E. E. NOVOTNY.

METHOD OF MAKING PRINTING PLATE MATRICES OR MOLDS, &c.

APPLICATION FILED MAY 20, 1916.

1,377,501. Patented May 10, 1921.

Fig. 1.

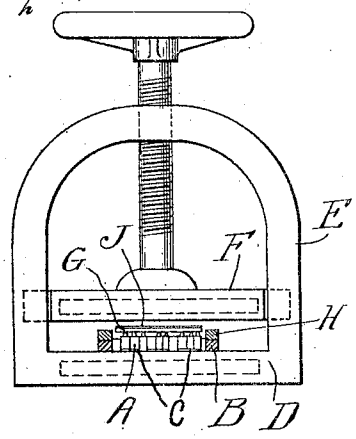


Fig. 2.

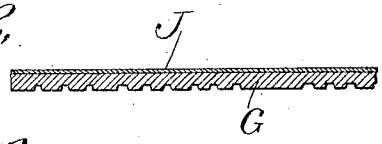


Fig. 3.

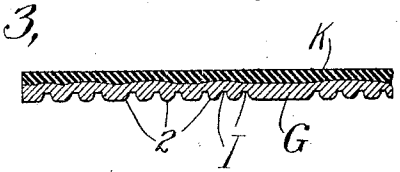


Fig. 4.

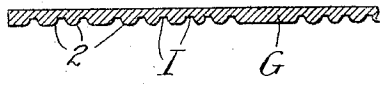


Fig. 5.

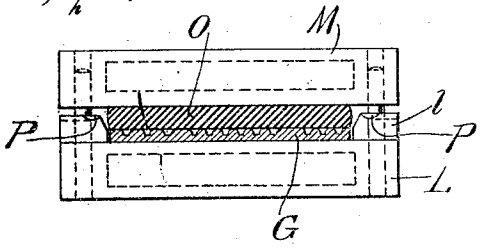


Fig. 6.



Fig. 7.

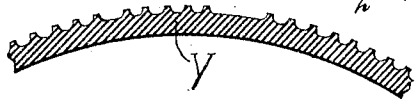


Fig. 8.

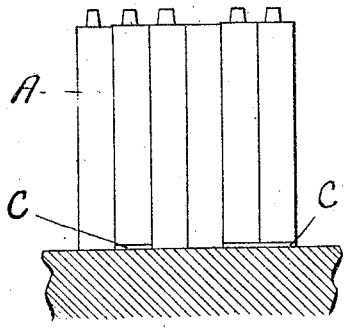


Fig. 9.

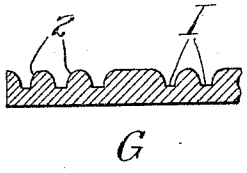
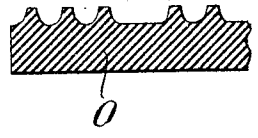


Fig. 10.



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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING PRINTING-PLATE MATRICES OR MOLDS, &c.

1,377,501. Specification of Letters Patent. Patented May 10, 1921.

Application filed May 20, 1916. Serial No. 98,905.

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 Methods of Making Printing-Plate Matrices or Molds, &c., of which the following is a specification.

This invention relates to the manufacture of molded printing plates.

In practising my invention I follow such a method that the matrix or mold when completed will so embody the essential factors of exactness of form and accuracy of dimensions and the duplications of working surface regularities and irregularities comparable with the original properly proofed type matter used in making the mold that the printing plates duplicated or produced through the agency of this mold will require but a minimum amount of make-ready when applied to the printing press. In other words, all of the various inaccuracies, faults and errors both of the type matter itself and the particular printing press upon which the plate is to be used may be taken into consideration and compensated for in the making of the matrix or mold, thereby substantially eliminating the element of make-ready in connection with the plate usually necessary to assure uniform printing.

As is well known in the printing art there are a number of factors which necessitate following out a tedious and expensive make-ready process before the printing can be proceeded with under the assurance that the proper results as to uniformity of printing impression, accuracy and appearance will be attained. These factors may exist for a number of reasons, such for instance as defects in the original type matter, distortion or variation in the height of the body of type or the plate, resulting in incorrect heights to the paper being printed upon, variations in the printing pressure due to the yieldable packing used on the impression cylinders or platens, and other elements of error affecting the uniformity of impression of the type body or plate, which are well known and recognized by printers and pressmen, and which require considerable make-ready to eliminate. In addition to these defects peculiar to the body of the type or plate there are the structural defects and inaccuracies of the printing press itself to be considered, and each style and make of press, such as the bed and platen type, exemplified for instance by the Gordon press, the bed and cylinder press and the rotary press has its own peculiar and particular defects which must be taken into consideration and compensated for by the pressman through the medium of a laborious and time-consuming procedure of make-ready.

My present invention is applicable to the production of molds for making two styles or classes of plates, that is to say, flat printing plates to be used upon printing presses having substantially flat beds upon which the plates are mounted, and curved printing plates for rotary presses employing cylinders upon which the plates are carried, and a matrix or mold made by my method will produce printing plates of either style characterized by great strength and durability coupled with sharpness and trueness of outline and accuracy of dimensions and which will require but little or no make-ready work on the part of the pressman, thus accomplishing a saving of time, labor and expense.

Furthermore, both the matrix or mold and the plate produced thereby will have those portions of the face which offer no printing surfaces so formed as to provide depth without abrupt angles thus giving to the printing surfaces or type portions fine lines, and stable, rigid footings or bases. The mold produced by my method is preferably made of lead or a composite body containing lead as this is an ideal metal for my purpose inasmuch as it possesses plasticity with but little ductility, and consequently when under pressure or heat and pressure, in contact with a body of original type matter in a chase, the metal will flow in such manner as to produce sharp glossy type-face-molding portions with well rounded, swelled or curved non-type-face forming portions therebetween. Consequently a printing plate cast in such mold will possess fine, sharp clear type faces surmounting broad foot sections or bases tapering and widening as they approach and merge into the body of the plate so that a plate of unusual strength results. Especially is this the case where the cast plate in its final form is composed, as is preferable.

of a hard, infusible phenolic condensation product, such as that called bakelite, or the like.

In the accompanying drawings:

Figure 1 is a view showing a simple form of apparatus for making my mold and showing the mold sheet therein.

Fig. 2 is a transverse sectional view showing the mold sheet after it has been subjected to pressure with a yieldable backing sheet imposed on the mold sheet.

Fig. 3 is a similar view taken through the mold sheet after it has been subjected to another pressing operation in conjunction with a resilient backing sheet or blanket.

Fig. 4 is a transverse sectional view of a completed mold after it has been leveled by shaving, or otherwise.

Fig. 5 is a transverse view through a conventional form of casting box and showing a printing plate being made with my mold.

Fig. 6 is a transverse sectional view through the completed printing plate, in this instance a flat plate.

Fig. 7 is a similar view through a curved or partly cylindrical plate.

Figs. 8, 9 and 10 are sectional views diagrammatically illustrating on an exaggerated scale the made ready printing surface of the original type body; the facsimile mold surface produced therefrom and the duplicate positive plate surface produced by the mold, and showing the exactness of similarity existing between the same.

In the present instance I have, by way of illustration, described the mold as made under pressure from a single sheet or plate of metal, such as lead, but in this connection I wish to state that the mold may be made from various materials and combinations of materials, such for instance as form the subject matter of copending applications Serial Nos. 98,906; 98,907; 98,908; 98,909, all filed May 20, 1916; and furthermore that the mold in the course of manufacture may be subjected to both heat and pressure, if desirable.

Therefore this invention deals broadly with the production of a new printing plate and a mold or matrix therefor, produced by a novel method all to attain the ultimate ends set forth herein.

The mold.

The original type matter which is shown at A, is first set up in the chase B and the usual preliminary proofs taken on a proofing press which has been preferably standardized and made ready for its own errors.

The preliminary proof is of course checked as usual for composition errors, such as spelling, punctuation, etc., and when correction has been made in this respect further proofs are taken, and studied for inaccuracies in height to paper, printing pressure and the like. Suitably make-ready material C is now placed beneath the type to compensate for various other errors or defects such as variations in height to paper of different sections or areas of the type body, the difference in thickness between the proof paper and the paper to be printed upon, difference in printing pressures required and other similar matters well known to printers and pressmen, and dealing particularly with the rectification of the type body. When the final proof sheet shows uniform and satisfactory impressions this properly proofed body of original type is ready for the mold making operation. This body of original, proofed type is now placed on the bed D, of the press E, of any suitable character, and which press in the present instance includes a reciprocating block or platen F. By means of this press the mold or matrix may be subjected to pressure for the purpose hereinafter described.

The sheet or plate from which the mold is to be made, is in the present instance composed of a single sheet of cold lead of suitable thickness and is shown at G. It will be understood that in this instance the cold lead sheet is to be subjected solely to pressure, but if desired may be in some cases subjected to both heat and pressure, and instead of a single lead sheet, other forms and compositions of sheets may be used.

The single lead sheet employed may be of a thickness of .080, for example, and this sheet placed on the body of type. Upon the chase preferably at the longitudinal sides thereof I mount a pair of bearer bars H which are of such height or thickness as to accurately limit the downward movement of the movable platen F of the press, so that the proper pressure will be applied to impress the type into the lead mold sheet the required depth as the platen will be limited in its downward pressing movement by contact with the top of the bearers.

Upon this cold lead sheet G I may now place a sheet or sheets of material having yieldability, but not flexibility, such for example, as newspaper sheets shown at J and now operate the press to subject the lead mold sheet to its initial or first pressure. The platen of the press is now moved into contact with paper covered mold sheet and the pressure applied until the press platen preferably contacts with the top of the bearer bars, thus pressing the type faces of the body of type into the lead mold sheet. In some instances one operation of the press may be sufficient to produce the proper type forming depressions in the mold sheet, but it is preferable in many cases to repeat this pressing operation one or more times and with each successive pressing operation an additional layer or sheet of the yieldable backing such as the newspaper is added and

used. These successive impressions result in the gradual formation of the type depressions without excessive pressure at any one operation. I use a backing sheet, such as newspaper, because it is what I consider as a yieldable as distinguished from a resilient backing such as I subsequently employ as hereinafter described, this yieldable backing enabling me to obtain the proper type-forming depressions in the mold sheet without altering the non-type forming surfaces of the mold sheet, such alterations of the non-type forming surfaces taking place when a resilient backing is employed in that step of my method which I will now describe.

After the pressing operations with the yieldable backing have been completed, and the type depressions of requisite depth and sharpness formed in the mold sheet, I substitute for the paper backing, a resilient backing sheet or layer, preferably of rubber or any other material possessing the necessary resiliency and thickness, as shown at K. The pressing operation is now repeated with the result that the face of the mold is formed with the swelled or curved non-type forming portion 2, adjacent or surrounding the type-forming depressions. These swelled or curved portions of the molding face of the mold result because the backing sheet having the quality of resiliency, under the action of the press pushes outward or downward against the portions of the lead sheet not held or suspended by the impressed type-faces, and consequently imparts a bulging, swelling or curving effect to such unsuspended portions. When this step of the method is completed the molding face of the mold will be a reverse duplicate of the face of the type body, that is to say, will embody, with exactitude all the printing regularities and irregularities existant in the original type-body with its make-ready.

The back of the mold sheet may now be planed and shaved so that the back of the mold will present a uniform level surface, and there will exist a substantially fixed depth or thickness of material between the bottom of the type depressions I and the back of the mold. I use the word substantially because there may, and probably will, exist slight variations or differences in this depth or thickness in different parts of the mold, due to whatever make-ready and other regularities are used.

The type depressions penetrate the lead mold sheet preferably to substantially the central horizontal line of the latter, that is, go half way through the mold sheet, because in using the mold for the casting of curved plates the mold must conform to the curvature of the female portion of the casting box, and as the convex portion of the mold will be subjected to stretch and the concave portion subjected to shrinkage, the central portion or type depression level will be at a substantially neutral point, eliminating shrinkage or stretch to the type matter due to the curvature of the mold.

The plate.

While the mold herein described may be employed in casting a plate made of any suitable material, it is especially well adapted for the molding of a plate composed of a phenolic condensation product or composition of which there are a number of varieties known in the art. Such a phenolic product, which as is well known is a synthetic resin, usually has as constituents phenol and formaldehyde, and a printing plate made of this class of material possesses manifest advantages, inasmuch as being a plastic material at a certain stage it is capable of faithfully reproducing the regularities and irregularities which are required in a printing plate, thus insuring an exact negative reproduction of delicate outlines and levels of the mold. It also produces a plate having durability, rigidity, stability and uniformity under variations in temperature, and one which will withstand the stresses and strains encountered in the printing operation, and will present sharp, clear type outlines, thus insuring clear, attractive work.

I take a sheet or portion of this material in its unset form in which it is commercially marketed, such sheet being of approximately the area, but of slightly greater thickness than the plate to be made, the extra thickness allowing for compression. This sheet is heated at a temperature for example of from 200° to 400° Fahrenheit to render it soft and plastic. The mold G is placed on the bed of the casting box L and within the frame 1 of the box which predetermines the size of the plate, this frame 1 may be formed to cast a plate with beveled edges. The mold is clamped in position, and the mold and casting box heated. The top M of the casting box is also heated, the casting box having previously been coated interiorly with a weak, soapy solution, preferably of Turkey red oil and water to prevent the plate composition sticking to the casting box. The plastic material for the plate shown at O is placed on top of the lead mold, the top part of the casting box placed in position, and the assembled casting box placed in a heated press and subjected to slow pressure to completely close the casting box and retain it in that position, subjecting the plastic material to both heat and pressure for a suitable length of time, depending on the degree of hardness of plate desired. For instance, the plate may be subjected to heat and pressure for from one to twenty minutes at a heat of

from 200° to 400° Fahrenheit. This is merely illustrative. The casting box is provided with suitable vents P, which are small enough so the pressure is not greatly reduced, but large enough so that any excess of plastic material may escape from the casting box. The plate O is preferably cooled under pressure either by transferring to another previously cooled press or by cooling the same press. The mold and plate are then removed from the casting box and the plate separated from the mold, and is now complete and ready for use as a flat plate.

If a curved plate is to be made such a plate shown at Y in Fig. 7 may be formed in several ways. For instance, by taking a plate which has been impressed in a flat mold, but only partially hardened and cooled and curving such plate over a cylindrical mandrel of proper dimensions and which has been preferably heated to a suitable temperature, for example, of from 200° to 400° Fahrenheit. The plate on the mandrel is covered with a correspondingly concaved weight and heated for a suitable length of time, or until it is permanently hardened. Or the casting box and the mold may be made concaved and the plate cast therein.

While I have herein shown and described by way of illustration certain preferred forms of the invention, I wish it to be understood that I do not confine myself to all the precise details herein set forth, as modifications and variations may be made without departing from the spirit of the invention or exceeding the scope of the appended claim.

What I claim is:

The herein described method which comprises applying a predetermined amount of make-ready material to a type body to insure correct printing planes for the latter, then imposing a metal sheet upon the corrected type face of the type body and applying pressure to form a matrix having a metallic molding face which is an exact reverse duplication of the printing planes of the type body, as corrected with the make-ready, then removing the matrix from the type-body and imposing upon the molding face of the matrix a body of synthetic resinous material capable of assuming a hard, set and infusible form when heated to a predetermined degree, and then subjecting the synthetic resinous body to heat and pressure against the matrix to form a hard, set and infusible printing plate having printing planes corresponding to the corrected printing planes of the type body.

In testimony whereof I affix my signature.

EMIL E. NOVOTNY.