March 25, 1941. J. A. KOESSLER ET AL 2,236,000

METHOD FOR REGISTERING PRINTING PLATES

Filed Sept. 7, 1938 2 Sheets-Sheet 1

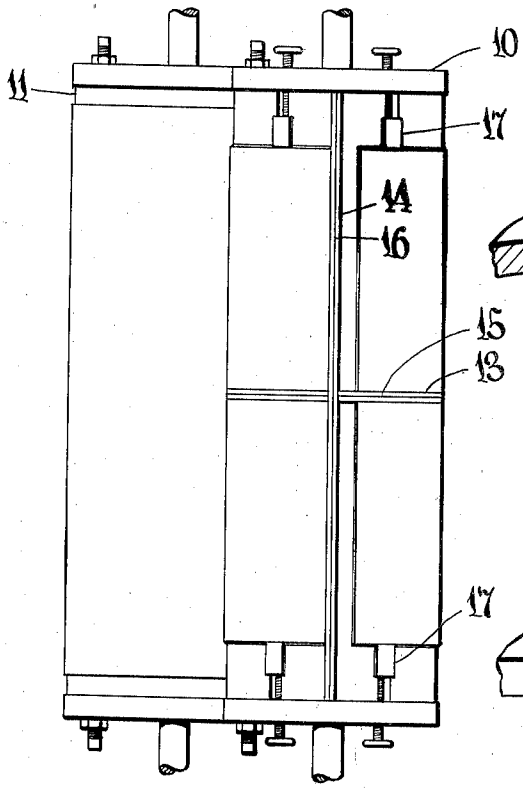


Fig. 1.

Fig. 3.

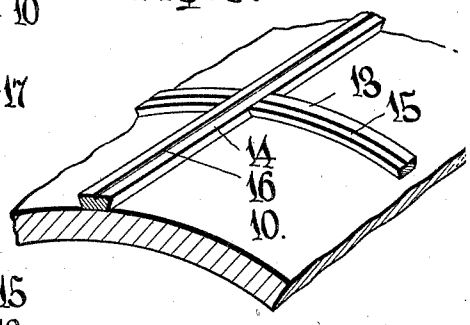


Fig. 4.

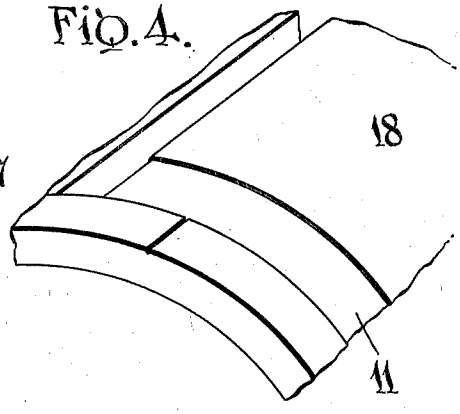
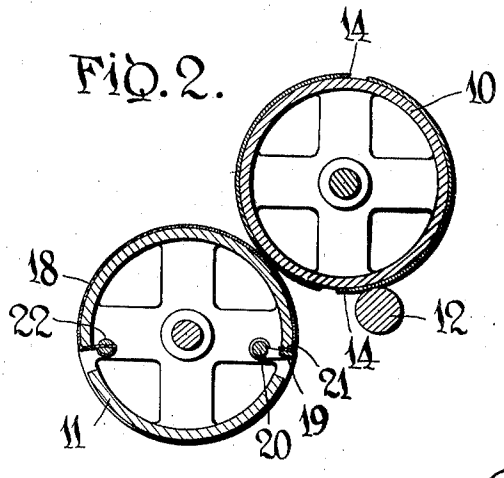


Fig. 2.



John A. Koessler
John W. Koessler
Kenneth L. Koessler
INVENTORS

BY

Bean, Brooks, Buckley & Bean
ATTORNEYS

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METHOD FOR REGISTERING PRINTING PLATES

Filed Sept. 7, 1938 2 Sheets-Sheet 2

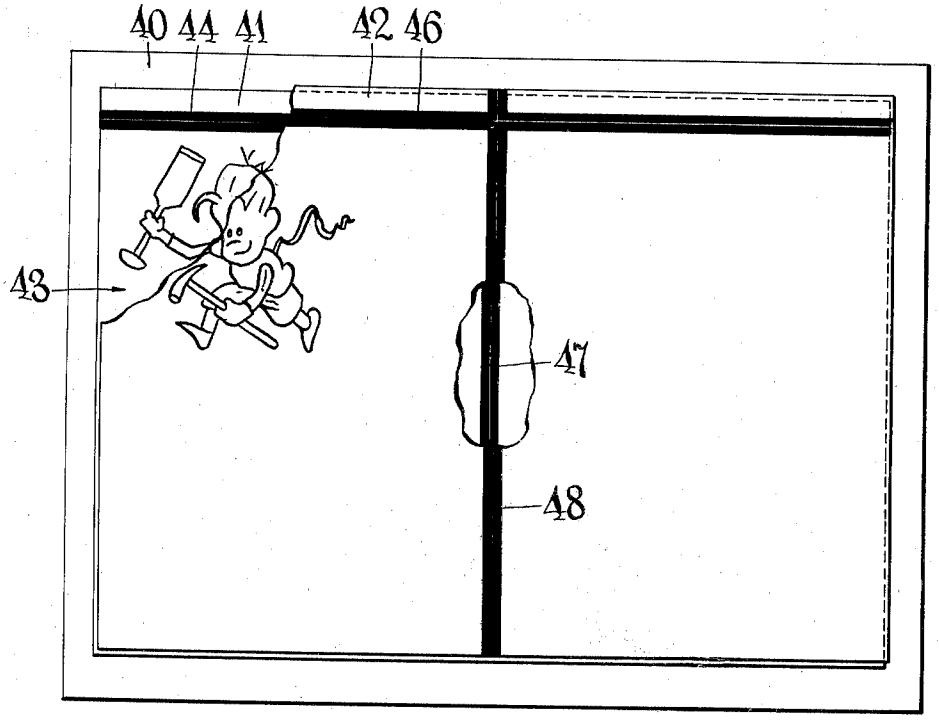


Fig. 5.

Fig. 6.

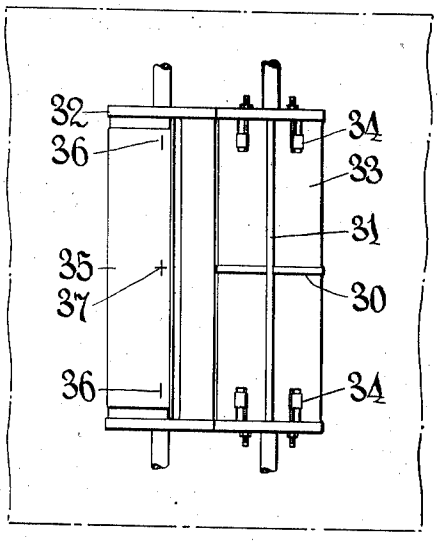
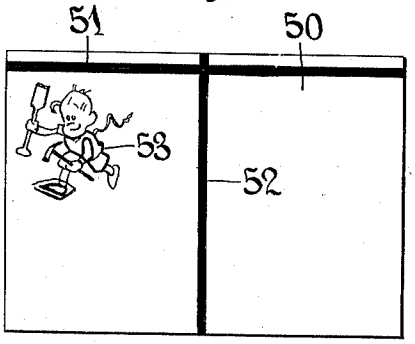


Fig. 7.



John A. Koessler
John W. Koessler
Kenneth L. Koessler
INVENTORS

BY
Bean, Brooks, Buckley & Bean
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,236,000

METHOD FOR REGISTERING PRINTING PLATES

John A. Koessler, John W. Koessler, and Kenneth L. Koessler, Buffalo, N. Y.

Application September 7, 1938, Serial No. 228,814

7 Claims. (Cl. 101—211)

This invention relates to a method for securing registry of related printing plates or forms and for facilitating the location of the make-ready upon the impression cylinder or impression plate of a printing press.

In making a number of superposed or related printing impressions, as in multi-color printing, considerable difficulty is encountered in locating the several printing plates, blocks, forms, cuts, or the like, in such position that the several impressions will be in accurate superposition or alinement, in other words, in registry. This is true whether the impressions are made consecutively in the same press and with the same impression cylinder or plate; whether they are made with different presses; or whether they are made in a multi-color printing press having plural printing stations or positions for the several impressions.

While the principles of our invention may be employed in any of the foregoing processes, we shall discuss it here, for the purpose of delineating a single complete embodiment, in connection with a rotary multi-color press of the type commonly in use in newspaper printing.

In presses of this type a continuous web of paper passes through the press from the feed roll to the cutting and folding instrumentalities and in its course passes between a number of pairs of rollers. Each of these pairs of rollers consists of a plate cylinder carrying one or more arcuate printing plates, usually cast, and an impression cylinder for pressing the moving web of paper against the type surface of the plates on the plate cylinder. The impression cylinder customarily carries on its surface a make-ready for insuring uniform contact of the web with all parts of the type surface.

For convenience we shall discuss our invention in connection with printing in four colors. This number may be varied and is chosen only because it is commonly used in the printing of comic supplements for newspapers.

In a rotary press for such printing there are, in addition to the usual feed rolls, tension rollers, ink fountain and distributing rolls, etc., four pairs of impression and plate cylinders. In a conventional multi-color press of this type the four plate cylinders are identical in dimension and construction and each plate cylinder usually has a raised central ring and a plurality of members called head bars which extend along the surface of the cylinder from the center ring to the outer edge and parallel to the axis of the cylinder.

The curved stereotype plates are customarily clamped against the center ring with a circumferentially extending edge of the plate in abutment with the center ring and with one axially extending edge of each plate against one of the head bars and since the relative location and sizes of the center rings and head bars on the several plate cylinders are identical accurate registry of the several color plates is effected, according to the present invention, by treating the stereotype plates in such manner that the edges of the plates which engage the center rings and the head bars are uniformly located with respect to the type surfaces throughout the series of color plates. This treatment of the plates is effected prior to setting up the printing press and in such manner that no testing or registering of the plates subsequent to their initial placement in the press is necessary.

It is to be understood, of course, that the several impression and plate cylinders are arranged to rotate in accurately timed relation whereby when registry of the several impressions is once effected by proper location of the printing plates such registry will be effectively maintained during the period of operation of the press.

One important advantage of our invention is the fact that registry of sets of multi-color plates may be effected while other jobs are being run on the large newspaper printing presses and without interfering with their production during such time as is consumed in registering the plates.

The apparatus and method of our invention is further adapted to the production of a make-ready for each impression cylinder of the press which may be more accurately positioned with respect to the type surface than has heretofore been possible and, further, a make-ready which may be positively and directly located and applied to the impression cylinder without preliminary testing and shifting to determine the proper location of the make-ready. This latter object is accomplished as an accompaniment of our new method of registering the plates and in general by producing make-readys bearing locating marks which may be alined with similar permanently provided marks on the tympan or other relatively fixed backing for the make-ready found on each impression cylinder. In providing for the accomplishment of the foregoing objects we utilize a novel proof press wherein means are provided for automatically and graphically indicating on each proof that is pulled the exact relationship and spacing of the center ring contacting edge and the head bar contacting edge of the printing plate with respect to the type matter thereon.

An exemplary embodiment of the novel instrumentalities employed in the accomplishment of our invention will be found illustrated in the drawings and described in this specification but it is to be understood that the scope of our invention is not limited thereto or in any other way excepting as defined in the appended claims.

In the accompanying drawings:

Fig. 1 is a fragmentary plan view of the impression and plate cylinders of our novel proof press;

Fig. 2 is an end elevational view thereof in cross section;

Fig. 3 is a fragmentary perspective view of a central portion of the plate cylinder of the proof press showing the intersection of the center ring and a head bar;

Fig. 4 is a fragmentary perspective view of the impression cylinder of the proof press showing a portion of a printed proof sheet in position;

Fig. 5 is a plan view of a tracing table with a pair of superposed proofs of related printing plates;

Fig. 6 is a fragmentary plan view of a printing station of a conventional multi-color newspaper press showing a related plate cylinder and impression cylinder; and

Fig. 7 is a schematic plan view of a make-ready prepared according to our invention.

We shall now describe one specific application of the principles of our invention and in so doing reference will be had to rotary multi-color presses of the newspaper printing type employing curved stereotype printing plates. It is to be understood, however, that the following detailed description is merely by way of example and that our invention is not to be considered as limited in any way save by the appended claims.

In the production of curved plates for newspaper printing a matrix is produced by impressing the type form against a flong composed of laminations of paper and the matrix so formed is then dried and placed in a molding machine where it is caused to assume a curve corresponding with the curve of the plate cylinder of the press in which the plate is to be employed.

Type metal is then poured into the machine and a curved stereotype plate is produced. The back of the plate, that is the convex surface thereof, is then shaved or surfaced by conventional means so that the plate will be of uniform thickness.

The steps thus far discussed are conventional and well known in newspaper printing and in following the process of the present invention no departure therefrom is noted.

In carrying out our present invention we provide and utilize a novel proof press for producing preliminary impressions or proofs of the several plates. As illustrated in the drawings, the proof press is provided with a plate cylinder **10** and a cooperating impression cylinder **11**, these cylinders being arranged to rotate in timed relation with each other in any convenient manner. A suitable inking roller **12** and other conventional ink fountain and distributing means (not shown) are provided.

In the construction of our proof press it is intended to reproduce, as to certain features, the conditions which exist in the impression and plate cylinder construction of the conventional multi-color newspaper printing machine of which the proof press is an adjunct.

In a newspaper printing machine of the type here under consideration and generally used there are provided on the plate cylinders center rings and head bars against which the stereotype plates are adapted to be clamped. In practice the center ring encircles the plate cylinder midway between its ends and projects above the surface of the cylinder a distance less than type height so as not to interfere with the printing of the plate. The head bars, of which there are usually several spaced about the cylinder, project above the surface of the cylinder about the same amount as the center ring and extend from the center ring in each direction parallel to the axis of the cylinder and to a point adjacent the edge of the cylinder. The center ring and a head bar are indicated at **30** and **31**, respectively, in Fig. 6, where an impression cylinder and a plate cylinder of a multi-color newspaper printing press are designated **32** and **33**, respectively.

The curved stereotype plates are placed in the nawspaper printing press with one arcuate edge abutting the center ring and one axially extending edge against a head bar. Clamps **34** are then applied to the other arcuate edge of the plate at the end of the cylinder to retain the plate in position.

In constructing the plate cylinder of our improved proof press we use a cylinder having the same diameter as the cylinder in the newspaper printing press and having its center ring and head bars located as they are located in a newspaper printing press and of the same width. The center ring and head bars of our proof press are designated **13** and **14**, respectively, in the drawings. Instead of keeping the height of the center ring and the head bar low enough to avoid interference with printing, as has heretofore been the practice, we construct the center ring **13** and the head bars **14** of our proof press so that they are exactly type high, in order that proofs produced on the press will have printed thereon a reproduction of the center ring and head bars for indicating their location with respect to the type matter. To render this printed indication more useful we preferably provide a narrow annular central groove **15** in the printing surface of the center ring and a narrow longitudinal central groove **16** in the printing surface of each head bar whereby the otherwise solid black impressions of the center ring and head bar will appear with a narrow white line extending centrally thereof.

Clamps **17** are provided at the edge of the plate cylinder of the proof press for retaining the stereotype plates against the center ring and head bars in the same manner as in the newspaper printing press.

In the drawings the impression cylinder **11** is shown bearing a proof sheet **18** which may be held in place on the impression cylinder in any convenient manner. In Fig. 2 will be found a bar **19** hinged at **20** and having prongs on pins **21** which pierce and thereby hold one edge of the proof sheet **18**. The opposite edge of the proof sheet is inserted in a longitudinal slot in a rotatable bar **2**. After insertion of the edge of the proof sheet **18** the bar **22** is rotated to wind up any slack in the proof sheet and hold it taut on the impression cylinder. This construction is the same as that conventionally employed on the impression cylinder of the newspaper printing press for holding the make-ready and other sheets underlying the web of news print. It is noted that newspaper printing presses act upon a continuous web in which no means on the impression cylinder for holding the web itself thereto are needed.

In pursuing the method involved in our invention, in the embodiment now being described, a complete set of stereotype plates, comprising one plate for each color to be printed in superposition, is brought to the proof press after the casting and back shaving steps previously referred to. Since the plate for printing the black matter is usually most complete and generally prints borders, outlines, etc., this plate may be conveniently used as a master plate. For greater convenience this master plate is usually placed in a conventional stereotype plate edge trimmer and one curved edge and one straight edge thereof, these being the edges intended to contact the center ring and head bar when the plate is positioned either in the proof press or the newspaper printing press, are trimmed straight and to such size that these edges will be closer to any given point in the type matter than the corresponding edges of the remaining plates in the set. Each plate is then successively positioned in the proof press and one or several proofs thereof are made.

The proofs are then preferably brought to a conventional tracing table having a glass top and a light therebeneath and the black proof, that of the master plate, is placed on the table.

Referring to Fig. 5, the numeral **40** designates the tracing table mentioned above and shown there in plan view. A proof sheet **41** from the plate for printing in black, heretofore designated the master plate, is placed upon the table and it may be secured by thumbtacks or paste. A proof sheet 42 from another plate in the set, for printing another color, is then placed upon the master proof sheet **41** and is adjusted until the pictures or reading matter on the two proof sheets are in accurate registry. At **43** in Fig. 5 a portion of the upper proof sheet **42** has been broken away to more clearly illustrate this condition.

Owing to the preliminary trimming of the edges of the black plate this plate will be smaller than the other plates in the set and the black lines printed by the center ring and the head bar on the proof sheets will be closer to the matter printed by the stereotype plate than in the remaining plates in the set. In effect, the edges of the black lines which lie closest to the printed matter on the proof demarcate those edges of the plate which lie against the center ring and head bar during the printing of the proof.

As seen in Fig. 5, the border line **44** impressed upon the black proof sheet **41** by one of the head bars **14** of the proof press, together with its narrower white central guide line, is offset toward the text of the plate relative to the corresponding border line **46** on the superposed proof sheet **42**. The distance between corresponding parts of these lines, as for instance the distance between the white central guide lines on the two sheets, indicates the amount that the edge of the plate used in producing the upper proof sheet **42** should be trimmed to bring the type matter of the two plates into accurate registry in the direction of the circumference of the plate cylinders wherein both plates are mounted on the same plate cylinder and run consecutively or when they are mounted on plate cylinders of duplicate size and proportion and having identically located center rings and head bars.

A similar condition exists in Fig. 5 with respect to the vertical central guide lines **47** and **48** of the lower and upper proof sheets **41** and **42**, respectively, and the distance between the central white lines of these guide lines indicates the amount that the curved edge of the plate used in producing the upper proof sheet **42** must be trimmed in order to bring the type matter of the two plates in accurate registry in the direction of the axis of the plate cylinder when they are mounted and used as outlined in the preceding paragraph. Proofs of the other plates in the set are then successively placed upon the black proof **41** with the subject matter of the plates in registry and reference is had to the guide lines printed upon each of the two proof sheets and the process described in the case of the proof sheet **42** is repeated until the head bar and center ring contacting edges of all of the plates in the set bear a uniformly identical relation to the type matter of the plates.

Since the center ring and head bar-contacting edges of the plate for printing in black have previously been trimmed, the guide lines on the proof being compared therewith will in all cases be farther from the printed context than they are on the black proof and the distance between corresponding lines on the black proof and the proof being compared therewith indicate exactly the amount which the corresponding edge of the plate being compared should be trimmed to cause the printed guide lines to exactly register when the printed context of the two proofs are also in registry.

It should be noted that in printing each of the complete proof sheets **41** and **42** two plates are employed, one on each side of the center ring. We have described the method of registering the plates which print the matter appearing to the left of the central guide lines **47** and **48** in Fig. 5. After this has been done the upper sheet **42** must be shifted until the matter to the right of these lines is in registry and the same process is then followed for the set of plates that prints the matter to the right of the central guide lines **47** and **48** of Fig. 5. While a plate edge trimmer is conveniently used in our new method, its general use for trimming the edges of stereotype plates is well-known and conventional and no separate disclosure thereof is believed necessary.

After the edges of the several plates in a particular set have been trimmed, as indicated by comparison of the guide lines impressed by the center line and head bars of the proof press, new proofs may be made as a check but this step is not essential to successful operation of the plate registry part of our new process.

With the plates thus provided with accurate locating edges and since the position they assume on the several plate cylinders of the newspaper printing press are the same throughout the set and the same as in the proof press, it is merely necessary to lock the several plates in position with the assurance that the resultant printed matter will be in accurate register.

It has been customary in the past, in setting up presses of the type here being discussed, to prepare the make-ready for the impression cylinder after the plates have been set up in the press. This necessitates keeping a large press out of production for a considerable period of time and, of course, results in substantial waste. By our invention a make-ready is prepared while the stereotype plate is set up in the proof press and on a proof sheet having the previously described printed guide lines showing the location of the plate cylinder center ring and head bars with relation to the type matter. The proof sheet for this purpose should be one that is made after the edge trimming operation previously referred to so that the proof sheet shows, by means of the guide lines, the location which

the plate will assume when it is set up in the newspaper printing press.

Such a make-ready is more or less diagrammatically shown in Fig. 7 when the numeral 50 designates a proof sheet bearing head bar and center ring impressions, designated 51 and 52, respectively. The procedure in preparing the make-ready, save for the presence of the lines 51 and 52, is the same as has heretofore been followed. A backing for the proof sheet 50 may be employed, if desired, and the overlays indicated at 53 are applied in the conventional manner.

Fig. 6 shows guide lines which are scored or otherwise applied to the tympan 35 or other permanent backing member of the impression cylinder 32 in the printing press proper. These lines comprise preferably two axially extending lines at the ends of the cylinder marked 36 and a pair of crossed lines at the center of the cylinder 37, with one of the cross lines 37 in line with the lines 36 at the ends of the cylinder. The lines 36 and 37 are so located on the tympan that the make-ready may be simply located on the impression cylinder by merely registering the lines 36 with the ends of the guide lines 51 produced by the head bar 14 and alining the crossed lines 37 with the crossed guide lines appearing on the proof sheet at the juncture of the lines 51 and 52. In this manner accurate positioning of the make-ready for each stereotype plate is effected directly without any preliminary shifting or testing.

One important advantage of our invention is the fact that registry of sets of multi-color plates may be effected while other jobs are being run on the large newspaper printing presses and without interfering with their production during such time as is consumed in registering the plates.

In an alternative form of the method of our invention we dispense with the tracing table heretofore referred to insofar as registering the several plates is concerned. In this modified procedure we provide a transparent expanse, preferably of a flexible nature, and a sheet of Cellophane has been found to serve satisfactorily.

In proceeding in accordance with this alternative the novel proof press hereinbefore described and illustrated in the drawings may be employed but for present purposes the center ring and head bar need not be type high. The first step in the alternative method is, as in the principal embodiment, to trim two adjacent edges of one of the stereotype plates, usually the black plate, so that when comparisons of other plates in the set are made with the black plate the trimming necessary to cause the plates to register will always be of the other plates and not of the black plate.

After trimming, the black plate is positioned in the proof press and a proof is struck therefrom and the proof is left in position on the impression cylinder of the proof press. The transparent sheet, as of Cellophane, is then secured to the impression cylinder so that it covers the proof sheet struck from the black plate and the black plate is removed from the press and another plate of the set is positioned upon the plate cylinder with two of its edges in contact with the stationary locating means of the proof press.

A proof of this second plate is then impressed upon the transparent sheet and the visual effect of the two superposed impressions, owing to the transparency of the second sheet, is substantially the same as if both impressions were struck onto one sheet. The discrepancy of the locating edges of the second plate with relation to the black plate is then checked by comparing related type matter on the two plates and the two adjacent locating edges of the second plate are trimmed to correct this discrepancy.

The first proof impression from the second plate having served its purpose, the smooth transparent sheet is wiped off with a cloth or the like and the trimmed second plate is repositioned in the press and a second proof is struck therefrom onto the transparent sheet to check the trimming and the resultant registry. If further correction is required the foregoing process is repeated but that is usually unnecessary.

With the original proof sheet of the black plate still in position and with the transparent superposed sheet again wiped clean, or if necessary, replaced, the third plate of the set is positioned in the proof press and the method employed in registering the second plate is repeated with the third plate.

Each plate of the set is so treated and the net result, as in the first described embodiment of the instant invention, is that each plate of a set has its locating edges accurately trimmed prior to introduction of the plates into the actual printing press, as distinguished from the proof press, before introduction of any of the plates into the printing press and complete registry of the set of plates is effected with no checking or trimming after the plates are first placed in position in the printing press.

It is desirable to use the novel proof press of Figs. 1 through 4 of the drawings even in the last described modification of the invention in order that make-ready sheets having the novel locating guide lines may be produced for accurately positioning make-readies on the impression cylinders of the multicolor printing presses.

What is claimed is:

1. The method of registering sets of stereotype printing plates for use in rotary multicolor printing presses which comprises consecutively impressing proofs of the several plates in a set and simultaneously impressing upon each proof sheet impressions of the plate holding and locating bars of said proof press for graphically recording on said proof sheet the relative position of the edges of said plates with respect to their type matter, superposing said proof sheets with the type matter impressed by the several stereotype printing plates in registry, comparing the impressions of the plate holding means on the several proof sheets and measuring variations in location thereof, and subsequently trimming the edges of the several plates to compensate for such variations.

2. The method of registering sets of stereotype printing plates for use in rotary multicolor printing presses which comprises consecutively impressing proofs of the several plates in a set and simultaneously impressing upon each proof sheet guide lines demarcating the location of two edges of each plate to indicate graphically the relative disposition of such edges with respect to the type matter of the plate, superposing the several proof sheets so produced with their type matter of the several proofs in registry and determining the variations in alinement between the guide lines demarcating the location of the said two edges of

each plate and subsequently trimming the plates whose said two edges are at greater distances from corresponding points on the type matter to cause the said two edges of each plate to bear the same relationship to the type matter of each plate in the set.

3. The method of registering a set of related stereotype printing plates for multicolor rotary printing which comprises positioning one of the plates of said set in a proof press and striking a proof therefrom and, without removing said proof from the proof press, positioning thereover a transparent sheet, replacing said first plate with another plate on the set and impressing on said transparent sheet an impression of the second plate and comparing the superposed impressions to determine the discrepancy in registry of the two impressions, and trimming the edges of the second plate an amount sufficient to compensate for such discrepancies.

4. The method of registering a set of related stereotype printing plates for multicolor rotary printing which comprises positioning one of the plates of said set in a proof press and striking a proof therefrom and, without removing said proof from the proof press, positioning thereover a transparent sheet, replacing said first plate with another plate of the set and impressing on said transparent sheet an impression of the second plate and comparing the superposed impressions to determine the discrepancy in registry of the two impressions, trimming the edges of the second plate an amount sufficient to compensate for such discrepancies, and removing the impression from the transparent sheet by wiping or the like preparatory to making further checking impressions thereon.

5. The method of registering a set of related stereotype printing plates for multicolor rotary printing which comprises positioning one of the plates of said set in a proof press and striking a proof therefrom upon a proof sheet, replacing said first plate with another plate of the set and impressing an impression of the second plate on another proof sheet, comparing the two impressions with the two proof sheets superposed in accordance with the relative positions of the locating edges of their respective plates to determine the discrepancy in registry of the two impressions; and trimming the edges of one of the plates an amount sufficient to compensate for such discrepancy.

6. The method of registering sets of stereotype printing plates for use in rotary multicolor printing presses which comprises consecutively impressing proofs of the several plates in a set, superposing a pair of proof sheets, providing means for maintaining said proof sheets in the same relative position with respect to the impressions thereon as the plates from which they are struck, providing transparent means for simultaneously inspecting both superposed proof sheets to observe lack of registry, and trimming the edges of one of the plates to compensate for such lack of registry.

7. The method of registering sets of stereotype printing plates for use in rotary multicolor printing presses which comprises impressing a proof of one of the plates in a set, impressing a proof from another of the plates in said set, superposing said proofs, and providing means for maintaining said proof sheets in the same relative position with respect to the impressions thereon as the plates from which they are struck, providing transparent means for simultaneously inspecting both superposed proof sheets to observe lack of registry, and trimming the edges of said other plate to compensate for such lack of registry.

JOHN A. KOESSLER.
JOHN W. KOESSLER.
KENNETH L. KOESSLER.