E. E. NOVOTNY.

PRINTING PLATE REGISTRATION.

APPLICATION FILED JUNE 1, 1917.

1,377,511. Patented May 10, 1921.

4 SHEETS—SHEET 1.

Fig. 1.

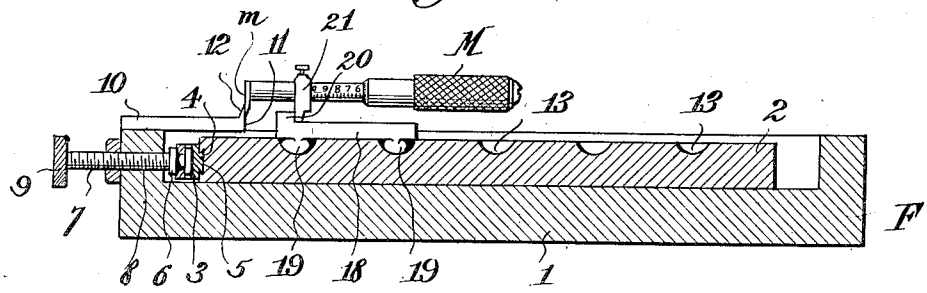
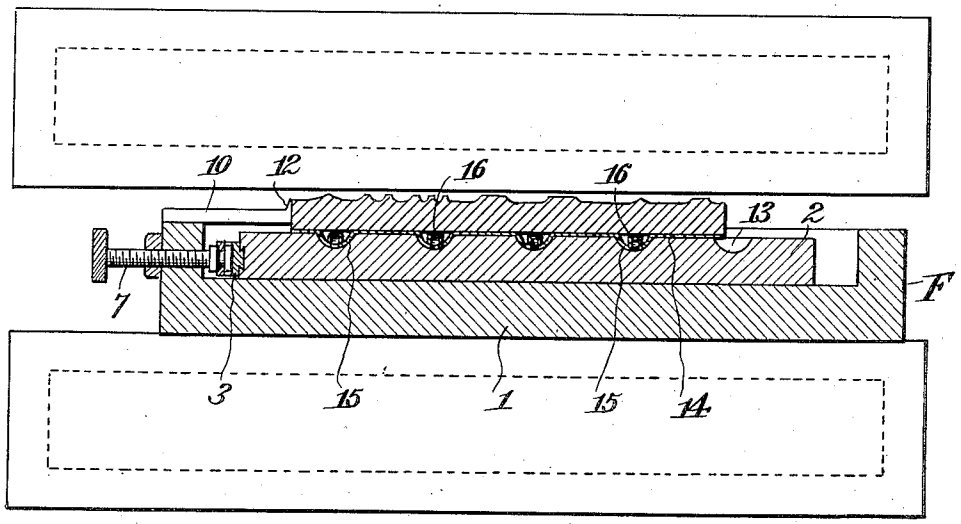


Fig. 2.



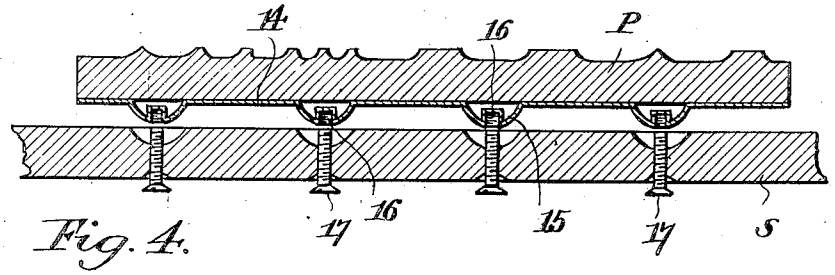


Fig. 4.

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4 SHEETS—SHEET 2.

Fig. 3.

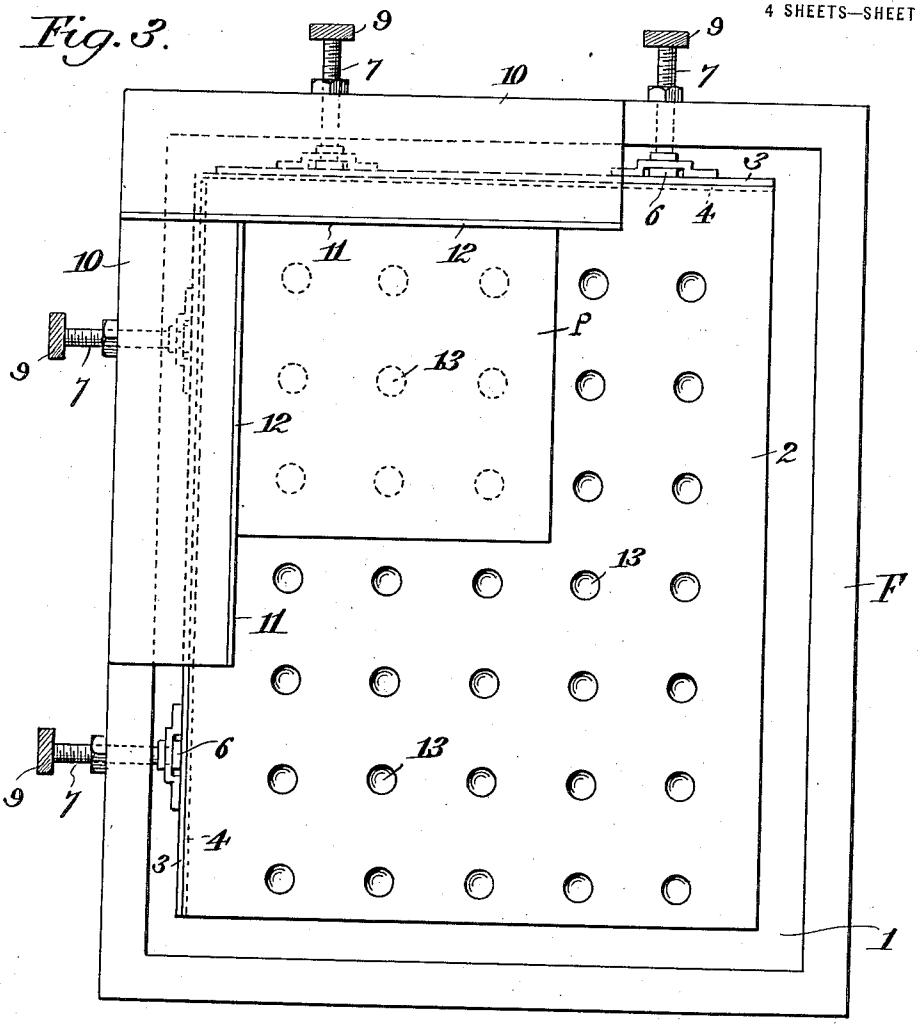
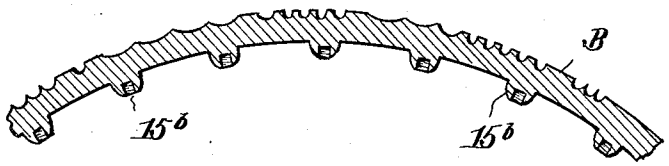


Fig. 7.



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4 SHEETS—SHEET 3.

Fig. 5.

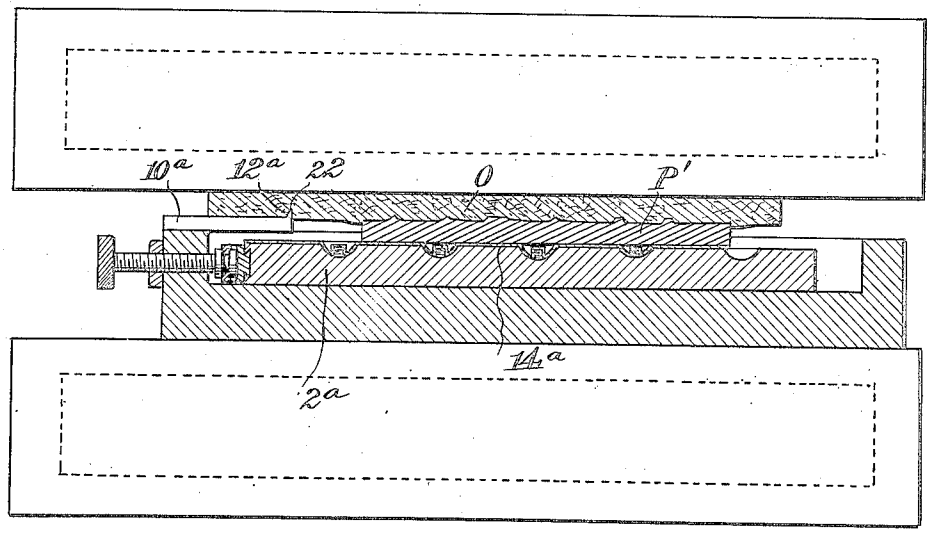
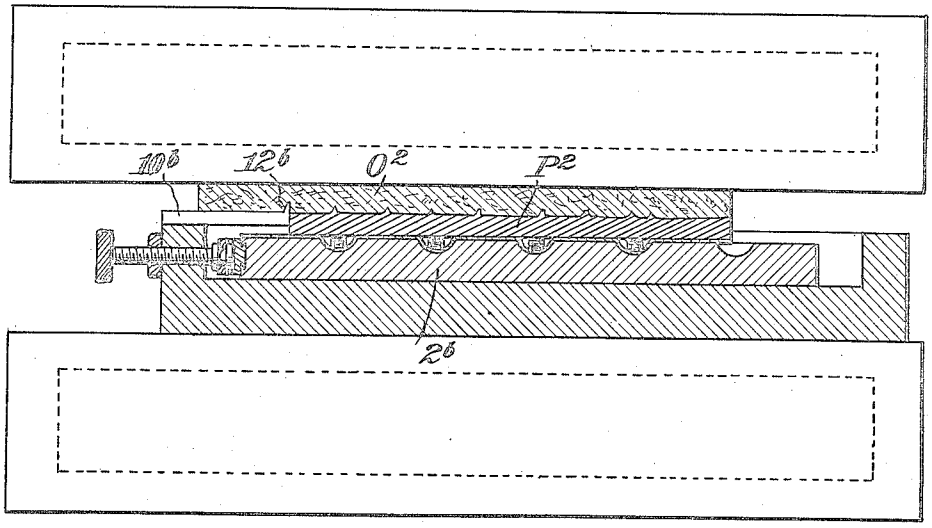


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 8.

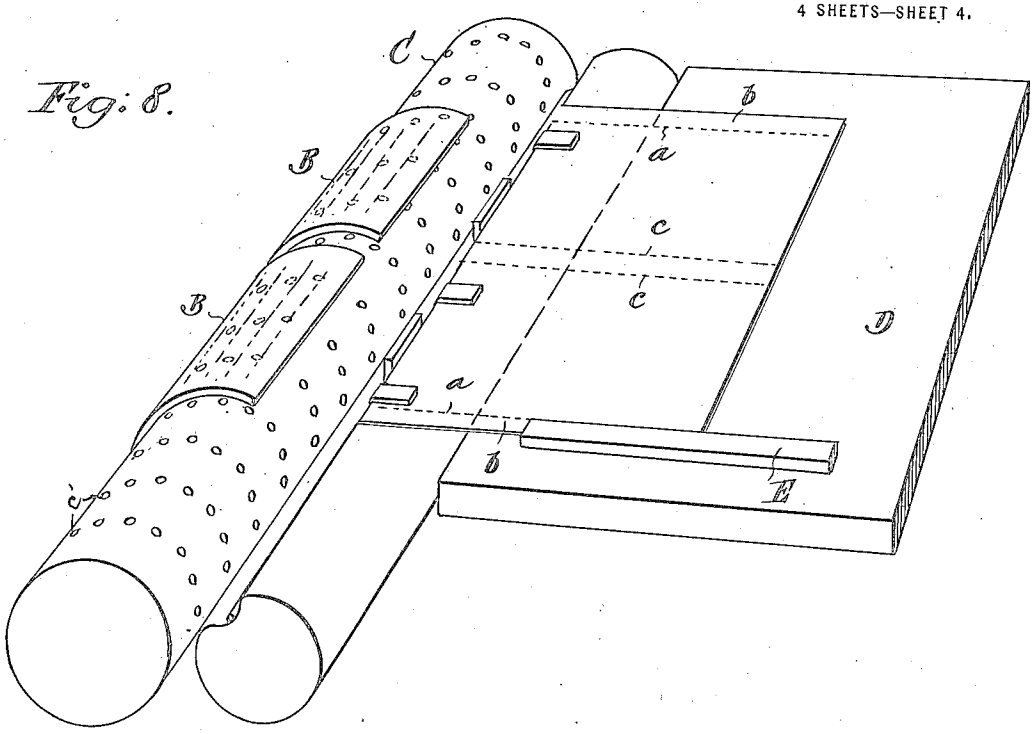
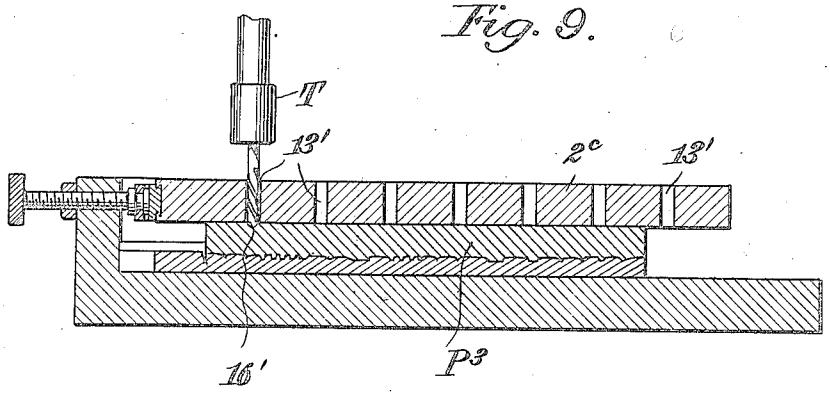


Fig. 9.



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UNITED STATES PATENT OFFICE.

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PRINTING-PLATE REGISTRATION.

1,377,511. Specification of Letters Patent. Patented May 10, 1921.

Application filed June 1, 1917. Serial No. 172,194.

To all whom it may concern:

Be it known that I, EMIL E. NOVOTNY, a citizen of the United States, residing at Riverside, in the county of Cook and State of Illinois, have invented new and useful Improvements in Printing-Plate Registration, of which the following is a specification.

This invention relates to the registration of printing elements, such as plates, cuts, etchings, type bodies, or the like.

As is well known in the printing art, the pressman in preparing the press for printing must, among other duties, undertake the tedious and technical operation commonly known as registration. This consists in properly placing the plates, cuts or the like on the press in such exact position that they will produce the proper printing impressions in predetermined spaces or locations on the paper or sheet. In the case of multicolor work, where the superimposition of various colors is necessary, care must be taken to so register the plates that they will print in proper sequence and at proper points or places on the paper or sheet. Therefore, in order to attain proper registration, a number of factors must be taken into consideration, such as the blank paper margin which is to exist between the printed matter and the edge of the sheet, the place on the sheet where a particular cut is to appear, the proper sequential superimposition of colors made with different plates, and other matters well known to skilled pressmen.

This work of registration not only requires the services of a highly skilled or expert pressman, but also necessitates the expenditure of a great deal of his time, and in addition, usually causes the press to remain idle while the registration process is being carried out.

In the present instance it is my purpose to prepare a printing plate or similar element for registration prior to its application to the press so that the usual labor, and consequently much of the expense, incident to such registration is obviated, by reason of the fact that the plate may be instantly and accurately positioned on the press in proper location ready for the printing operation and this registration may be made with exactitude of measurement as to paper margins, superimposition of colors and the like.

In my Patent No. 1,280,527, dated October 1, 1918, I have shown and described the registration of printing plates and the present invention deals with modifications and improvements thereof.

In the accompanying drawings,

Figure 1 is a cross sectional view through a jig adapted to be used in connection with the preparation of a printing plate for registration, and illustrating the use of a micrometer for determining a selected marginal measurement.

Fig. 2 is a view showing the jig in cross section with a printing plate thereon and illustrating the application of a registration plate to the back of the printing plate while in a press, such press being conventionally shown in elevation.

Fig. 3 is a top plan view of the jig base and jig plate and showing a printing plate positioned on the jig plate and abutting against the gage plates or stops carried by the jig base.

Fig. 4 is a cross sectional view taken through a printing plate with the registration plate applied thereto.

Figs. 5 and 6 are cross sectional views showing a registration matrix employed in conjunction with the jig for determining the position of the registration plate on the printing plate.

Fig. 7 is a cross sectional view taken through a modified form of printing plate which has been curved to fit on a cylinder press.

Fig. 8 is a diagrammatic view illustrating conventionally the application of curved printing plates in registered position on a printing press.

Fig. 9 is a modified arrangement for forming indications on the printing plate.

In order to obtain the rapid and exact registration of a printing plate upon its support on the press I provide means for enabling the printing plate to be instantly applied to such support so that a margin of the printing portion or type matter of the plate will coincide with a marginal line, imaginary or actual, on the paper or sheet being fed into printing relation to such plate. For example, if it is desired to print on a paper so that a blank margin of one inch will exist between the printed matter and an edge or edges of the paper, I provide means by which the printing plate may be so located on its support in the press, relative to the

paper being operated upon that this margin will be attained with exactitude without the necessity of frequent trials to secure proper alinement or registration. Of course where I speak of the paper margin or margins, it will be understood that this is to include various kinds of margins as are encountered in printing, such as those relating to column and cut arrangements, superimposition of colors when necessary, border margins, and the like.

There are a number of ways in which I may obtain instant registration, without successive trials, as above indicated, and in order to give a clear understanding of the invention, I will hereinafter specifically describe certain means for accomplishing this purpose, but I wish it to be understood that the invention is not limited to the specific means or methods recited as these may be varied without departing from the principle embodied in the invention.

Before entering into a detailed description of the invention, I will briefly state that one manner in which my purpose may be accomplished is to provide the printing plate support of the press, such as a form cylinder, or a flat bed, as the case may be, with certain indicating means which are adapted to coincide with certain other indicating means formed on the printing plate, these indicating means on the printing plate, preferably located at the back thereof, occupying a certain predetermined position relative to the printing portion at the front face of the plate, that is to say, to the type section of the printing plate.

The indicating means on the plate support of the press may be, as shown herein, in the nature of small sockets spaced selected and predetermined distances apart, for example one inch. The printing plate may be equipped with small projections or bosses likewise spaced apart distances corresponding to the spacing of the sockets of the support, that is to say one inch. The bosses on the back of the printing plate, however, should be located relative to the margins or edges of the field of the printing portion at the front of the printing plate so that when the latter is applied to the support with its bosses seating in the sockets of the support, the margins of the field of the printing portion of the printing plate will properly coincide with desired paper margins, imaginary or actual, on the paper to be printed upon.

Of course it is to be understood that other indicating means may be employed in lieu of the bosses and sockets.

To more fully understand the invention, reference may be had to the diagrammatic view in Fig. 8 wherein a plurality of curved plates are shown as located upon the form cylinder of a press. In this connection, I will state that in preparing the curved plates for a form cylinder, such plates may first be made in the flat form as shown in Figs. 1 to 6 inclusive, and then bent or curved, through suitable instrumentalities, such as by a mandrel or rollers, so that they will appear as shown at B in Fig. 8. If it is desired, for instance, to print upon a paper sheet with the side margins of the printed matter terminating at the dotted lines *a* so as to leave the blank paper margins *b*, and with the central or column margins as indicated at the dotted lines *c*, it is of course necessary to spot or register the plates B on the form cylinder C in such positions that the margins of the printing portions of the plates will print accurately to these margins of the paper. As the feed of the paper from the table D is governed by the usual paper stops E and consequently the paper travels in a predetermined path to the printing elements of the press, great care must ordinarily be taken to see that the plates B are adjusted or positioned to the minutest fraction of an inch to obtain the selected paper margins. Ordinarily this is done by visual registration, that is to say, the accuracy with which the printing plates are positioned on the support is dependent upon the eyesight and judgment of the pressman and perfect registration, as previously mentioned, is obtainable after numerous trials. In order to properly register the printing plates on the form cylinder to obtain this margin without the necessity of such trial registration, I may pursue the practice of operating upon the printing plate itself prior to its application to the press, as I will now proceed to describe.

I make use of an apparatus, such as a jig, which is indicated as an entirety by the letter F. The complete jig F embodies two parts, the jig base 1, and the jig plate 2, and therefore, where I herein use the term "jig," unqualified by any reference to the jig base or jig plate, I intend this term to include the complete jig made up of both the base and the plate. The jig plate 2 is intended to be moved in two directions, longitudinally and transversely of the jig base 1, and this may be accomplished in any suitable manner. For instance, referring to Figs. 1 to 3 I have shown an arrangement for shifting the jig plate, which includes the bars 3, each having a dovetailed tongue 4 engaging with a correspondingly dovetailed groove 5 in the adjacent edge of the jig plate 2, the grooved heads 6 of screws 7 engaging with the bars 3, each screw being threaded in a bore 8 in the jig base 1, and is turned by means of its milled head 9. I employ two of these bars 3, arranged at right angles to each other, one for a longitudinal side of the plate 2, and one for a transverse side thereof, and any number

of screws may be employed for operating each bar, depending upon the length of the latter. By means of the screws and bars, such as shown, the plate may be readily shifted longitudinally and transversely in the jig base to obtain the finest dimensions. On two adjacent top walls of the jig base 1, preferably where these walls form a corner of the base, I mount a pair of horizontal gage plates or stops, such as shown at 10, these flat plates or stops extending inward of the base and each is provided at its inner edge 11 with a small sharp flange 12. The inner edge 11 of each gage plate may be said to constitute a zero point in the sense that it is against this edge that the shoe *m* of the micrometer M is adapted to abut in taking a measurement for properly locating the jig plate on the base. This jig plate 2 is provided on its upper face with a series of small sockets 13 spaced selected distances apart, say one inch, the spacings of these sockets corresponding to the spacing of the sockets on the surface or field of the plate support which is a part of the printing press and is shown at *s*, Fig. 4, and also corresponding to the spacing of the bosses which are to lie at the back of the printing plate.

As shown in Fig. 4 the printing plate P is equipped with such bosses by forming the latter on a plate 14, which may be in the nature of thin sheet metal, the bosses 15 of the plate having threaded sockets 16 therein for the reception of screws 17 for fastening the printing plate to the plate support on the printing press. The boss plate 14 is intended to be temporarily placed on the jig plate 2 with its bosses 15 fitting in the sockets 13 of this jig plate, such boss plate being sweated onto the printing plate P while in the jig as shown in Fig. 2. However, although the bosses on the boss plate may be spaced to conform to the spacing of the sockets on the jig plate, and of course to the sockets of the plate support on the press, it is also necessary that the boss plate be so positioned at the back of the printing plate that the bosses when seated in the sockets of a predetermined field or surface portion of the plate support on the press, will bring the type margin or margins of the printing portion of the plate into coincidence with the paper margins, imaginary or actual, which may have been decided upon. This will be apparent when we consider that if, for example, the left-hand margin of the printing portion or type matter of a plate fell in a line directly between the two bosses, or two rows of bosses, such printing plate could not be properly positioned to a similar line on the paper to be printed upon were the outside row of bosses on the back of the plate set in one inch from this printing portion margin. In such case the printing portion margin instead of lining up with the selected paper margin would be thrown one-half inch inward or one-half inch too far to the left. Therefore, I must position the boss plate at the back of the printing plate so as to always insure the coincidence of the margins of the printing portion of the plate with the selected margins on the paper or sheet to be printed upon. This I accomplish as follows:

The edge walls 11 of the gage plates are intended to form the stops against which the adjacent edges of the printing plate P will abut during the sweating on of the boss plate as shown in Figs. 2 and 3, and in order to properly locate the boss plate the jig plate 2, which is to carry the boss plate during the sweating operation, must be shifted to a predetermined position on the base of the jig so that the centers of the sockets 13, which seat the bosses during the sweating operation will be a predetermined distance from the edges 11 of the gage plates 10. To accurately measure this distance the micrometer M is employed in conjunction with a removable templet 18 which is provided with a pair of bosses 19, spaced the same distance apart as the sockets, the shoulder 20 of the templet lying directly in the vertical central line of one of the bosses, and consequently one of the sockets 13 when the templet is applied to the jig plate as shown in Fig. 1. Thus by means of the micrometer the desired distance from the edge 11 of an adjacent gage plate 10 to the center of a socket 13 may be accurately measured, and the screws 7 may be turned to shift or move the jig plate 2 until the proper measurement has been obtained, which will be shown when the shoulder 20 of the templet is brought into contact with the slide 21 of the micrometer gage. Of course the jig plate is micrometrically adjusted in both directions, and when it has been properly positioned on the jig base 1, with the sockets predetermined distances from the gage plates, the templet may be removed and the boss plate 14 placed on top of the jig plate as shown in Fig. 2, and of course the bosses will thus bear a certain relation so far as position is concerned, relative to the gage plates 10.

With the trimmed marginal edges of the plate P abutting against the edges 11 of the gage plates 10, the platens of the press may now be closed, and heat applied to heat the jig and thus sweat the boss plate onto the back of the printing plate. In order to insure the adherence of the boss plate to the printing plate under the heating and sweating operation, a thin sheet of suitable material, such as tinfoil may be interposed between the two plates, which will cause an intimate uniting of the same, as is well known. Of course if the plate P is of a

plastic material, such as a phenolic product, a suitable cement, such as a phenolic cement, may be interposed between the printing plate and the boss plate to insure the adherence of the latter.

In the arrangement shown in Figs. 1 to 3, it will be noted that the proper positioning of the boss plate relative to the printing plate is obtained by placing the printing plate against permanent gage stops and then shifting the jig plate so as to bring the boss plate carried thereby into the desired dimensional relation to the printing plate. However, the same result may be obtained in other ways, for instance, as shown in Fig. 5, I may maintain the jig plate in a permanently set position, which may be known as a zero position, and so mount or arrange the printing plate that it may be placed above the jig plate in a location to cause the proper positioning of the bosses at its back. Such an arrangement, as will be hereinafter explained, would practically amount to shifting the printing plate relative to the jig plate. If desired, I may employ the method hereinafter described as pertaining to the arrangement illustrated in Fig. 6.

Turning to Fig. 5, for example, the jig plate 2^a may be brought to a permanent position on the base so that it occupies a fixed relation to one or more of the stationary gage plates 10^a, this being preferably accomplished by drawing the plate toward the sides of the box with its screws to the full extent of movement. Of course under such conditions the flange or spur 12^a of the gage plate will occupy a permanent fixed relation to the socketed jig plate, that is to say the distances from the centers of the sockets of the jig plate to the gage plate will be fixed.

Therefore, in order to locate the boss plate 14^a in selected position relative to the printing plate P', it will be necessary to arrange for the adjustment of the printing plate. This may be done by taking a sheet O which has been prepared in a proof press and there provided with a margin indication or register mark 22, and embedding the impression face of the printing plate in this matrix-like sheet so that the margin of the printing portion will be a predetermined distance from this register mark 22. With the printing plate and matrix sheet O thus assembled they may be placed on the jig so that the register mark 22 of the matrix sheet registers or seats the spur 12^a of the gage plate 10^a. This will cause the printing plate P' to occupy the desired position above the jig plate and relative to the boss plate seated on the jig plate. The sweating or cementing operation to fasten the boss plate to the printing plate may now be carried out as before mentioned. This arrangement of using a registration matrix or sheet and positioning the printing plate on the same relative to the registration mark thereof and then causing the registration of this mark with a permanent fixed gage located in fixed relation to the jig plate will be found especially useful in preparing plates for registration for use in multicolor work where it is necessary to superimpose a number of colors, or in cases where great accuracy in registering the printing portions of the plate is required, because with such practice we may disregard the trimmed edges of the non-printing part of the printing plate and secure accurate alinement with a predetermined margin by fixing with exactitude, for proper proofing, the distance where the printing portion of the printing plate will be relative to the registration mark on the matrix, or sheet carrying the printing plate when in the jig. In addition, the matrix or sheet O assists in holding the printing plate in fixed position during the sweating on operation.

Now in Fig. 6 I have shown the printing plat P^2 as applied to the register matrix or sheet O^2 as described for Fig. 5, but in this case, if desired the jig plate 2^b instead of being held in permanent or fixed relation to the flange 12^b of the gage plate 10^b, may be shifted or moved by its screw arrangement precisely as the jig plate shown in Figs. 1 to 3, inclusive, is shifted, so that in accurately fixing the printing plate for the proper location of the boss plate, the jig plate may be shifted, and then the matrix or sheet O^2 carrying the printing plate may be applied, as shown in said Fig. 6. This combination of methods enables me to obtain an exceedingly fine and accurate adjustment with a relatively small jig plate, in addition to providing for the great flexibility of dimensions.

In Fig. 9, instead of employing a boss plate, I provide the jig plate 2^c with holes 13', spaced predetermined distances apart, and after the printing plate P^3 has been placed in the jig and the jig plate properly adjusted, a suitable boring tool indicated at T may be used for drilling or boring sockets 16' in the back of the plate, these sockets being preferably threaded for the reception of suitable fastening screws for securing the printing plate to the support on the press, the sockets of course taking the place of the bosses heretofore described. The adjustment or location of the printing plate while in the jig may be accomplished as previously described.

Of course while I have herein described the printing plate as provided with either bosses, or sockets, it will be understood that any visual marks or markings, or trimming lines or edges may be made thereon for the

purpose of securing accurate registration on the press. Indeed, under some conditions, instead of providing the plate on its non-printing portions with a plurality of indications, I may simply accurately trim the edges of the plate to enable it to be at once spotted in a desired position of registration on the support of the press. Under such conditions, it will be convenient to mark the plate with indications along which the edges are to be trimmed and this may be done in any suitable manner, by means of a jig or otherwise. In fact, it may be done at the time of making the plate, the trimming marks being ascertained at the time of taking the proof of the matter to be printed, or the use of a gage against the printing matter in order to obtain such registration.

In Fig. 7 I have shown one of the curved plates B which in Fig. 8 are illustrated as applied to the form cylinder of a rotary press, the socketed bosses 15^b of such curved plate seating in the sockets of the cylinder or plate support C, these sockets being shown at c', suitable screws being employed for fastening purposes.

In preparing to register the plates, such for instance as shown in Fig. 8, the compositor may prepare a chart showing precisely the situation or position on the form or plate support of the press which a plate or plates are to occupy to give proper margins and the like on printed sheets. With this chart before him the layout man in charge of registration may prepare the printing plate as hereinbefore described to insure that the plate will register with the exact position pointed out on the chart, and eliminating at the same time any guesswork or trial process in obtaining the registration.

While I have herein shown and described certain embodiments of my invention, I wish it to be understood that I do not limit myself to all the precise details set forth by way of illustration, as modification and variation may be made without departing from the spirit of the invention or exceeding the scope of the appended claims.

What I claim is:

1. An apparatus for positioning a printing plate on a boss plate for registration, comprising a jig plate provided with spaced registration indications to receive the bosses of the boss plate, and against which jig plate the boss plate is adapted to lie, and a gage stop mounted adjacent the jig plate and operatively associated therewith for engaging the printing plate.

2. An apparatus for positioning a printing plate on a boss plate for registration, comprising a jig base, and jig plate on the base provided with spaced registration indications and against which jig plate the boss plate is adapted to lie, and a stop carried by the jig base and operatively associated with the jig plate for engaging the printing plate.

3. An apparatus for positioning a printing plate on a boss plate for registration, comprising a jig base, a jig plate adjustably mounted on the jig base and provided with spaced registration indications to receive the bosses of the boss plate, and a gage stop carried by the jig base and operatively associated therewith for engaging the printing plate.

4. An apparatus for positioning a printing plate on a boss plate for registration, comprising a jig base, a jig plate mounted on the base and having means for receiving the bosses of the boss plate, and means for adjusting the jig plate laterally and longitudinally of the jig base.

In testimony whereof I have hereunto set my hand.

EMIL E. NOVOTNY.