

UNITED STATES PATENT OFFICE.

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STEREOTYPE-MATRIX.

1,173,907.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, GLENN S. WILLIAMSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Stereotype-Matrices, of which the following is a specification.

This invention relates to matrices for use in the casting of stereotype or similar plates commonly employed in the art of printing.

Such matrices have been heretofore molded from paper or other suitable fibrous material, previously impregnated with such condensation products of phenols and formaldehyde as may be rendered infusible by heat, the condensation product being transformed during or after the act of molding into a hard and infusible condition.

I have found that matrices of the above general character may be rendered more resistant to the effects of molten stereotype metal at high temperatures, more serviceable, and in general more efficient under the usual working conditions, by using in conjunction with phenolic condensation products of the character above mentioned, certain structureless salts or compounds, which although soluble in water are refractory at the casting temperature of stereotype metal, say 550° Fahrenheit. Of such compounds I believe the most suitable to be the silicates of the alkali metals, and particularly sodium silicate, and the corresponding aluminates, particularly sodium aluminate.

The preparation of matrices in accordance with the present invention may be carried out as follows: A highly absorptive paper, as for example a heavy blotting paper, is first saturated by dipping or otherwise, with a strong solution of commercial sodium silicate, a twenty-five per cent. solution being suitable. The paper is then pressed to remove excess solution and is thereafter dried, for instance in a current of warm air. The dry sheets, which are still highly absorbent, are then further impregnated with a solution of a condensation product of phenols and formaldehyde, the condensation product used being such as is capable of transformation by heat into an infusible body. A condensation product of this kind may be prepared in accordance with any of the methods known to the art, or as follows: To 1000 grams of phenol are added 40 grams of caustic soda dissolved in 100 grams of

water, and 900 grams of 40 per cent. commercial formaldehyde, and the mixture is boiled in a suitable vessel, preferably provided with a return condenser, for about one hour, then quickly cooled. The liquid thus obtained may be suitably diluted by the addition of water or other solvent, either before or after the boiling process.

The impregnation should be so conducted as to load the paper approximately to its full capacity with the dissolved condensation product. It is preferable to impregnate the sheet two or more times with the condensation product, with a partial or complete drying between the impregnations, in order that it may take up as much of the condensation product as practicable. After the final drying the paper is gently heated to convert the condensation product into the so-called "intermediate" state, wherein it retains a considerable degree of plasticity but is no longer completely soluble. One effect of the preliminary saturation of the paper with sodium silicate is materially to reduce the time required for this conversion; heating to about 70° C. for a period of fifteen minutes or somewhat more will usually be found sufficient in the case of paper which has been first impregnated with the sodium silicate solution, whereas in the case of paper which has not been so treated it may be necessary to heat it for an hour or more in order to effect the desired change. The mat or blank is now preferably further strengthened by pasting on to one side of the sheet a reinforcing sheet of comparatively thin and strong paper such as sisal paper; for attaching this reinforcing sheet I preferably use sodium silicate solution, whereby an additional proportion of this salt is incorporated. After again drying, if necessary, the opposite face of the sheet, which is to constitute the molded face of the matrix, is polished by means of baryta, talc or other suitable material; or this face of the sheet is otherwise given a smooth and non-absorbent surface, as for example by applying thereto a thin sheet of paper of finer texture, such for instance as tissue or the so-called "onion-skin" paper.

The sheet, impregnated and dried as above described, is now molded in a press, heated by steam or otherwise, by forcing it against the type or other matter to be reproduced. Under ordinary circumstances, and using a temperature approximating 180° C., the

sheet should be held in the mold for approximately one minute, although good results are obtainable with longer or shorter heating periods. It is merely necessary to
5 heat in the press long enough to secure the degree of hardness requisite at this stage of the process, which degree is usually less than the maximum hardness of which the composition is capable. The sheet is immediately
10 trimmed and may then be further heated by means of a so-called "scorcher" which by the further application of heat brings the hardness to a maximum or to a sufficient approximation thereto, and completes the
15 transformation of the condensation product into an infusible body, at the same time expelling any gaseous or volatile substances which might interfere with the further operation of casting the molten metal.

20 For ordinary press work, a flat "scorcher" may be used, that is to say a hot plate, heated by any suitable means, and upon which the matrix is placed for a short time, or until a condition of hardness sufficiently approximating the maximum is attained.

25 In case a curved matrix is desired, as for rotary press work, it should of course be adapted in curvature to the requirements of the casting machine and press used. While
30 the necessary curvature may be imparted at any stage of the process before the condition of ultimate hardness is reached, it has proven satisfactory in practice to curve the matrix during the "scorching" process
35 above referred to. The matrix should be trimmed and transferred to the curved scorcher immediately after molding and while it still retains a considerable degree of plasticity. Such scorcher may be heated
40 by gas flames, or electrically or otherwise as may be preferred.

A modified procedure which is preferred under some conditions is as follows: The blotting paper is impregnated with a liquid
45 condensation product as before described, and is then baked for an hour, more or less, at about 70° Centigrade. The sheet is then dipped or otherwise impregnated with a fifty per cent. solution of sodium silicate,
50 and is thereafter thoroughly dried at normal or somewhat higher temperatures. It is then baked for fifteen minutes at seventy degrees. The sheet is then faced with thin paper, as for example sisal paper, pasted on
55 with sodium silicate solution, and is also backed with from one to three sheets of a similar light, strong paper, also applied with sodium silicate solution. The compound sheet thus prepared is then dried and
60 molded in the manner above described.

65 Matrices prepared by the above methods have been found well adapted to withstand the action of type metal introduced under pressure and at temperatures of 550° F. or upward, without any necessity for extensive

so-called "backing up" which has for its purpose the reinforcement of the blank or projecting areas of the matrix. As will be readily understood by those familiar with this art, this results in a most important
70 saving of time at the very period when such saving is most advantageous, that is to say after the molding of the matrix. Blank areas of unusually large size may require backing up, but the great bulk of this
75 work as heretofore invariably required, is eliminated.

It appears that the phenolic condensation product, by reason of its initial plasticity and its capability of ultimate transformation into an infusible and non-plastic state,
80 serves to receive and retain the impression of the type, and also to harden and strengthen the finished matrix; whereas the sodium silicate or other suitable inorganic
85 body acts as a reinforcing-agent, especially during the earlier stages of the process, while the phenolic condensation product is yet in its plastic condition.

In the above specification, as well as in
90 the following claims, the word "phenols" is meant to designate not only the first member of the phenol group, but its homologues and isomers, or phenolic bodies, or mixtures thereof, which are equivalent in this reaction.
95 And in the same way the polymers of formaldehyde, hexamethylenetetramin, or substances which may engender formaldehyde, or which are equivalent thereto in this reaction, may be used as equivalents of formaldehyde.
100

The invention is not restricted to the particular manipulations herein above described as illustrative. Nor is the invention
105 restricted to the use of soluble silicates as reinforcing agents, inasmuch as it is possible that other salts, compounds, or inorganic bodies, preferably structureless, which are soluble in water but are refractory in a solid state in presence of molten stereotype
110 or linotype metal, or similar alloys, may be substituted therefor and may be equivalent thereto for the purposes of this invention.

Salts or compounds which are basic in character or which have an alkaline reaction
115 in aqueous solution are preferred, since by their use the baking and molding processes appear to be materially accelerated.

I claim:

1. A mat or blank for molding stereotype and similar matrices, comprising a fibrous sheet containing a plastic organic body which is hardened and rendered infusible by a chemical transformation occurring under the action of heat, and a reinforcing-
125 agent.

2. A mat or blank for molding stereotype and similar matrices, comprising an absorptive material containing a structureless inorganic body which in the solid state
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is refractory in the presence of molten stereotype or linotype metal, and a plastic organic body which is hardened and rendered infusible by a chemical transformation occurring under the action of heat.

3. A mat or blank for molding stereotype and similar matrices, comprising a fibrous material impregnated with a structureless inorganic body which in the solid state is refractory in the presence of molten stereotype or linotype metal, and with a plastic phenolic condensation product which is capable of transformation by heat into an infusible product.

4. A mat or blank for molding stereotype and similar matrices, comprising fibrous material impregnated with a silicate of an alkali metal and a plastic phenolic condensation product which is capable of transformation by heat into an infusible product.

5. A matrix for metallic stereotype and similar plates, comprising fibrous material containing a structureless inorganic body which in the solid state is refractory in the presence of molten stereotype or linotype metal, and an infusible phenolic condensation product.

6. A matrix for metallic stereotype and similar plates, comprising a fibrous material containing a silicate of an alkali metal and an infusible phenolic condensation product.

7. The method of making stereotype and similar matrices, which consists in impregnating a fibrous material with a structureless inorganic body which in the solid state is refractory in the presence of molten stereotype or linotype metal, and with a plastic

phenolic condensation product, and molding the composition under heat and pressure, whereby said condensation product is transformed into an infusible body.

8. The method of making stereotype and similar matrices, which consists in impregnating a fibrous material with a silicate of an alkali metal, and with a plastic phenolic condensation product, and molding the composition under heat and pressure, whereby the said condensation product is transformed into an infusible body.

9. The method of making stereotype and similar matrices, which consists in impregnating a fibrous material successively with a structureless inorganic body which in the solid state is refractory in the presence of molten stereotype or linotype metal, and with a plastic phenolic condensation product, and molding the composition under heat and pressure, whereby said condensation product is transformed into an infusible body.

10. The method of making stereotype and similar matrices, which consists in impregnating a fibrous material successively with a silicate of an alkali metal and with a plastic phenolic condensation product and molding the composition under heat and pressure, whereby the said condensation product is transformed into an infusible body.

In testimony whereof I affix my signature in presence of two witnesses.

GLENN S. WILLIAMSON.

Witnesses:

PAUL LAUGERFELD,
EDMUND D. TITUS.