E. E. NOVOTNY.

MANUFACTURE OF PRINTING PLATES.

APPLICATION FILED AUG. 6, 1918.

1,377,516. Patented May 10, 1921.

Fig. 1.

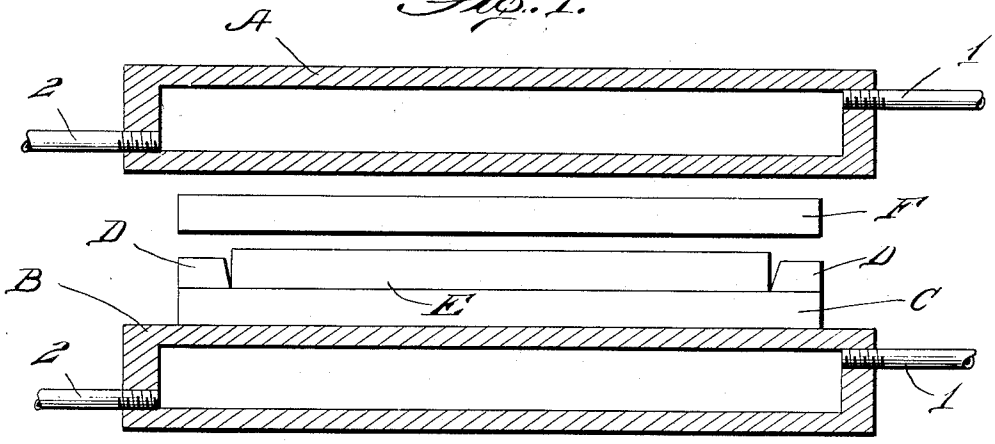


Fig. 2.

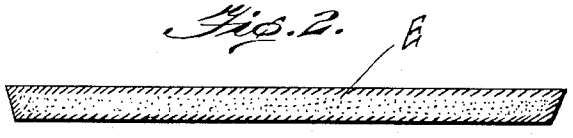


Fig. 3.

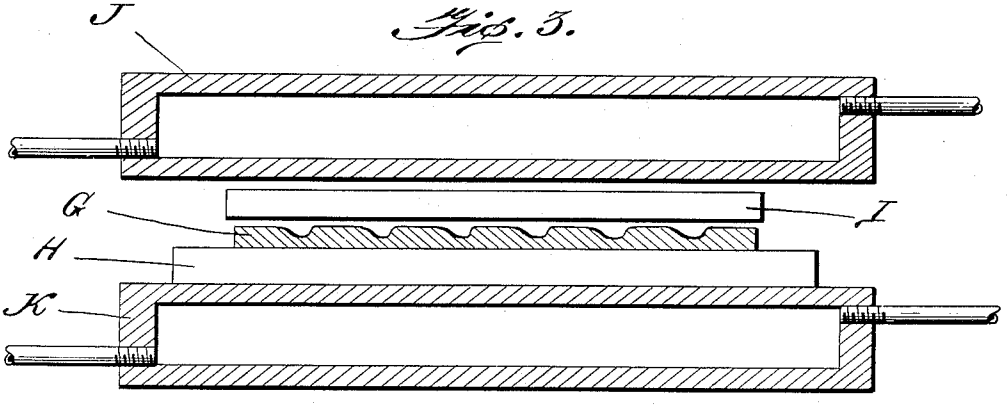


Fig. 4.

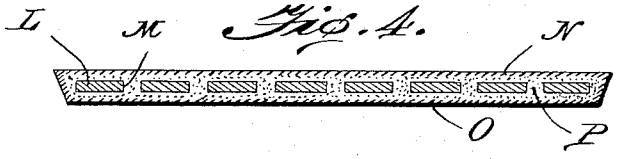
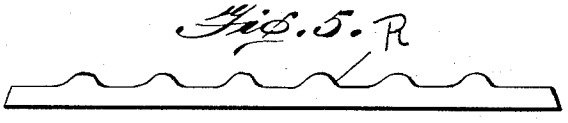


Fig. 5.



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MANUFACTURE OF PRINTING-PLATES.

1,377,516. Specification of Letters Patent. Patented May 10, 1921.

Application filed August 6, 1913. Serial No. 248,649.

To all whom it may concern:

Be it known that I, EMIL E. NOVOTNY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented new and useful Improvements in the Manufacture of Printing-Plates, of which the following is a specification.

This invention relates to the manufacture of blanks and of printing plates composed wholly or in part of synthetic resins, such as bakelite, condensite and other phenolic condensation products.

In the manufacture of such plates as previously practised by me, a sheet of the unset or uncooked phenolic condensation product, as supplied by the manufacturer thereof as an article of commerce has been brought into contact with a printing plate matrix preferably having a metal face, and equipped with side bars or bearers so that when heat and pressure was applied with the agency of a suitable press, these bearers would limit the closing of the press, while the phenolic material would be forced closely against the molding face of the matrix to reproduce the characters thereof as printing characters on the surface of the plate. The matrix after being cooled in the press and subsequent to the heating operation, and while still under pressure, has been removed from the press and the plate then separated from the matrix. This is briefly and in a general way one procedure that I have followed in the manufacture of these phenolic printing plates. While satisfactory from a general stand point I have found that I could improve the process as to speed, ease of operation, less attention on the part of one who might be unskilled as a plate maker, and increase in production.

For instance in practising the general method of making a plate above outlined, certain factors are liable to be encountered which will interfere with the production of these plates on a very large scale or which might cause delay in some instances when the plates are made by an unskilled plate maker. For example where a plurality of plates, say eight or ten, are to be cast in a single operation in a relatively large casting box, and which plates might have different dimensions and thicknesses, it has been necessary to employ side bars or bearers for each plate, depending upon the dimensions of the plate both as to size and thickness. Frequently, especially in a small shop, these bearers of a requisite size might not be immediately available and time is lost in making the same. Furthermore if these bearers be not employed, but large sheets of the uncooked material be imposed so as to cover a plurality of matrices in the box, such plates would of course have to be cut or severed subsequent to the molding operation. Under these conditions not only would there be a loss of an amount of the plate making phenolic material which would lie in the empty spaces between the matrices, but the cutting operation, owing to the overflow of this material at the edges of the matrix would be a difficult matter from the standpoint of separation of the material from the parts to which it adheres.

Another point is that as this uncooked plate making material is supplied by the manufacturer thereof it has incorporated therein a certain amount of a phenolic substance which assumes a juicy, tacky, sticky state under the application of the heat of the press in the plate molding operation. While under the action of the hot press platens this sticky substance comes to the surface of the platen or phenolic sheet and when heated and hardened provides a polished surface which is very advantageous and useful in giving nonporous, perfect ink holding surfaces, yet at the time of making the plate it is liable to adhere both to the surface of the matrix, if there be any cut or imperfection in the face of the matrix, and also to adhere to the press platen or casting box sometimes, though not frequently, marring or damaging the back of the product. Furthermore in making these molded plates under the old process I have found it desirable to employ a matrix having a metallic molding face because there is a possibility that the softened and heated phenolic material would stick to the surfaces against which it contacts were such a metallic faced matrix not employed.

With my present invention I have eliminated these disadvantages from the standpoint of the manufacture of molded phenolic plates on a large commercial scale for I so preliminarily prepare the sheet of uncooked phenolic material that not only may I dispense with the use of side bars or bearers in conjunction with the matrix or matrices in

the casting box, but I obviate the overflow of the material over the sides of the matrix at the time the plates are being made, and I also avoid waste of material by having it flow into empty spaces between the matrices where a number are used for a single casting operation. In addition to the elimination of these disadvantages I am enabled to gage accurately the size or amount of material which a specific plate may require for its manufacture and therefore am able to cut a determined amount of material from the large sheet, thereby avoiding the necessity of using a surplus amount of material, which would result in wastage. I also take advantage of the polished surface which a plate of this phenolic material will take under heat and pressure as above stated, to obtain a non-porous ink holding surface, and such a polished surface will enable me, if I so desire, to dispense with the use of a metallic faced matrix because the blank prepared in accordance with my invention will not stick to the matrix, metallic faced or otherwise. If desired the matrix itself may be made with the blank prepared in accordance with my invention and as hereinafter described.

Before entering into a detailed description of my present invention I will briefly state that I first prepare a blank of a phenolic material by taking a sheet of the same just as it is supplied by the manufacturer thereof, that is in its uncooked or unset condition, and I place this sheet between the flat level platens of a heated casting box and subject the same to a relatively low degree of heat, say 212 degrees F. for about one minute. This will result in the liquid-like phenolic material of the blank oozing to the surfaces and of hardening and setting to a certain degree, and at the same time forming a highly polished surface coating or skin on the blank. The interior of the blank remains relatively soft, as this material is not a good conductor of heat. In other words the blank is but partially cooked, being harder at the outer surfaces where it is exposed to the heat than at the interior thereof and furthermore such blank is but partially compressed, as the pressure exerted in the casting box is relatively low. The blank in this condition is removed from the casting box when cool. It may then be placed in storage, and supplied to the plate maker in this form. The blank is easily cut with a knife or machine and the plate maker may cut the blank the desired size and proceed with the making of the plate as hereinafter described.

Referring now to the accompanying drawings in detail:

Figure 1 is a view showing conventionally the top and bottom platens of a casting box and showing an uncooked blank ready to be partially heated or cooked to provide the polished surface,

Fig. 2 is a cross sectional view of the blank.

Fig. 3 is a view showing conventionally the two platens of the cold press and illustrating the plate being made against the matrix from my preliminarily prepared blank.

Fig. 4 is a cross sectional view showing a modified form of plate blank, in this case a blank being composed of an interior layer of fibrous material, and exterior layers of synthetic resin.

Fig. 5 is a view and end elevation of the finished plate.

Referring now to the accompanying drawings in detail, particularly to Fig. 1 thereof: The letters A and B indicate respectively the upper and lower platens of a casting box. On the lower platen I mount a pressure plate C provided with side pressure bars or bearers D, and I impose upon the pressure plate C a relatively large sheet of the uncooked phenolic material just as it is supplied by the manufacturer, this sheet being shown at E. A second pressure plate F is then placed upon the upper surface of this sheet of material, the pressure plates being of sufficient size to accommodate the large sheet which is to be subsequently cut up into smaller sections. The casting box is then closed pressure applied in conjunction with heat at a temperature of about 212 degrees F. For heating purposes the platens are equipped with steam inlet pipes 1 and steam outlet pipes 2 as usual. But a relatively low pressure is employed, and the temperature 212 degrees F. for the heat may also be considered as a low temperature in operating upon this material. The heat and pressure is maintained for about one minute and during the application thereof the liquid-like phenolic material in the blank E will ooze to the surface of the blank and be cooked or hardened, but not to its absolute final hard and set form, but just sufficient to form a relatively hard non-flowing polished skin exterior of the blank the interior of the blank remaining comparatively soft. Water is now admitted to the press passing through the pipes 1 and 2, and after the blank is cooled it is removed from the press, and appears in cross section as indicated in Fig. 2. The blank may now be stored, to be supplied to the plate maker as desired and can be maintained indefinitely in its semi-hardened or semi-cooked condition. When it is desired to make a printing plate, a suitable matrix shown at G is placed upon the pressure plate H having a level flat surface. A section of a partially cooked oily polished plate is shown in Fig. 2, of sufficient size to cover the molding face of the matrix, or such part thereof as it may be desired to reproduce, is then cut from the plate E, the material being in such a condition that this may be done with accuracy and ease by a knife or other cutting instrument. The cut

off section which is shown at I in Fig. 3 is placed in face contact with the matrix and the pressure plate H, the matrix G and the plate blank I thus assembled are placed upon a suitable steam table (not shown) where they are subject to a heat of about 300 degrees F., which causes the blank to soften or become pliable, but not to flow, it possessing a pliability somewhat resembling that of leather. After so heating the assembled parts they are, while heated, placed in a cold press as shown in Fig. 3 and the top platen J and the bottom platen K of the press are closed and sufficient pressure exerted to compress the plate blank and to force it against the molding face of the matrix so as to reproduce in the contacting face of the plate blank printing characters R complemental to those characters on the matrix. No side bearers are required for this operation of making the plate as the material will not flow or spread, and at the same time owing to its highly polished surfaces it will not stick either to the matrix or to the contacting parts of the press, but the type or printing surface produced on the plate will be highly polished and capable of readily holding and distributing the ink during the printing operation. I have found there will be just about sufficient heat retained in the pressure plate H to set the printing plate during the pressing operation. It will be noted that this operation of making a plate partakes more in the nature of a stamping operation than of a true molding procedure. If desired the matrix G instead of being faced with metal, may be made from a blank of synthetic resinous material, or such a blank as is illustrated in Fig. 2 and is made by my method, as the polished surface or skin will prevent the adherence of the free phenolic material or varnish or even the printing plate being made directly from the uncooked commercial form of the phenolic material as contradistinguished from the partially cooked blank such as I have herein described.

In Fig. 4 I have shown a slightly modified form of printing plate blank in this case employing an intermediate layer or sheet L composed of chip board or other fibrous material and which is provided with suitably spaced perforations M. In making this blank two sections of the uncooked phenolic material are placed one at each side of the fibrous sheet and heat and pressure under about 212 degrees applied in the manner described for the preparation of the blank shown in Fig. 2, so that at the completion of the blank forming operation the fibrous sheet will be embedded between the polished top layer N and the polished bottom layer O, with the intermediate, relatively soft portions of the phenolic material projecting in stud like formation through the openings or perforations in the fibrous sheet as shown at P, to unite the top and bottom layers of the blank to each other and also the fibrous sheet in a staple, homogeneous mass. This blank may then be used for making a printing plate in precisely the same manner as described for the blank shown in Fig. 2.

My improved method of producing plate blanks and printing plates insures there will be no hollow spots in half-tones, that the type will be sharp and square cut and that there will be no defects throughout the printing plate caused by the structure of the blank, as my plate blank when made as above described possesses a known and determined compression uniform throughout its entire structure.

While I have herein shown and described certain preferred embodiments of my invention I wish it to be understood that I do not confine myself to all the details herein 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. The herein described method of making a printing plate which comprises preliminarily heating and pressing a blank of synthetic resin material between flat surfaces to form a relatively hard skin exteriorly of the blank, the interior remaining relatively soft, then cooling the blank then subsequently placing the same in contact with the molding face of the printing plate matrix and heating both the blank and matrix, then subjecting the said blank and matrix to pressure to produce in one face of the blank printing characters complemental to those of the matrix.

2. The herein described method of making a printing plate which comprises preliminarily heating and pressing a blank of synthetic resin material between flat surfaces to form a relatively hard polished skin exteriorly thereof, the interior of the blank being relatively soft, then cooling the blank, then subsequently placing said blank in contact with the molding face of the printing plate matrix and heating both the blank and the matrix at a higher temperature than employed for the preliminary heat and then subjecting said blank and matrix to pressure to produce in one of the faces of the sheet printing characters complemental to those of the matrix.

3. The herein described method of making a printing plate which comprises preliminarily heating and pressing a blank of phenolic condensation product between flat surfaces at a comparatively low temperature to form a relatively hard skin exteriorly thereof and to maintain the interior of the blank in a relatively soft condition and then cooling said blank, then subsequently plac-

ing said blank in contact with the molding face of the printing plate matrix and heating both the blank and matrix at a relatively high temperature to render the blank pliable; then subjecting said blank and matrix to pressure in a cold press to provide in one of the faces of the blank printing characters complemental to those of the matrix.

4. The herein described method of making a printing plate which comprises preliminarily heating a blank of phenolic condensation product at a temperature of less than 212 degrees F. to form a relatively hard polished skin exteriorly of the blank, the interior of such a blank being maintained in a relatively soft condition, then cooling said blank, then subsequently replacing said blank in contact with the molding face of the printing plate matrix and heating the same at a temperature exceeding 250 degrees F., then subjecting said blank and matrix to pressure in a cold press to produce in one face of the blank printing characters complemental to those of the matrix.

EMIL E. NOVOTNY.