E. E. NOVOTNY.

PRINTING PLATE.

APPLICATION FILED MAY 5, 1917.

1,377,509. Patented May 10, 1921.

Fig. 1.

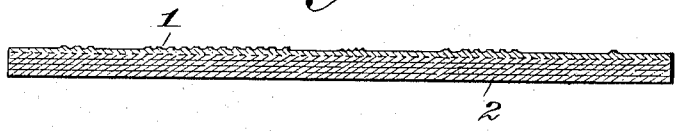


Fig. 2.

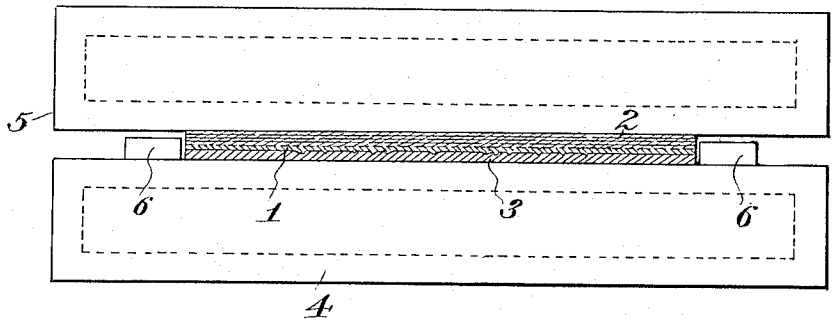


Fig. 3.

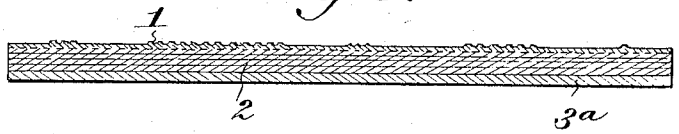
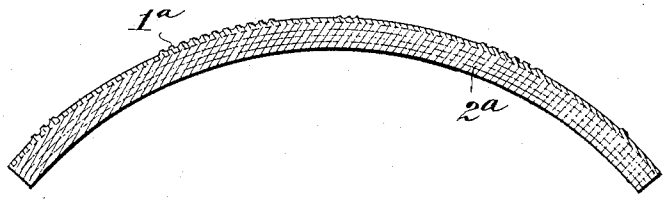


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PRINTING-PLATE.

1,377,509. Specification of Letters Patent. Patented May 10, 1921.

Application filed May 5, 1917. Serial No. 166,532.

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 certain new and useful Improvements in Printing-Plates, of which the following is a specification.

This invention relates to printing plates, and has particular application to the production of printing plates from plastic materials preferably by molding under pressure.

In carrying out my invention it is my purpose to produce in a simple and economical manner, a rigid, tough printing plate which is capable of accurately reproducing the finest details of type, etchings, half tones or plates, and furthermore, I aim to provide a plate which possesses a certain degree of flexibility at certain stages in the course of its manufacture whereby a flat plate, for instance, may be readily and easily bent and curved to produce a curved printing plate and this without injuring the printing surface of such plate.

My invention consists in the improved printing plate, and in the method of making the same set forth in and falling within the scope of the appended claims.

In the accompanying drawings,

Figure 1 is a cross sectional view taken through one form of printing plate embodying my invention.

Fig. 2 is a cross sectional view of the printing plate of Fig. 1 and showing a step in the molding of the latter in the press, such press being merely conventionally illustrated.

Fig. 3 shows a cross-sectional view taken from a modified form of flat printing plate.

Fig. 4 is a cross - sectional view taken through a curved printing plate embodying my invention.

Referring now to Figs. 1 and 2 of the drawings wherein I have shown a preferred form of printing plate and have illustrated, by Fig. 2, a step in the making of the same from a matrix, the numeral 1 indicates a thin surface layer forming the printing face of the plate. This surface layer or printing face is supported by a backing 2. The surface layer or printing face 1 is preferably composed of a coagulated colloidal substance or cementitious material capable of assuming a hard and set form, especially under heat and pressure, and in some instances under pressure alone. For this purpose I prefer to use a phenolic condensation product of which there are several well known forms on the market, such as condensite, bakelite and the like, and this condensation product used for making this printing face or surface layer 1, may be employed in liquid, sheeted or powdered form. The backing 2 for the surface layer or printing face 1 may be of any suitable material, and in the present instance is shown as made up of laminations of an open porous material, such as blotting paper. In the place of blotting paper I may use any suitable fibrous substance, such as paper felt, or any material possessing the requisite degree of porosity and fiber. The material of the backing 2 is impregnated with a suitable cementitious material capable of being cemented under pressure to cause it to assume an unyielding character. For this purpose I also prefer to use a liquid phenolic condensation product which I boil down to the point where it is more in the nature of a plastic material, making use of a water bath for this purpose, and while still hot, I incorporate a suitable quantity of solvent, such as denatured alcohol, to induce penetration. The backing 2, whether in the form of laminations, or of a single sheet, is impregnated in the phenolic bath just mentioned, and is then allowed to drain off. In the case of the laminated backing the sheets are impregnated singly and after draining are placed in an oven where they are subjected to heat treatment at about 140 deg. F. for a period of from 20 to 30 minutes. This heat treatment causes the solvent to evaporate and sets the phenolic condensation product so that it is no longer in the nature of a fluid, but assumes a plastic, yielding condition thinly impregnated in the fibrous structure, causing the fibrous structure to assume a swelled, or expanded character, readily compressible under pressure but wherein the flow of the phenolic material is so retarded that it does not readily ooze out of the edges of the sheet when being molded.

Referring to Fig. 2, the numeral 3 indicates a suitable matrix for forming the printing plate, and in the making of the plate this matrix may be placed, for instance, upon the bed platen 4 of a suitable press which may be heated and cooled in

any desirable manner, the upper platen of the press being shown at 5. Alongside the mold or matrix the usual type high bearers 6 are placed in predetermined and desired position. If the face sheet 1 of the printing plate is to be composed of the cementitious material, such as the phenolic condensation product in powder form, the face of the mold is first wiped with a separating fluid, such as a solid phenolic solvent and the powdered phenolic condensation product is sprinkled or spread onto the molding face to the desired thickness and is preferably tamped down with a suitable tool or block. The backing sheet, or sheets, preferably composed of the impregnated blotter paper or paper felt, may now be imposed on this layer or sheet of powdered phenolic condensation product and the top platen of the press is lowered into position to exert pressure, or is lowered until it reaches the type high bearers. The platens of the press may be heated to a desired degree, for instance from 212 to 350 deg. F. With the bearers limiting the closing of the platens, the latter are slowly closed to the required pressure, depending on the size of the plate to be made, and such pressure may be for instance of from 200 to 1000 pounds to the square inch and maintained for from one to 10 minutes. The platens may now be cooled in a well known manner, as by the admission of water to the interior thereof, or what is more desirable, the press may be opened and the matrix and plate transferred to a suitable cooling press where the plate is cooled while in contact with the matrix so that such plate will assume its hardened final form. The hardening may be done also by subjecting the plate to only a minimum heating under pressure, cooling as usual, and later baking the plate in an oven at about 212 deg. F., or slightly higher, but not enough to cause blistering, should there be any tendency toward the liberation of gases. Where the face of the matrix 3 is of a material such as sheet lead, the latter at the time of making is preferably cleaned with soldering salts and treated with bicarbonate of soda to produce a permanent, stable, carbonate coating on the lead face instead of the lead oxid, which would form and to which the phenolic condensation product would have a tendency to stick or adhere; and over the lead face so prepared, at the time of molding the plate from the matrix, I may apply the phenolic solid solvent before mentioned.

In plastic plate molding it is advantageous to make use of a plastic material which has little or no side flow, causing the pressure to be directly against the matrix face and still be capable of seeping deep down into the smallest of type forming depressions. Fiber long in structure gives great strength and if it is hardened to a firm solid form will still retain considerable flexibility. With the expelling of surplus plastic syrupy substance against the matrix face or uniting with the plastic sheet or powder it readily reproduces the finest of details with little pressure. It is not necessary to confine the plate during the molding operation, because, as before mentioned the action of the material under pressure is without appreciable side flow. This simplifies molding as only the press platens are required. The fiber when impregnated with a phenolic condensation product can be readily cut with ordinary tools—routed out where greater depth is needed for non-printing parts of the printing plate and several plates can be nailed or cemented adjacent each other without difficulty. This is not true of plates made entirely of phenolic condensation material except under certain intermediate conditions of curing.

This invention makes it possible to utilize a hard, tough coating for the purpose of reproducing the printing faces and at the same time utilize a cheap, open, porous, absorbent body portion of long fiber, giving the plate under suitable conditions of heat or moisture a considerable flexibility and freedom from brittleness, making it possible to utilize such printing plate under most rigid printing impressions and the possibility of casting such printing plates in the flat form, and by simple means causing them to be flexed to the curve of the printing press plate cylinder.

In some instances it may be desired to apply a coating to the rear of the backing 2 to prevent warping under certain conditions, as where the plate is very thin, or where the phenolic surfacing is of different shrinkage tendencies than the backing materials, such a coating, which may also be of a phenolic condensation product, being shown at 3^a in Fig. 3.

In Fig. 4 I have shown a curved plate embodying my invention, the printing face or surface layer being indicated at 1^a and the backing at 2^a, and in such structure a flat plate, such as shown in Fig. 1 may be curved by suitable mechanism, such as a mandrel machine to enable the plate to be used on a rotary press. The curving may be done while the plate is in a flexible form or before it has set to its hard, inflexible state.

In the manufacture of the curved plates these can be cast flat but removed from the hot platens in about four minutes, cooled and then warmed for a few minutes at about 212 deg. F. to render the same flexible, when they can be curved to the desired extent in any suitable manner and subsequently permitted to cool. For instance, a hot plate bending press such as is used for curving electrotypes may be employed.

What I claim is:

1. A composite printing plate comprising a sheet composed of compressible fiber having a cementitious binding material incorporated therewith, and a surface layer for said sheet, formed of a hard and set synthetic resin having printing characters formed therein to constitute a printing face.

2. A composite printing plate comprising a fiber sheet having on one side thereof a surface layer of hard and set synthetic resin, and provided with printing characters to constitute a printing face, said sheet having on its opposite side a hard and set layer of synthetic resin, forming a backing.

3. A composite printing plate comprising a fiber sheet impregnated with a hard and set phenolic condensation product, a surface layer for said fiber sheet also formed of a hard and set phenolic condensation product and provided with printing characters to constitute a printing face, and a backing layer, united with the opposite side of said fiber sheet.

4. A composite printing plate comprising a fiber sheet impregnated with a hard and set synthetic resin, and a non-fibrous facing layer united with the fibrous sheet and having printing characters formed therein to constitute a printing face.

5. The herein described method of making a printing plate which comprises impregnating a fiber sheet with a liquid synthetic resin, and then heating said sheet to drive off the solvent of the resin and to partially harden and set such resin, then applying face coatings of moldable synthetic resin to the front and back of said impregnated fiber sheet, and then subjecting the composite sheet thus formed to heat and pressure against a suitable mold to unite the laminations formed by the synthetic resin layers and the impregnated fiber sheet, to harden and set synthetic resin, and to form printing characters in one of the synthetic resinous faces of the sheet.

In testimony whereof I affix my signature.

EMIL E. NOVOTNY.