Oct. 27, 1953 F. E. REILLY 2,656,790

MAKING READY CYLINDRICAL PLATE

Filed May 13, 1950 2 Sheets-Sheet 1

Fig. 1

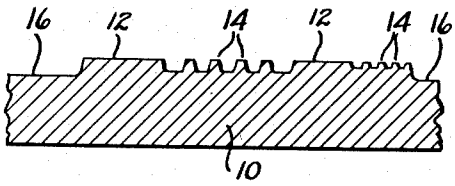


Fig. 2

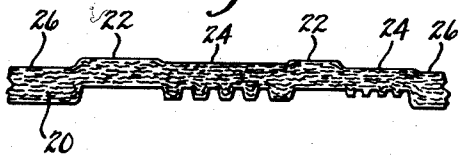


Fig. 3

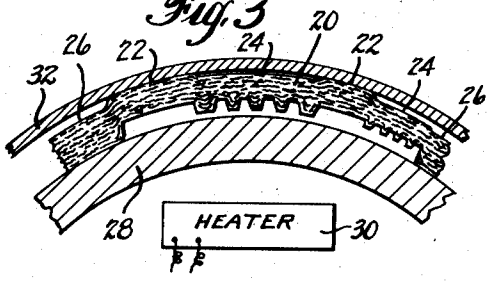


Fig. 4

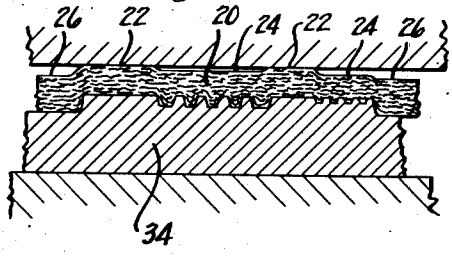
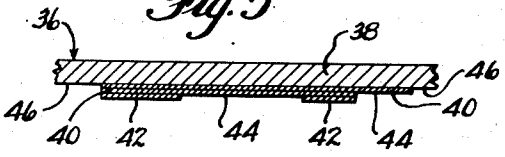


Fig. 5



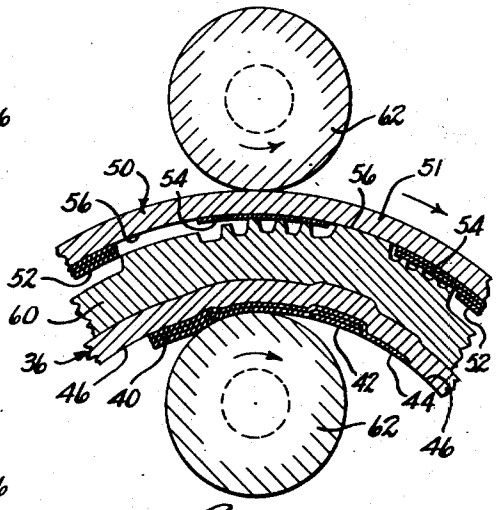


Fig. 6

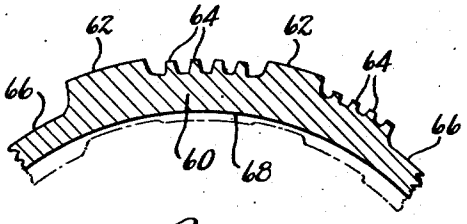


Fig. 7

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MAKING READY CYLINDRICAL PLATE

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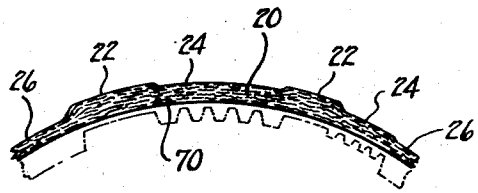


Fig. 8

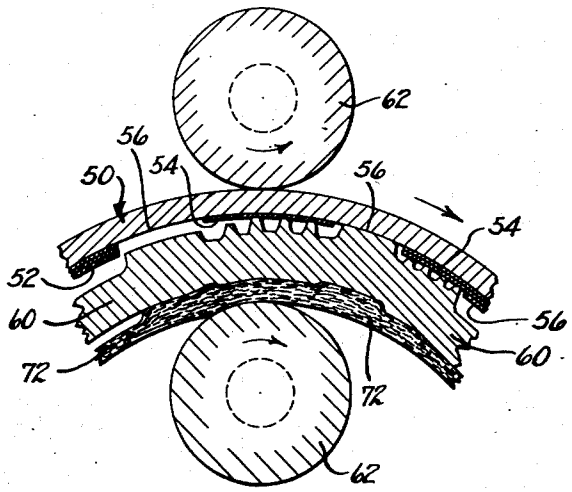


Fig. 9

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MAKING READY CYLINDRICAL PLATES

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Application May 13, 1950, Serial No. 161,848

11 Claims. (Cl. 101—401.3)

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The present invention relates to a novel and improved process of making-ready cylindrically curved relief printing plates.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the processes, steps and instrumentalities pointed out in the appended claims.

The invention consists in the novel steps, processes, instrumentalities and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, schematically illustrate two modes of carrying out the process of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a fragmentary, exaggerated, sectional view showing an original letterpress or relief printing plate which is to be duplicated as a cylindrically curved printing plate for rotary letterpress printing;

Figure 2 is a similar view of a mat produced from the plate of Figure 1;

Figure 3 is a sectional view showing the operation of drying, scorching and shrinking the mat of Figure 2;

Figure 4 is a view showing the casting of a stereotype from the shrunk mat;

Figure 5 is an exaggerated fragmentary sectional view of an underlay prepared from the plate shown in Figure 4;

Figure 6 is a fragmentary sectional view showing the bumping or making-ready of a cylindrically curved duplicate plate using the underlay of Figure 5;

Figure 7 is an exaggerated fragmentary sectional view of the made-ready plate produced by the process of the present invention;

Figure 8 is an exaggerated sectional view showing the mat of Figure 2 after it has been treated so as to be used as an underlay in accordance with the modification of the present invention; and

Figure 9 is a sectional view showing the bumping of the plate using the treated matrix of Figure 8 as the underlay.

The present invention has for its object the provision of a novel and improved method of making-ready cylindrically curved letterpress printing plates so as to prepare them for use on the plate cylinder of a rotary printing press. A further object of the invention is the provision

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of a process by which the preparation of an underlay for use in the bumping of cylindrically curved plates is facilitated and expedited, resulting in more economical made-ready and more accurate treatment of the cylindrically curved plates. Still another object of the invention is the provision of a process of preparing an underlay for a curved printing plate from the original of the plate which underlay will accurately register with the plate when it is positioned against the underside thereof.

The preparation of underlays for use in making-ready cylindrically curved relief printing plates heretofore has involved laborious, careful and expert preparation of an underlay from a proof of the original or duplicate plate, the size and position of the different areas of the underlay being changed from those of the original proof so that the underlay will be in correct radial register with the plate when the underlay is applied to the concave or underside of the plate. It has also been possible to prepare such underlays with mechanical aids, but this method requires the provision of special equipment not ordinarily found in the plate-making or printing establishment, and consequently such a process is not one of general application.

In the preparation of an underlay for a cylindrically curved plate of the size conventionally used for printing a magazine page, the underlay will be oftentimes as much as one-half inch shorter than the overlay or proof of the original, the difference in length between the original proof and the underlay being determined by the diameter of the cylinder, the length of the plate and the thickness of the plate. The difference in length must be distributed uniformly along the length of the underlay in order to secure the desired, correct radial register of the underlay with the plate.

In accordance with the present invention, the underlay is prepared from a stereotype mat of the kind which exhibits substantial and controllable shrinking in one direction only as the mat is dried and scorched. For this purpose the conventional "dry" flong is used, and is positioned on the original plate during the molding operation so that its shrinkage will be in a direction corresponding to the circumferential extent of the plate to be made-ready. Thus in the making-ready of an electrotype where the cylindrically curved plate is an accurate duplicate of the original plate, the mat would be molded from the original plate, and after shrinkage would be

used to form the underlay, by removal of the face of the mat so as to provide a smooth surface. Alternatively, a stereotype plate may be cast from the mat, and the stereotype plate proved on underlay stock, so that the proof impression forms an accurate guide in the cutting of the underlay. If the original plate is not available, or if the curved plate is to be formed by stereotyping, the stereotype mat to be used in forming the underlay would be molded from the duplicate cylindrically curved plate.

Referring now in detail to the accompanying drawings in which Figures 1 to 7 illustrate the present preferred and typical manner of carrying out the process of the present invention, Figure 1 shows a relief or letterpress printing form 10 which may be a type form or a photoengraving, having solid printing areas 12, areas of intermediate tone 14, and nonprinting areas 16. In a photoengraving the areas 12, 14 and 16 might correspond to the blacks, halftones and whites, respectively, while in a type form the areas 12, 14 and 16 would be the heavy bold letters, the fine light letters, and the non-printing areas, respectively.

A stereotype mat is prepared from the original form 10 in accordance with conventional stereotype practice, care being taken that the direction of shrinkage of the mat is known, and that the flong is so positioned on the form 10 that the shrinkage will be in a direction corresponding to the circumference of the printing cylinder on which the duplicate plate is to be mounted for printing. Such a stereotype flong usually comprises a sheet at least as large as the form 10, and about 0.050 to 0.100'' in thickness, the sheet being composed of a mixture of fibrous material and clay and being quite moist so that it is moldable under relatively heavy pressure. Such flongs are generally called "dry mats" and on drying exhibit almost no shrinkage in one direction but exhibit a controlled amount of shrinkage at right angles to the first direction, the amount of the controlled shrinkage depending upon the conditions of drying, particularly the time and temperature of drying so that a shrinkage of 3% to 6% or 7% in the length of the mat is easily obtained, while a shrinkage of less than 1% in the width of the mat occurs.

Figure 2 schematically illustrates a fragmentary section of the mat 20 as molded from the original form 10, and as will be seen the back of the mat is at several different elevations corresponding to the various portions of the original form 10. Thus, as shown, the areas 22 overlying the solid portions 12 are the highest, the portions 24 overlying the intermediate tones 14 are of intermediate elevation while the areas 26 overlying the white or nonprinting areas are the lowest. The difference in elevation between the portions 22 and 26 are produced by resiliency of the padding used in molding the mat 20, this padding usually being in the form of a blanket or a thick layer of newsprint positioned between the flong and the upper platen of the molding press. While shown exaggerated, the difference in elevation between the portions 22 and 26 in actual practice will amount to only a few thousandths of an inch.

After the mat 20 has been molded in the manner described, the mat is removed from the form 10, and is thereafter dried and scorched, the latter operation being one in which the mat is heated for a period of from five to fifteen minutes at a temperature of from 250° to 400° F. This operation is shown schematically in Figure 3 where the mat 20 is positioned face down upon a cylindrically curved metal shell 28 which is heated by a suitable heater 30, the mat being held to conform to the shell 28 by means of a cover member 32. When the drying and scorching operation has been completed, the mat has shrunk along its circumferential direction and is then used for the casting of a conventional stereotype plate 34 which may be either a flat plate or a cylindrically curved plate. In casting a flat plate from a mat which has been scorched in a cylindrical shape, the mat may be flattened out and then used in a conventional flat casting box, or alternatively the mat may be flattened and scorched in a flattened condition. The stereotype plate 34 is an accurate reproduction of the original form 10 except that the plate 34 is shorter along the direction of the circumference of the eventual printing cylinder.

The stereotype plate 34 is then proved on a sheet of underlay stock 36, which underlay stock usually comprises a relatively heavy sheet of hard paper 38, such as manila tag, on which are provided one or more layers of thin paper 40, the thin layers usually being about .002 or .003 of an inch thickness. Preferably the underlay stock is of the kind disclosed in the prior patent to Bishop No. 2,088,398, although any conventional underlay stock may be used. The proof of the stereotype plate 34 on the underlay stock 36 forms an accurate guide which may be rigorously followed by the operator in cutting through the thin layers 40 for their removal. When completed, the underlay comprises the heavy sheet 38, and the overlying adherent layers 40 which have been removed in portions to provide relatively thick areas 42 corresponding to the solids 12, areas of intermediate thickness 44 corresponding to the intermediate tones, and areas of minimum thickness 46 corresponding to the whites or nonprinting areas 16.

The underlay which is shown schematically and in exaggerated form in Figure 5 may be used in that condition as a press underlay, in case the plate is not to be bumped, and in that case the underlay is positioned on the concave back of the finished cylindrically curved printing plate in register with the various areas of the plate, and remains with the plate as it is clamped to the printing cylinder and thereafter printed.

However, the underlay is preferably used for the bumping of the cylindrically curved press plate, and for this purpose is similarly mounted on the concave or backside of the cylindrically curved electrotype or other duplicate plate in radial register with the design on the face of the plate. In case the plate is to be bumped, a conventional overlay is prepared, and comprises a sheet of uneven thickness which, except for its circumferential length, is the complement of the underlay. Such an overlay 50 is shown in Figure 6 and includes a heavy base sheet 51 on which the areas of thin paper form the thick areas 52, the areas of intermediate thickness 54, and the areas of minimum thickness 56 corresponding to the areas 16, 14, and 12, respectively of the original form 10, and likewise corresponding to the areas 42, 44 and 46, respectively, of the underlay 36. The overlay is positioned on the face of the electrotype or other cylindrically curved plate 60, and the assembly comprising the underlay 36, the overlay 50 and the plate 60 are passed through a pair of powerful pressure rollers 62

which are adjusted to exert high pressure on the assembly so as to deform the plate **60** in accordance with the thickness of the various portions of the underlay **36** and the complementary overlay **50**. In this operation the underlay **36** and the overlay **50** act as male and female dies and after the bumping operation has been completed, a plate is produced which is schematically shown in Figure 7. As there shown, the solid areas **62** have been raised above the intermediate printing areas **64**, and the areas **62** and **64** are both raised with respect to the whites or nonprinting areas **66**. The bumped plate **60** is then finished by shaving or boring its concave or rear face so as to provide a truly cylindrical concave face **68** which corresponds accurately in curvature to the surface of the printing cylinder on which the plate is to be mounted and printed. As shown by the dot-dash line in Figure 7, the portion of the plate indented by the underlay **36** during the bumping operation is completely removed during the boring or shaving operation which reduces the plate to the desired final thickness.

In accordance with the modified form of the process of the present invention, the underlay is prepared directly from the dried and scorched mat upon completion of the operation shown in Figure 3. In accordance with this modification of the invention, the mat **20** with its back having the areas **22**, **24** and **26** corresponding to the solids, intermediate tones and highlights or nonprinting areas of the original form, is treated to remove its face and to provide a smooth, flat or cylindrically curved surface **70**. This operation of removing the molding face of the mat may be performed in any desired manner, as by milling or grinding, and Figure 8 of the drawing shows the dot-dash lines the portion of the molding face of the mat which is thus removed. The dried, scorched and shrunken mat **20**, the molding face of which has been removed to provide a smooth surface, now forms an underlay **72** and is positioned against the back or concave face of the cylindrically curved plate **60** in radial register with the plate and with the overlay **50**. With the parts in this position, the plate underlay and overlay are passed between the powerful pressure rollers **62** so as to deform the plate **60** after which the irregularities in the concave back of the plate **60** are removed by boring or shaving to produce a plate similar to that shown in Figure 7.

The invention in its broader aspects is not limited to the specific process and steps shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. The process of preparing an underlay for making ready a cylindrically curved relief printing plate which comprises forming a stereotype mat from a printing plate or form of the same size and design as the plate to be made ready and a flong which shrinks on drying principally in a direction circumferentially of the cylindrical plate to be underlaid, drying the mat until the mat is in substantial radial register with the concave face of the curved plate with which it is to be used and forming from the mat an underlay having thicker portions corresponding to the solid printing areas of the curved plate and in radial register therewith.

2. The process claimed in claim 1 in which the back of the mat is raised and the face of the mat is removed to provide a smooth surface.

3. The process of making ready a curved plate which comprises producing an underlay in accordance with claim 2 and using it with a complemental overlay to bump the curved plate.

4. The process claimed in claim 1 in which a stereotype is cast from the shrunk mat, the stereotype is printed on a sheet of underlay stock which is then cut to form an underlay in accordance with the printed impression thereon.

5. The process of preparing an underlay for making ready a cylindrically curved relief printing plate which comprises forming a stereotype mat from a flat printing plate or form of the same size and design as the plate to be made ready and a fibrous and slightly moist flong which shrinks on drying principally in a direction circumferentially of the cylindrical plate to be underlaid, drying and scorching the mat until the mat is in substantial radial register with the concave face of the curved plate with which it is to be used and forming from the mat an underlay having thicker portions corresponding to the solid printing areas of the curved plate which will radially register with the curved plate to be underlaid.

6. The process claimed in claim 5 in which the back of the mat is raised and the face of the mat is removed to provide a smooth surface.

7. The process claimed in claim 5 in which a stereotype is cast from the shrunk mat, the stereotype is printed on a sheet of underlay stock which is then cut to form an underlay in accordance with the printed impression thereon.

8. The process of making ready cylindrically curved relief printing plates which comprises forming a stereotype mat from a printing plate or form of the same size and design as the plate to be made ready and a flong which shrinks on drying principally in a direction circumferentially of the cylindrical plate to be underlaid, drying the mat until the mat is in substantial radial register with the concave face of the curved plate with which it is to be used and forming from the mat an underlay having thicker portions corresponding to the solid printing areas of the plate which will radially register with the curved plate when used as an underlay, forming an overlay for the curved plate having thicker portions corresponding to the nonprinting areas of the curved plate, positioning the overlay over the face of the cylindrically curved plate and the underlay on the back of the cylindrically curved plate and deforming the plate by pressure applied radially of the plate to be made ready to raise the solid areas of the printing face of the curved plate.

9. The process claimed in claim 8 in which the back of the mat is raised and the face of the mat is removed to provide a smooth surface.

10. The process claimed in claim 8 in which a stereotype is cast from the shrunk mat, the stereotype is printed on a sheet of underlay stock which is then cut to form an underlay in accordance with the printed impression thereon.

11. The process of making ready cylindrically curved relief printing plates which comprises forming a stereotype mat from a flat printing plate or form of the same size and design as the plate to be made ready and a fibrous and slightly moist flong which shrinks on drying principally in a direction circumferentially of the cylindrical plate to be underlaid, drying the mat until the mat is in substantial radial register with the concave face of the curved plate with which it is

to be used and forming from the mat an underlay having thicker portions corresponding to the solid printing areas of the curved plate, which will radially register with the curved plate when used as an underlay, forming an overlay for the curved plate having thicker portions corresponding to the non-printing areas of the plate, positioning the overlay over the face of the cylindrically curved plate and the underlay on the back of the cylindrically curved plate and deforming the plate by pressure applied radially of the plate to raise the solid areas of the printing face of the curved plate.

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