E. E. NOVOTNY.

MATRIX.

APPLICATION FILED MAY 5, 1917.

1,377,510. Patented May 10, 1921.

Fig. 1.

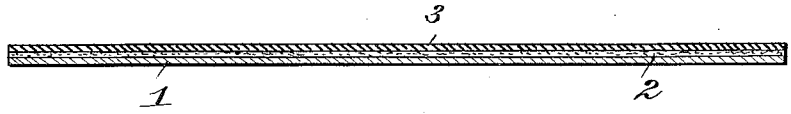



Fig. 2.

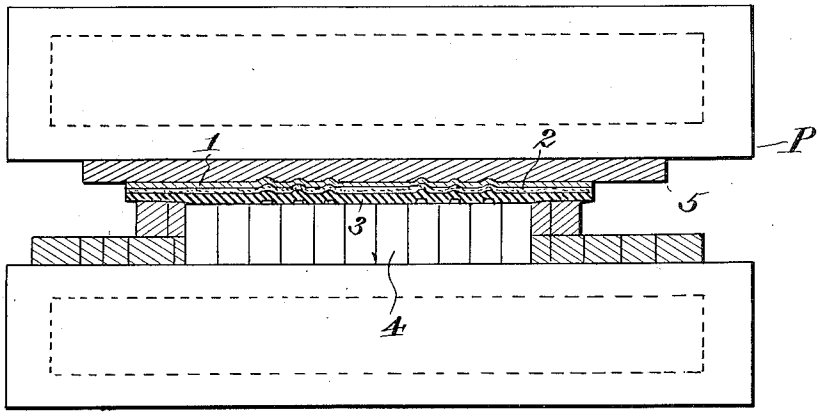
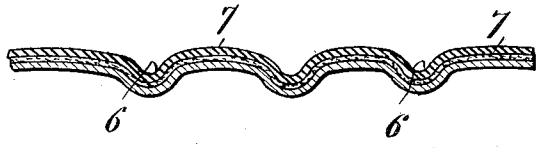



Fig. 3.




Inventor,

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By his Attorneys,

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# UNITED STATES PATENT OFFICE.

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## MATRIX.

1,377,510. Specification of Letters Patent. Patented May 10, 1921.

Application filed May 5, 1917. Serial No. 166,533.

*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 Matrices, of which the following is a specification.

This invention relates to matrices for use in the printing art and in the method for making the same, and while a matrix made in accordance with my invention may be used for the manufacture of plastic molded plates, electrotypes and stereotypes, it will be found particularly adapted for use in stereotyping.

In the present instance it is my purpose to provide a matrix through the medium of which a printing plate or the like having polished, glossy type surfaces may be produced by molding against such matrix, such a matrix being capable of reproducing fine screen half tones, a work which cannot be performed with the ordinary stereotype matrices now in use.

Furthermore, it is my purpose to provide a matrix of this class which will embody the desired features of durability and strength and flexibility, coupled with economy in the cost of production or manufacture.

With the above recited objects and others of a similar nature in view, my invention consists in the improved matrix 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 a sheet or body from which my improved matrix is to be made.

Fig. 2 is a view showing a conventional form of press and illustrating a step in the molding of the matrix, such matrix being shown in cross section.

Fig. 3 is a cross sectional view of the complete matrix.

Before entering into a detailed description of my invention I will briefly state that in the practice of the same I first provide a matrix sheet which, when used for making the matrix against the body of type or the like, will require no other preparation except slight moistening and heating thereof to give a certain degree of plasticity to both the face and the body of the sheet, as the sheet in a slightly plastic state facilitates the actual operation of making a good matrix. In preparing the matrix sheet I preferably make use of a well woven plastic matrix paper, which may be obtained in the open market and I coat a face or surface of this matrix paper with a suitable material to impart to such face of the matrix paper a smooth, polished, enamel-like surface, as it is this surface which is to form the molding face of the matrix when operated upon, as hereinafter described. For the purpose of so enameling or coating the face of the matrix paper I prefer to use kaolin or China clay, although I wish it to be understood that any material suitable for this purpose may be employed. After this enamel-like surface coating has been permitted to dry, so that the face of the matrix paper or sheet presents a smooth, polished burnished surface, I apply a second coating over this enamel-like coating, this second coating of the material being preferably in the nature of a plastic or cementitious substance capable of assuming a hardened, set form. For this purpose I prefer to use a synthetic resin in the nature of a liquid phenolic condensation product, such as condensite or bakelite. The sheet is then permitted to dry and may be stored away ready for use in the making of the matrix. In making the matrix the sheet is placed with the coated face downward against the body of type or the like to be reproduced and pressure, or heat and pressure applied to mold the matrix, as hereinafter mentioned.

Referring now to the accompanying drawings in detail, the numeral 1 designates a backing or base body which may be of a suitable material, such as a sheet or layer of well woven plastic matrix paper, which may be readily obtained in the open market. Ordinarily, this matrix paper is absorbent and quite porous. I apply to one face of this sheet 1, a layer, film, or coating 2 which may be of a material more absorbent than the sheet 1, such for instance as kaolin, or may be of a material less absorbent than the said sheet 1, such for instance as a sheet of closely woven paper. On this layer, film or coating 2, I apply an outer facing layer 3, which is preferably in the nature of a cementitious substance capable of hardening and setting under pressure, or heat and pres-

sure. For this purpose I prefer to use a phenolic condensation product which will assume a glossy, hard, tenacious and rigid structure and which will produce highly polished type when used as a component part of a matrix from which the printing plate is molded. I have above referred to applying a layer, film or coating 2 to the sheet 1, and which coating in some instances may be more absorbent than the sheet 1, or in some instances less absorbent than the sheet 1. I have found by experience that if the cementitious facing layer 3 is incorporated or applied directly to the matrix sheet 1, in a quantity sufficient to produce a glossy, polished face mold, it will under working conditions of heat and pressure flow or ooze out from the sheet 1 in a sticky, semi-plastic form, causing sticking of the plate or type, and in many instances resulting in the ruining of the article being molded. On the other hand, I have found that if only a relatively small quantity of the phenolic condensation product be applied to or incorporated with the matrix sheet 1, the latter will absorb or soak up such a small quantity of this condensation product, and the resulting matrix will have a thread-like, fibrous, rough face, which will not give the fine details necessary for half-tone work, and which will in many instances produce an exceedingly unsatisfactory plate.

I have further found that if I interpose a layer, film or coating 2 between the surface or molding face 3 of the phenolic condensation product and the fiber backing or sheet 1, and if this interposed sheet be of an enamel-like smooth substance, such as kaolin, chalk, or the like, which is more absorbent than the matrix paper sheet 1, it will take up or absorb in itself the phenolic condensation product and forms a composite or compound facing sheet, thus preventing the phenolic condensation product from freely soaking through to the sheet 1. The phenolic condensation product may slightly soak through this kaolin layer or film and slightly penetrate the sheet 1, but this is an advantage inasmuch as it tends to anchor the phenolic facing to the backing sheet or matrix paper. If, however, the interposed layer 2 be of paper, which is less absorbent than the backing sheet or matrix paper 1, it will prevent the too free absorption and penetration of the surface layer 3 to and by the matrix sheet 1, and consequently will insure the smooth, hard, polished molding face for the matrix at the same time preventing too much material being absorbed by the sheet 1 which would have the disadvantage of making too stiff a matrix and of oozing out, as before mentioned. It is not desirable to have the matrix too stiff, for should such a condition exist when using the matrix for casting stereotype plates, the stiffness of the matrix would be liable to prevent the molten or cast metal from which the stereotype plate is made from forcing or pressing the back face of the matrix flat against the bed of the casting box on which the matrix rests and the consequence would be that irregularities, bucklings and the like might appear in the cast plate due to the fact that it was not properly supported against an unyielding surface during the casting operation.

At the time of making the matrix sheet, such as shown in Fig. 1, the facing layer 3 is heated by passing the sheet over a heated area or surface causing the volatile substances of the liquid cementitious sheet 3 to evaporate, which will cause such face 3 to assume a plastic rather than a liquid or varnished-like form and at the same time this will attain the saving in the time required for the purpose of finally setting the matrix on the type, as when making such matrix for speedy work, as daily newspaper editions. In some forms, and for some less particular uses, for example in newspaper work, where speed is more necessary than high grade printing, it is possible to even heat-treat the face 3 so that only such pressure as is commonly used in dry matrix making need be utilized to produce a fairly satisfactory matrix. Under these conditions, however, the matrix is preferably warm in order to induce a certain amount of flexibility and to obviate therefore the brittleness that might be present and which would cause breaks in the matrix, as when molding sharp angles.

In using this matrix for making a stereotype plate, for instance, the matrix material or sheet shown in Fig. 1 is preferably heated in a suitable humidor so that the non-treated matrix paper body 1, will absorb a sufficient amount of moisture to make it more plastic and available in molding. Such matrix is then, as is usual in the art, placed with its surface or matrix face down against the type body to be reproduced, which is shown herein at 4, and an impression blanket 5 is placed against the back of the matrix. The type body with the matrix sheet and the blanket above the matrix, may then be placed in a suitable press, shown at P in Fig. 2, and subjected to pressure or to heat and pressure, to mold the type faces in the face 3 of the matrix sheet so that the latter when finished will appear as illustrated in Fig. 3 with the well rounded depressions 6 and the curved and swelled elevations 7. If desired, the matrix may be molded against the type, with the aid of the blanket, or by other mechanisms, such as the ordinary matrix rolling machine. While the matrix is still in contact with the type it may be placed in a suitable steam drying press with a drying blanket against its back and heat and pressure applied for a few

minutes until the moisture in the back of the matrix will have been evaporated, when it will be found that the very thin film of phenolic material forming the facing 3 has set under heat and pressure with highly glossed or polished type forming faces. It is also possible to roll a matrix through a rolling machine in the same manner, with or without the back being moistened, and the matrix may then be stripped from the type form and is ready for casting or molding the printing plate. In such instances, however, it is preferable to treat the matrix sheet with a harder form of phenolic material than would ordinarily be used so as to prevent any tendency to stick to the type. For most purposes where a suitable thickness of the facing or coating 3 is desired, to withstand the weight or pressures of different thicknesses of plates being molded or cast, it will be found that the phenolic material when set is sufficiently stiff and unyielding so as to form hard, non-printing curved portions which will require no building up or filling in with blotters, powder and the like, as is now done in the art, although this filling-in step may be desirable where there are large open spaces, or where the matrix is too thin to bridge a large unsupported surface.

For some purposes it may be sufficient to surface the matrix paper sheet with the plastic or phenolic material without the use of kaolin, or other absorbent inert surfacing materials, such cementitious facing sheet, as for instance the phenolic condensation product being applied by sprinkling in powdered form or rolling on in plastic form directly on the fibrous sheet 1. However, as heretofore indicated, there are certain disadvantages to this form of sheet which might render it undesirable for certain classes of work, and therefore, I prefer to employ the intermediate layer 2 for the matrix sheet, as indicated in Fig. 1, and as above described. This interposed sheet, layer or film 2, as previously mentioned, may be of a kaolin-like body or a fiber sheet, or if desired, may be made of a paper-like sheet coated with kaolin.

What I claim is:

1. A matrix comprising a backing sheet of fibrous material, a surface coating composed of a hard and set cementitious material constituting the molding face of the matrix, and a separating layer interposed between the backing sheet and the surface coating and adapted to prevent the penetration of the material of the surface coating into the backing sheet.

2. A matrix comprising a fibrous backing sheet, a molding face composed of a hard cementitious substance and a separating layer of absorbent filler material interposed between the face and the backing sheet.

3. A matrix comprising a porous sheet, a separating layer of absorbent material applied to one face thereof, and a surface coating of a hard and set synthetic resin varnish overlying the separating layer and constituting the molding face of the matrix.

4. A matrix comprising a backing sheet, a facing sheet composed of a hard phenolic condensation product and a separating layer of absorbent material interposed between the backing sheet and the facing sheet.

5. A matrix comprising a backing sheet of fibrous material, a layer of clay imposed thereon and a surface layer of a phenolic condensation product imposed upon the clay layer and constituting the molding face of the matrix.

6. A matrix comprising a backing sheet of paper, an enamel-like separating layer of an absorbent filler material imposed on the backing sheet, and a surface layer of a hard phenolic condensation product imposed on the enamel-like layer and constituting the molding face of the matrix.

7. The herein described method of making a matrix which consists in applying a separating layer of absorbent filler material to a face of a porous matrix sheet, then coating the face with a varnish capable of assuming a set enamel-like form under heat and pressure, and subsequently subjecting the sheet to heat and pressure to harden and set the same.

In testimony whereof I affix my signature.

EMIL E. NOVOTNY.