May 9, 1950 R. R. MYERS, JR 2,507,347

METHOD OF PRODUCING ARCULAR PRINTING PLATES

Filed Dec. 26, 1947 2 Sheets-Sheet 1

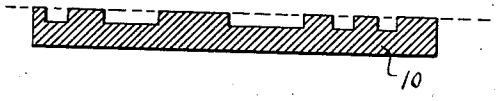



Fig. 1.

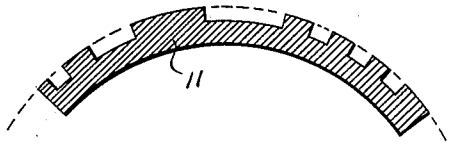



Fig. 2.

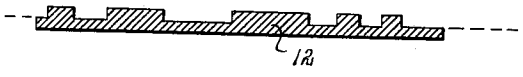



Fig. 3.

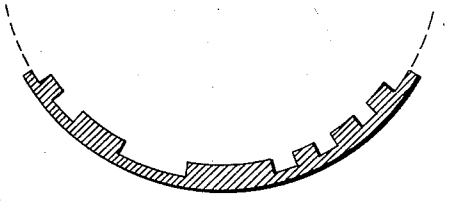


Fig. 4.

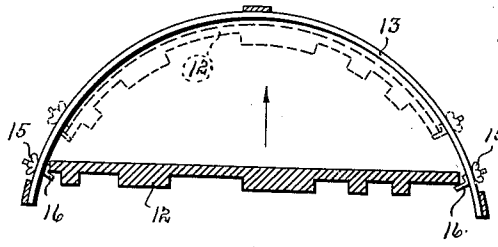



Fig. 5.

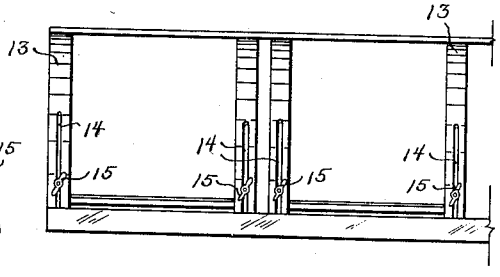



Fig. 6.

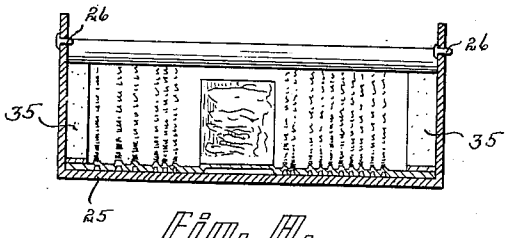



Fig. 8.

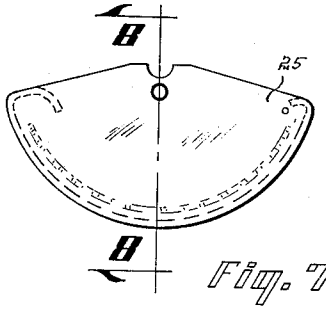



Fig. 7.

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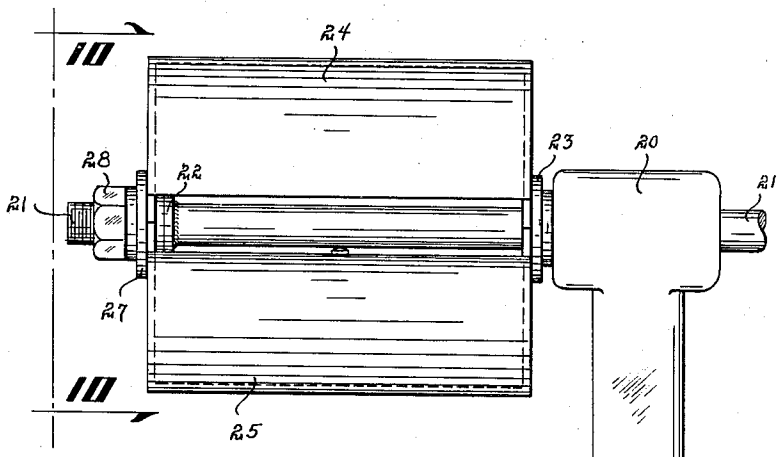



Fig. 9.

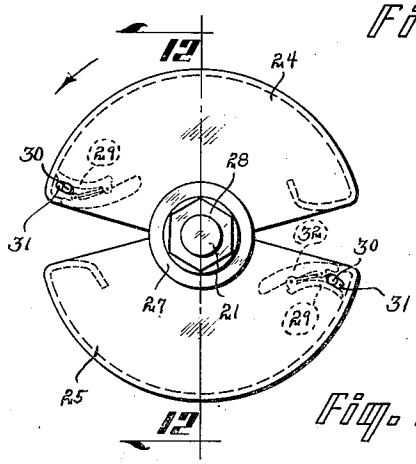



Fig. 10.

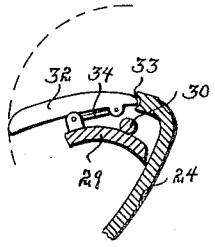



Fig. 11.

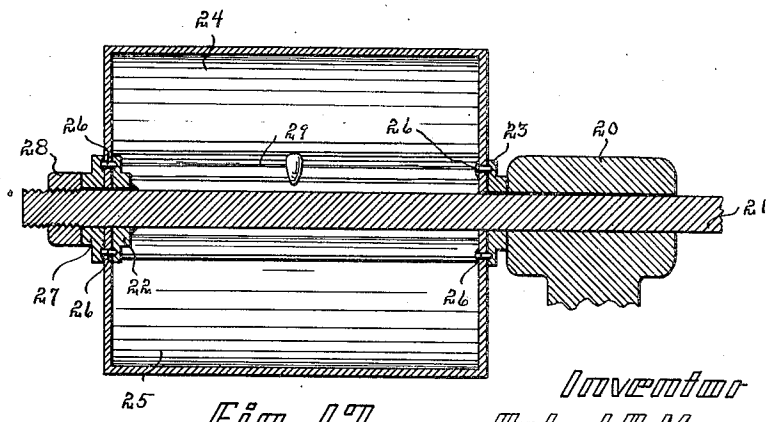



Fig. 12.

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## METHOD OF PRODUCING ARCULAR PRINTING PLATES

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Application December 26, 1947, Serial No. 793,807

3 Claims. (Cl. 22—200.5)

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The principal object of my invention is to provide a method of producing arcular printing plates without appreciable distortions thereby making for printing fidelity and accurate color registry in multi-color printing.

A further object of this invention is to provide a method of producing arcular printing plates that is economical and a saving in time, material and labor.

A still further object of my invention is to provide a method of producing arcular printing plates that permits the use of harder, stronger and more durable material.

A still further object of my invention is to provide a method of producing precision curved printing plates that requires relatively inexpensive equipment.

A still further object of my invention is to provide a simplified method of making arculate printing plates that eliminates a considerable amount of the skilled workmanship now required by present methods.

These and other objects will be apparent to those skilled in the art.

My invention consists in the method, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a cross-sectional view of an ordinary printing plate.

Fig. 2 is a cross-sectional view of the printing plate of Fig. 1 after it has been bent into a curved or arcuate printing plate.

Fig. 3 is a cross-sectional view of a plastic or like mold, used in my method.

Fig. 4 is a cross-sectional view of the mold or matrix as shown in Fig. 3, after the same has been curved.

Fig. 5 is an end view of a means for bending a mold or like into an arc and so holding and supporting it for purposes of forming shell replicas by electroplating.

Fig. 6 is a side view of the device shown in Fig. 5.

Fig. 7 is an end view of one of the trays of my centrifugal casting machine.

Fig. 8 is a longitudinal sectional view of one of the centrifugal casting trays and is taken on line 8—8 of Fig. 7.

Fig. 9 is a side view of my centrifugal casting machine.

Fig. 10 is an end view of the machine shown in Fig. 9 and is taken on line 10—10 of that figure.

Fig. 11 is a side view of one of the gates used on the two trays of the centrifugal machine.

Fig. 12 is a longitudinal sectional view of my centrifugal casting machine taken on line 12—12 of Fig. 10.

Nationally known magazines and newspapers

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are printed by rotating cylindrical presses. This means that the printing plates must be arcular. The present method is to take a soft metal printing plate 10 such as shown in Fig. 1, and then hammering and bending it into an arcular plate 11 as shown in Fig. 2. Obviously this is slow and tedious work and the distortion of the printing plate is inevitable. Furthermore, it will be noted in Fig. 1, that the tops of the projections is the printing surface and that when the plate is bent into a curved printing plate as shown in Fig. 2, the tops of the projections will be spread further apart from each other. This objectionable spreading and further distorting of the printing surface points is caused by the stretching of the printing face surface and the contracting of the back of the plate, necessary in the bending of the plate into an arc. While the use of very soft metal aids in the easy bending of the plate, it really promotes certain distortions and "highs" and "lows" are most common. While rotary high speed printing presses have been accepted by all major printers as the ideal method of quantity printing, their main problem has been the obtaining of precision curved printing plates. Usually such printers depend upon commercial plate markers (electrotypers) for his plate supply. As above noted, however, accurate curved printing plates, under present methods of production are almost impossible, due to the stretching and distorting of the printing face and the damaging and distorting of the plate proper when it is bent into a curved plate from a flat plate. This objectionable distortion is even more serious and accentuated in making color plates register and especially is this true when the plates to be made had colored illustrations in combination with type, rules, or like. Obviously the skeletonized or open portions of the plates do not stretch uniformly with the flat halftone or solid portions. Even in the making of partially accurate plates, the following equipment is used: a bending machine, a special solidifying machine, a special plate shaving machine, a special curved plate proof press, male and female saddles, and special curved finishing tools for plate correction. Besides this, is the time, labor, and material costs. I have overcome such problems by a simple method, requiring few special tools, but producing an accurate precision curved printing plate. In my method I first take a plastic or like mold or matrix 12 shown in Fig. 3. Such molds are common in the art and the printing face is not at the top of the projection as is in the printing plate 10, but is in the valleys, or between the projections. This fact is important to my method. My first step is to take the mold 12 and curve or bend it into an arc as shown in Fig. 4. Obviously, as the printing points are between the projections, they will be little, if any, affected by this bending ac-

tion. Furthermore, such plastic or like molds bend readily, and quite uniformly. Any suitable device may be used to bend such molds. In Figs. 5 and 6, I show one means which consists of a frame 13, bent into the desired arc and having elongated slits 14, extending transversely of its width. The numeral 15 designates a thumb screw extending through the slits. The numeral 16 designates a hook on the inner end of each of the thumb screws. To bend a mold it is first placed in the frame as shown in Fig. 5, and then two or more of the thumb screws are slid upwardly to bring the mold into a curved condition as shown by dotted lines in Fig. 5. The thumb screws are then tightened and the device used as a frame support or jig for the next step in my method. This next step is the making of an electroplate shell from the mold. Any known method of making this shell may be employed, such as rendering the mold electro-conductive (accomplished usually by spraying a layer of silver or like metal thereon) the electro-plating of the mold (accomplished usually by an electro-plating bath of copper or like metal) to produce a shell-like replica of the original, and lastly the removal of the shell from the mold.

At this point in my method it will be noted that this shell replica will be curved and have little if any distortion and certainly no stretch distortion of the printing face. This is due to the fact that the valleys of the plastic or like mold were the printing face surface, and were not materially affected by the curving of the mold. The printing face points of the replica shell, however, are its high projections, but these are not stretched or distorted because the shell was formed originally in the required curve, and thereafter never bent. Obviously, therefore, the replica shell is free from distortions caused by bending and stretching. This fact is a most important phase of my method. From this point in my method we start with a perfectly curved precision printing shell as distinguished from the previous recited method of starting from a flat printing plate and stretching and bending it into a curve. In making duplicate shells, it is merely necessary to run off as many shells as desired from the plastic or like mold. Obviously, each of these shells will be exact duplicates in both indicia and curvature. In the old method of making curved printing plates it would be physically impossible to produce exact duplicates inasmuch as the bending and stretching of the flat printing plates would produce different distortions in the various plates being bent and stretched.

The next phase in my method is to back the curved shell with a suitable backing metal. Any standard procedure may be employed, such as applying a suitable liquid flux to the back of the metal shell, placing a layer of solder or tinfoil on the same, and lastly melting the solder or tinfoil and backing the shell with a thick layer of molten metal such as electrotype backing metal. The item when cooled provides a precision curved printing plate. As the plate is cast in a curved shape requiring no later bending or stretching, it need not necessarily be formed of the relatively soft electrotype backing metal. In fact, much tougher and harder metal may be used. The curvature of the plate will depend upon the curvature of the frame or like shown in Fig. 5. Different rotary presses have different diameters requiring therefore plates of different curvatures. This may be easily provided for by having different frames 14 of varying degrees of arc. By



the use of my method, the printing plate is substantially perfect and little, if any, work is required upon it before it is placed on the press.

Any suitable method may be employed to back the shells, such as by injection molding, centrifugal molding, or like. In the drawings I show a centrifugal casting machine which I have designed especially for this work, and which I will now describe.

The numeral 20 designates a bearing support. The numeral 21 designates a shaft rotatably mounted in said bearing support. The numerals 22 and 23 designate two spaced apart plates rigidly secured on the shaft. The numerals 24 and 25 designate two duplicate holding trays, each having studs 26 in their end pieces. These studs pierce the two plates 22 and 23 and thereby secure and hold the trays around and to the shaft in opposed diametric positions as shown in Fig. 10 and Fig. 12. The inside bottoms of each of these trays extend in a perfectly curved arc corresponding to the arc of the frame shown in Fig. 5 and the arc desired of the finished curved printing plate. The diametrically opposed trays are rigidly secured by the washer 27 and nut 28 on the shaft as shown in Fig. 12. The edges of trays are curved inwardly as shown in Fig. 10 to hold the molten metal to be centrifugally cast. If desired a gate as shown in Fig. 11 may be employed at one of the marginal edges of each of the trays to not only hold the molten metal during the operation, but to facilitate the placement of the shell therein and the removal of the plate after casting. The gate proper is designated by the numeral 29 and is elongated and curved as shown in Fig. 10. This portion 29 is secured to a rod shaft 30 which has its two end portions extending through slots 31 in the two sides of the tray to which it is secured. A manually operated lock handle 32 is employed which has its inner end detachably engaging a depression 33 in the marginal edge of the tray as shown in Fig. 11. The numeral 34 designates a link connection having one end hinged to the gate 29 and its other end hinged to the handle 32. When the device is placed as shown in Fig. 11 the gate will be held in proper closed position. By manually releasing the handle, the gate however may rotate with its supporting rod shaft to an out of the way position for the removal of the finished plate, or to place a shell within the tray. To use my centrifugal casting machine a shell is placed in each of the trays. In order that molten metal will not run between the bottom surface of the tray and a shell, I mask the edges of the shell with strips of asbestos tape or like 35 as shown in Fig. 8. After the shells are properly placed within the trays, the molten backing metal is placed therein and the shaft 21 rotated by any suitable power. Obviously, the metal will evenly spread out over the shells inasmuch as the inside bottoms of the trays are perfect arcs in ratio to the dead center of the shaft 21. This arc of the inside bottoms of the tray is predetermined to correspond correctly to the diameter of the rotary press to which the finished curved plates will eventually be attached. Several advantages are present in the use of centrifugal casting. The rotating trays will aid in quickly cooling and solidifying the backing metal. The speed of rotation of the shaft will determine the centrifugal pressure, necessary to properly form the curved plate. This means a selection of pressure in the casting process. Furthermore, centrifugal casting will purify the backing metal. As the heavier matter will move outwardly, all

air bubbles or light impurities will be forced rearwardly. Still another advantage (also present in injection molding) is that the resultant pressure will force and hold the shell tightly against the inside bottom of the tray, which as we have seen is a perfect arc. This means precision curved plates made quickly, easily and inexpensively.

As soon as the casting has hardened, the printing plate is removed and very little additional work upon it is necessary prior to its installation on a press.

A modified method of this invention is to take a mold of suitable material such as stereotype matrix and place it inside a rotating tray producing centrifugal force. The molten material is introduced in the usual manner and when cooled is removed and the mold then removed from the casting.

In making the centrifugal trays, care should be taken to insure their ends being at a right angle to their longitudinal axes in order that the same may be used as accurate guides in the proper and straight placement of the shells within the trays. After the shells have been placed in the trays their edges are always masked with suitable tape as shown in Figure 8 to prevent molten metal from getting between the shell and inside bottom of the tray. However, this masking also provides for the successful use of various sizes of printing plates in a given pressure casting machine. Another advantage I find in the use of my machine is that the centrifugal pressure can easily be regulated, but in any event should not be of such pressure that will damage or flatten the relief indicia of the shell. This is not true of past processes and is most important inasmuch as in my method there is no necessity after the printing plate has been formed to route out or hand tool parts that may have been crushed or distorted during the casting phase. This is indeed most important for still another reason, i. e. as no finishing work is necessary on the indicia after casting, a much tougher or stronger metal may be used in the plating and making of the shell. Here before it has been customary to make the shell of soft metal such as copper or nickel in order that the indicia may be hand finished and worked after it has been formed. Obviously such soft metal does not have long life and in many instances it is desirable to chrome plate the shell after it has been so formed and worked. This, however, is not only a slow and costly procedure but the printing face is often distorted or damaged by necessary handling, cleaning, polishing and like. In my method, however, this final finishing of the indicia is unnecessary and the shell may be originally formed by plating the mold with hard metal such as chromium. When a shell is so made it not only is accurate and of long life but will not be damaged by handling or by the application of a backing metal. Another advantage of my method is the lack of bend or buckle during the application of the hot backing metal. This is due to the curvature of the shell and to the pressure casting. In the past method, the shell is laid flat and the backing metal poured over it. Due to heat the shell would tend to buckle, and it has been a difficult task to hold the same down at all points until the backing metal cooled. Obviously, in my method my shell has little or no tendency to curve or buckle, due to its curved shape.

Any adhesive, or method or means may be employed to cause the backing metal to adhere to the shell. While I have referred to the backing material as metal, obviously it may be of any suitable material.



In the past, a great deal of work has been necessary to finish a curved plate for printing purposes. This is generally known as "make ready." Not all such work is due however, to the problems present in heretofore methods of making printing plates. It is often desired to lighten or darken certain indicia relative to the balance indicia, in order to produce certain printing effects. Many methods have been tried to this end, but with my method of producing curved plates, the procedure is most simplified. I merely place a thin sheet of suitable material between the indicia to be lightened of the shell and the indicia bottom of the case or tray of the pressure molding machine. The shell will be moved (by the pressure) against the inside of the case or tray, but this thin sheet will hold that part of the shell slightly away from case or tray and result in a very slight "Low" area. In the case of casting direct from the mold, (known as "stereotyping") the sheet is placed between the back of the mold and the inside of the case or tray.

Some changes may be made in the construction and arrangement of my method of producing arcular printing plates without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified methods or use of mechanical equivalents which may be reasonably included within their scope.

In my method the mold is held in a firm curved condition while the shell is being formed. This is important as no warping of the mold will take place during the plating phase. In previous methods the shell is formed with the mold in a flat condition, but it is impossible to hold a flat mold against warpage during the plating phase.

I claim:

1. The method of producing curved printing plates, comprising the placement of a curved member having printing indicia in a pressure casting machine having a curved molding compartment with its outer curved surface adjacent the inner curved surface of the molding compartment, the employment of a sheet member between the outer curved surface of said curved member having indicia and the inner curved surface of the molding compartment, the placement of a material for casting into the molding compartment of the pressure casting machine and in contact with that curved side of the curved member having indicia that is opposite to its side that is in contact with the sheet member, and lastly the removal of the resultant cast from the pressure casting machine and the sheet member from the curved member.

2. The method of producing curved printing plates, comprising the placement of a curved printing shell originally formed by electroplating on a curved mold in a pressure casting machine having a curved molding compartment with the outer curved printing surface of the curved shell adjacent the inner curved surface of the molding compartment, the employment of a material having a thickness between at least a part of the outer printing surface of said shell and the inner curved molding compartment of the pressure casting machine, the placement of a material for casting into the molding compartment and in contact with the inner curved side of said sheet which is opposite from its outer printing surface, permitting the casting material to solidify and permanently adhere to

the inner back curved surface of the shell, the removal of the cast from the pressure casting machine and the material having a thickness from the printing outer face surface of the shell.

3. The method of producing curved printing plates, comprising the placement of a curved printing shell originally formed by electroplating on a curved mold in a centrifugal casting machine having a curved molding compartment with the outer curved printing surface of the curved shell adjacent the inner curved surface of the molding compartment, the employment of a material having a thickness between at least a part of the outer printing surface of said shell and the inner curved molding compartment of the centrifugal casting machine, the placement of a material for casting into the molding compartment and in contact with the inner curved side of said sheet and which is opposite from its outer printing surface, permitting the casting material to solidify and permanently adhere to the inner back curved surface of the shell, the removal of the cast from the centrifugal casting machine and the material having a thickness from the printing outer face surface of the shell.



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