, screws 52 threadably engage the clamping bars 26 and 27 through elongated slots 53 in scales 50 and 51 with a washer or shoulder under the head of screws 52, so that scales 50 and 51 may slide axially with respect to the screws 52 at least to the extent defined by the lengths of slots 53.

At either end of each of the scales 50 and 51 and extending axially therebeyond is provided a roller 55 for rolling bearing engagement with the axially inner surface of end member 21 of cylinder 20, which roller is mounted on a vertical pin 56, which is carried in turn by a bracket 57. Bracket 57 includes an elongated axial slot 58 through which it is affixed to scale 50 (and 51) as by cap screws 59 threadably engaged with scales 50 or 51, whereby the axial extent by which bracket 57 and roller 55 thereon extends beyond the ends of scales 50 or 51 is simply adjusted by loosening cap screws 59 and moving bracket 57 axially with respect to either scale 50 or 51 before tightening the cap screws again.

With the brackets 57 in a particular adjustment on scales 50 and 51, rollers 55 engage the inner surface of end portion 21 of plate cylinder 20 for maintaining the axial positioning of scales 50 and 51 notwithstanding circumferential movement of clamping rails 24 or 25 under the adjusting action of set screws 34 and 35 as previously described. Similarly, since free axial sliding movement between each of the scales 50 and 51, and its respective clamping bar 26 and 27, is permitted by elongated slots 53 and screws 52, each of the clamping rails 24 and 25 may be moved axially of cylinder 20 by adjustment of adjusting screws 33, as previously described, and without similar axial movement of scales 50 and 51. For example, in the illustrated embodiment, scales 50 and 51 also include an oversize opening 60 through which access to clamping screw 30 is obtained notwithstanding different relative positionings of the scales 50 and 51 axially with respect to the clamping bars 26 and 27.

As will be apparent from the foregoing, the various axial scales 50 and 51 can readily be adjusted on all plate cylinders 20 and axially with respect thereto (by adjusting the axial positioning of the clamping scales with respect to brackets 57 and rollers 55 bearing against opposite cylinder end portions 21), so that the calibrations on scales 50 and 51 indicate for all the plate cylinders 20 exactly the same axial or transverse point at which paper to be printed will be contacted by all of the plate cylinders 20.

Accordingly, after a printing plate 10 is clamped in place with clamping bars 26 and 27, the entire plate 10 and clamping rails 24 and 25 may be adjusted axially of the cylinder 20 (using adjusting screws 33) so that guide line 14 (extending register marks 13 to the edge of plate 10) coincides with a predetermined calibration on scales 50 and 51. With the various scales 50 and 51 preset on all the plate cylinders 20 so that a given calibration on each plate cylinder indicates the same axial positioning of the image 11 on a plate 10, merely adjusting the axial positioning of each plate 10 so that the guide line 14 corresponds to the same calibration on scales 50 and 51 automatically arranges the proper axial positioning of all the plates and on all the plate cylinders 20 so that all the images 11 printed therefrom will be accurately in register on the paper being printed.

As will be apparent from the foregoing, it makes no difference whether the axial positioning of the plates 10 regarding scales 50 and 51 occurs before or after the angu-

lar positioning of plates 10 with respect to scale 40, because each of the axial and angular adjustments can be affected independently of the other. Similarly, the permanent presetting of scale 40 is not affected one way or the other by the permanent presetting of axial scales 50 and 51, and neither calibrating presetting of either angular scale 40 or axial scales 50 and 51 is affected by either axial or angular circumferential movement of clamping rails 24 and 25 under the individual adjusting forces of either adjusting screws 33 or screws 34 and 35. Thus, the axial positioning of scales 50 and 51 is determined, with respect to the end portions 21 of each plate cylinder 20 by the axial adjustment of rollers 55 with respect to scales 50 and 51, which adjustment is not affected by circumferential movement of either scales 50 and 51 or clamping rails 24 and 25. Similarly, clamping rails 24 and 25 may be moved or adjusted either circumferentially or axially, in the accurate positioning of plate 10, without affecting at all the preadjustments or calibrations of angular scale 40 or axial scales 50 and 51.

Nevertheless, to achieve precise positioning of the images 11 and the register points 13 on a plurality of printing plates 10 on a plurality of precalibrated plate cylinders 20, it is only necessary to bring guide lines 15 into coincidence with a particular calibration on angular scale 40 by adjustment of adjusting screws 34 and 35, and to bring guide lines 14 into similar coincidence with a predetermined calibration on axial scales 50 and 51 by similar adjustment of adjusting screws 33. Similarly, also, it makes no difference where register points 13, and guide lines 14 and 15 indicative thereof, are placed on printing plate 10, provided only that they are all placed in a manner to designate completely the positioning of the various images 11, since the entire scales 40 and 50–51 are preset or calibrated for all the plate cylinders 20 so that the alignment of guide lines such as 14 and 15, wherever they may be placed on the face of plate 10, with the predetermined calibrations at each printing cylinder results in the proper and precise and congruent positioning of register points 13 and printing images 11 properly on all plate cylinders so that the printing images 11 will strike the paper to be printed during rotation of the plate cylinders 20 at the precisely registered and predetermined spot to form the desired composite multi-color image to be printed.

There is, thus, provided in accordance herewith simple and inexpensive mechanism readily included in a conventional plate cylinder of a rotary printing press whereby the precise registering adjustment of a large plurality of printing plates can be simply achieved on a similarly large plurality of plate cylinders in one or more printing presses simultaneously to provide the desired precise registration of a plurality of superimposed printed images for multi-color and similar composite printing techniques. Furthermore, such fine adjustment may be obtained individually for each printing plate without extensive trial and error operations of the printing press and without the utilization of separate jigs or other measuring or calibrating devices which must be added to and removed from the press each time a plate is adjusted; and the mechanism in accordance herewith is simply included in or added to the conventional design of printing presses without requiring substantial redesigning or rebuilding thereof.

Also the advantageous effects hereof, in the precise registering of printing images on printing plates, are simply and readily achieved with the simultaneous adjustment of a large plurality of plates on plate cylinders, rather than having to produce or adjust each plate differently or individually with respect to the different characteristics or idiosyncrasies of each printing press or each plate cylinder, so that the printing plates may be mass produced readily in one particular location without special regard to the characteristics of the plate cylinder and in a uniform manner permitting the application and precise registering of the images on such mass produced plates on a wide variety of different plate cylinders on different printing presses in different locations. Such ease of utilization is also substantially independently of or notwithstanding inevitable minor variations from plate to plate or from press to press which may occur. Yet the entire apparatus required for accomplishing all the advantages of this invention is of relatively simple and inexpensive construction and relatively light weight to be readily accommodated on plate cylinders of various kinds of rotary printing presses to which it might be desired to apply this invention.

While the arrangements and apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise arrangements and apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. Apparatus for the precise positioning of the printing images on a plurality of multi-color printing plates each secured to the surface of different plate cylinders in a multi-color rotary printing press, which comprises in combination clamping means in each of said plate cylinders for securing a printing plate on the circumferential surface thereof, means for adjusting said clamping means both axially and circumferentially of said plate cylinders while holding said plates in clamped position for individually adjustng the axial and circumferential positioning of said printing plates and said printing images thereon, an axial and a circumferential calibrated scale on each said plate cylinder for indicating by the calibrations thereon axial and angular positions on said cylinders, and means for individually and selectively adjusting said axial and circumferential scales on all said cylinders whereby predetermined calibrations on said scales indicate the same axial and angular positions on all said cylinders and independently of said means for adjusting said clamping means on said cylinders.

2. In apparatus of the character described for the precise positioning on a printing press plate cylinder of the printing image on a printing plate clamped on the surface of said plate cylinder, the combination which comprises clamping means for affixing said printing plate onto the circumferential surface of said plate cylinder, means for adjusting said clamping means axially and circumferentially of said cylinder while holding said plates in clamped position for altering and adjusting the positioning of said printing plate and said printing image thereon over said circumferential surface of said plate cylinder, a calibrated scale extending axially of said cylinder and adjacent an axial edge of said plate, means for adjusting said calibrated scale axially of said plate cylinder whereby the calibrations thereon indicate precise axial position on said cylinder, a circumferential calibrated scale extending around said circumferential surface of said plate cylinder at at least one end thereof, and means for adjusting said circumferential scale around said cylinder whereby the calibrations thereon indicate precise angular points thereabout, said precise positioning of said printing plate and said image thereon being achieved with respect to said calbrations of said axial and circumferential scales throughout all of said individual and selective adjustments of said clamping means in both axial and circumferential directions.

3. In apparatus of the character described for the precise positioning on a printing press plate cylinder of the printing image on a printing plate clamped on the surface of said plate cylinder, the combination which comprises clamping means for affixing said printing plate onto the circumferential surfaces of said plate cylinder, means for adjusting said clamping means axially and circumferentially of said cylinder while holding said plate in clamped position for altering and adjusting the positioning of said printing plate and said printing image thereon over said circumferential surface of said plate

cylinder, a calibrated scale extending axially of said cylinder and adjacent an axial edge of said plate, means for adjusting said calibrated scale axially of said plate cylinder whereby the calibrations on said scale indicate precise axial positions on said cylnder and notwithstanding said axial and circumferential adjustments of said clamping means, said calibrated scale being carried by said clamping means for movement therewith circumferentially of said cylinder, and means providing limited free axial movement between said scale and said clamping means whereby said axial adjustment of said scale is maintained during said axial adjustments of said clamping means.

4. In apparatus of the character described for the precise positioning on a printing press plate cylinder of the printing image on a printing plate clamped on the surface of said plate cylinder, the combination which comprises clamping means for affixing said printing plate onto the circumferential surfaces of said plate cylinder, means for adjusting said clamping means axially and circumferentially of said cylinder while holding said plate in clamped position for altering and adjusting the positioning of said printing plate and said printing image thereon over said circumferential surface of said plate cylinder, a calibrated scale extending axially of said cylinder and

adjacent an axial edge of said plate, means for adjusting said calibrated scale axially of said plate cylinder whereby the calibrations on said scale indicate precise axial positions on said cylinder and notwithstanding said axial and circumferential adjustments of said clamping means, and means effecting movement of said calibrated scale circumferentially of said cylinder without disrupting said precise axial adjustment of said scale.

5. Apparatus as recited in claim 3 which also includes a circumferential calibrated scale extending around the circumferential surface of said plate cylinder at at least one end thereof.

6. Apparatus as recited in claim 4 in which said means for circumferential movement of said scale include roller means in bearing engagement with a stationary portion of said cylinder for circumferential movement therealong and means for adjustably connecting said roller means to said calibrated scale.

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