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PREPARATION OF MATERIALS FOR EMBOSSING

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This invention relates to the preparation of materials for embossing and similar treatments.

It possesses utility in all arts where sheets of material are embossed, and as a specific illustration of the details of our invention the description following is applied to the art of manufacturing and conditioning and using of stereotype mats.

One object of the invention is to produce a mat of even thickness and a smooth surface.

Another object of the invention is to produce a mat of the character indicated having a cellulose base of the type usually referred to as a dry mat which has a surface texture of such quality as to receive and hold impressions of the type and maintain them sharply.

Another object of the invention is to produce a mat of the character indicated which can be used a great number of times without loss of quality.

Another object of the invention is to produce such a mat neither of whose surfaces will be altered during the "scorching" step in their use.

Another object is to produce a mat which can be used in reproduction by stereotypes of fine screen half tones.

Another object is to produce a mat which will not be subject to "picking" and further injury when the type casting is removed from it.

Another object is to produce a mat which is coated on both the front and back.

Other objects of the invention will in part appear hereinafter and will in part be obvious.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the article possessing the features and properties which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

Two types of stereotype mats are known to the industry under the names wet mat and dry mat.

The wet mat is made of a sheet of paper built up to the required thickness by sheets of tissue paper secured to it and to each other by paste. This mat is prepared in the establishment where it is used, and is used immediately after it is made.

The dry mat, on the contrary, is normally produced in a factory, and conditioned and sent to the user, in condition for immediate use.

The mat to which this invention relates is a dry mat and has a cellulose base. Its process of manufacture is outlined below.

The cellulosic base is mixed in a beater with suitable binding agents, all as is known in the paper manufacturing industry and this pulp is formed upon the usual type of paper making machines and cut into sheets of the desired thickness and approximately three by four feet in dimensions.

These sheets are arranged in piles about three feet high, and pressed to remove excess water, and then further dried by well known means to the desired moisture content, and trimmed to the proper size.

When it is desired to give these mats the necessary coating as described below they are conditioned to the moisture content which will best facilitate the proper penetration of the coating mixture passed into a coating machine of any usual type and coated with the mixture described hereinafter or the coating may be applied in any convenient way. They are then passed through a drier and then calendered in a well known manner to the desired thickness and smoothness of surface, and then stored.

The mats can remain in this condition indefinitely, and be handled easily and rapidly. They are tough and flexible and have smooth surfaces, tough enough not to be harmed by careful handling, but to yield easily to the pressure from type in the press.

It is necessary that these qualtities be retained until after the mats have been pressed upon the type formes. But during the "scorching" process they must change into rigid hard sheets, able to withstand the pressure and heat of the molten metal in the casting box. The conditioning liquid gives them the ability to undergo this change of character. Although some proportions of the coating materials might also do so, we are able to produce exact and uniform results in a number of mats by the proportions we use, in connection with the said conditioning liquid.

When the mats are to be shipped to the user, they are conditioned with a liquid which will give them the necessary softness and pliability and which may react with the materials of the coating to render it more tenacious and to make the mat capable of receiving and retaining sharp impressions from the type in the casting process.

This conditioning liquid may be simply water, but very generally it is a solution of substances described hereinafter.

The conditioning liquid may be applied in any effective manner, either manually with brush, sponge, or by spraying, but we prefer to apply it by mechanism, constructed to carry the mats beneath the surface of the conditioning liquid at a determined rate, one embodiment of such mechanism is disclosed and claimed in a copending

application of one of us, A. R. Bradie, Serial No. 300 filed January 3, 1935.

After the mats have been conditioned they are placed, in convenient numbers, in water tight containers and sealed therein in order to retain the moisture.

These containers may be of rigid form, such as sheet metal, wood, or fiber, boxes, a wrapping of waterproof paper or other flexible material, as Cellophane, the waterproof paper being preferred.

The operations in a stereotype plant are well known to those skilled in the art, but will be outlined here in order to bring out more clearly the advantages of our mat, over those hitherto used.

In the stereotype plant connected with a newspaper the form of matter to be stereotyped is placed upon the flat bed of a roller press and the mat placed face down upon this form, and normally covered with a blanket of rubber, cork, felt or other suitable material. The whole is then passed beneath the roller whereby such heavy pressure is imposed upon the mat that the type are driven into its surface, and the material of the mat is forced into the faces of the type, the spaces between them and the depressions in the half-tones, if there be any present.

In the stereotype plants of book printers or of news syndicates the press used is of the direct pressure type, such as a hydraulic press, where the pressure is direct and simultaneously equal over the whole surface of the mat.

In order to avoid shrinkage where the mats are used by direct pressure, they may be dried upon the forms, but in mats prepared for roller press work, shrinkage is often desirable and drying may be done after removal from the form.

In this case, after the mats are removed from the form, they are heated to remove all the water. This may be done by heating between asbestos blankets, but it may also be accomplished in vacuum apparatus.

The temperature of this process, technically called "scorching", is close to that at which the mat will darken and become brittle, and is in the neighborhood of 350 degrees to 450 degrees Fahrenheit.

After the mat has been "scorched" it is placed in a casting machine, in which molten type metal is poured upon it and allowed to solidify in contact therewith. The molten metal flows into the depressions made by the type, and when cooled has in its face reversed replica or negative impression, of the face of the mat, that is, a duplicate or positive, of the face of the type from which the mat was made.

Some of these casting machines cool the metal by water, others allow it to cool by radiation of its heat to the atmosphere. Where the cooling is by radiation, the mat is apt to be made brittle because of the destructive action of the long continued heat of the metal. The metal should become solidified and be removed from the mold in from a few seconds to five minutes, depending upon whether water is used for cooling, the thickness of the cast, the temperature of the metal, and that of the casting box. As soon as the metal is solidified it is removed and the mat is normally then used for repetitions of the casting operation.

In casting as at present practiced, the molten metal frequently penetrates crevices or adheres to the surfaces of parts of mats which are not wholly satisfactory and when the cast and mat are separated will remove small particles therefrom and both mat and casting be rendered thereby useless the mat, because the removal will be repeated in subsequent castings, the casting, because its face will be imperfect. This defect is called "picking".

The coating that is applied to the mats as described above may comprise a solution of one of the proteins of animal origin, such as egg albumen, casein, blood serum, or one of the forms of hydrated collagen, all of which substances unite with tanning materials.

Of these substances, glue is typical, and will be used in the remainder of this specification and in the claims, not in a limiting sense, but as typical of the class indicated above.

This solution must contain also a peptizer, or stabilizer of the glue or equivalent substances, among which are the aliphatic amines, such as ethanolamine, biuret, guanidine, thiourea, urea and structurally similar substances, acetic acid, nitric acid, phenol and other substances. Urea is preferred because easily obtained and in quantity of proper purity, low cost, and ease of manipulation.

The coating solution must also carry a filler which may be whiting, slate flour, clay, barites, lithopone, and any other finely divided inert material used as filler in similar arts.

The coating may also well carry an antiseptic, which may be any one of the many available, the only limitation being that the one chosen shall be inert to other ingredients of the liquid. We usually make use of phenol, because of the ease with which it may be procured.

The function of the glue in the coating solution is to hold the filler in the mat, and to give to the finished mat a tough, smooth surface, of sufficient hardness to receive and hold the impressions of the type.

But rigidity of the mat is undesirable prior to the casting operation, and glue alone would make the mat rigid when it receives the drying immediately following the coating as described above.

To prevent this, a peptizer of the glue is added to the coating mixture. This may be any one of those listed above, but we prefer to use urea because its cost is not prohibitive, it can be procured of proper purity in any quantity, and is easily handled.

These peptizers listed above have the property of lowering the setting point of glue, and, if sufficient is added, will even cause it to remain liquid at the ordinary temperature.

Mats coated with this mixture remain soft and flexible until they are passed through the conditioning fluid, when they gain in stiffness, and become rigid during the "scorching" step.

This gain in stiffness is attributed to the tanning action of the tanning material in the conditioning fluid.

As such tanning material any of the natural tans, of the chemical tans, such as formaldehyde, aluminum and chromium salts, and of the synthetic tans may be used, but we prefer to use formaldehyde, which unites with the glue, displaces the peptizer, and so renders the mat water-proof and of proper rigidity.

A typical example of a coating liquid which we have used with satisfaction, is the following:

	Parts
Glue	5
Urea	5
Inorganic filler	40
Water	90

all of the parts being by weight.

To prepare this we first swell the glue in the water, then add the urea and dissolve both by heating, and when the solution is complete, the filler is stirred in, and a little antiseptic added.

The proportions of the glue and peptizer may vary between wide limits, depending on the quality of the glue and the amount desired in the mat. In general, the lower the quality of the glue, the less the amount of the urea necessary and the poorer the finished mat in quality.

The conditioning liquid we prefer to use is a one per cent solution of formaldehyde in water, and this is applied at the atmospheric temperature, although a higher temperature is not in any sense critical.

It is readily seen that the degree of stiffness and water-proofness can be controlled by the amount of tanning agent the mat is allowed to absorb, and that this can be readily controlled by the time a mat is allowed to remain in the conditioning fluid.

We find that with mats of our manufacture, as described above, an immersion of 5 seconds in the conditioning liquid gives satisfactory results but this time is stated purely as illustrative and not in a limiting sense. This time is controlled by changing the speed of the mechanism mentioned on page 3 of this specification.

It is the present practice to coat the mats on only the one surface, the face side, which is presented to the type in the press.

We follow the present practice generally, but we also coat mats on both sides. The coating is not necessarily the same on both sides.

The molded mat consists of hollows and raised places, a raised place on one face being represented by a hollow on the other. In the present practice it is necessary to always back up the mat by an operation known as "packing". This is done by means of gummed felt strips pasted in the depressions on the back of the mat in order to give them such rigidity that the molten metal will not cause them to collapse when poured upon the mat.

Just as the application of a coating to the face of a mat gives increased strength and rigidity, the addition of a coating to the back increases this rigidity, and the effect of this increase is such that so much care need not be expended in "packing" and in some types of work no packing needs to be done.

Another advantage of the coating on the back of a mat is that the mat is not so easily destroyed by heat in the casting operation. When the casting box is air cooled alone, the back becomes very hot, and the temperature often becomes so high as to harm the back of the mat to such a degree that the face gives way. This does not occur in the double coated mats.

When properly handled to avoid mechanical damage, the mat which is the subject of this invention will give more casts of metal than the mats now available on the market. This is a distinct economy since a lesser number of mats need be made from a form, in order to get the same number of reproductions in metal. In syndicate work, for instance, it is sometimes desired to make several stereotypes, and if the mats are resistant to scorching, picking, etc., a less number of them need to be used than if they were subject to those defects. More than 25 stereotypes have been made from single mats of our manufacture.

It is evident to those skilled in the arts concerned, that the coating, calendering, conditioning and drying steps above described, have utility in the manufacture of fibrous articles which are to be embossed or printed in relief, or pressed into form where such configuration can be produced by forcing type or dies into the surface of such material and heating be used to fix the embossing or relief printing into the surface.

As examples of such articles we name embossed signs of paper or analogous material, egg-supports designed to support eggs in crates and cartons, drinking cups, wall paper, books for the blind, book covers, etc.

For example in the production of an embossed wall decoration, either before or after printing or otherwise decorating it, the sheet may be pressed or run between rollers analogous to the process described for reproduction of type and a sheet or a continuous roll thus produced which can then be fixed according to the described procedure. The permanence of books so printed in Braille for the blind is obvious.

Since certain changes in carrying out the above process, and certain modifications in the article which embodies the invention may be made without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What we claim is:

1. The process of preparing a stereotype mat which comprises conditioning a sheet of cellulosic material to the proper moisture content for reception of a coating mixture, applying such coating mixture, drying, calendering the mat to the desired hardness and thickness, and passing it through a conditioning liquid.

2. The process of preparing a stereotype mat which comprises coating it with a viscous mixture of proteid material of animal origin, a peptizer thereof, and a filler, drying, calendering the coated mat to the desired thickness and surface, and then conditioning it for receiving the type impression.

3. The steps in the preparation of a stereotype mat which consist in coating it with a viscous mixture of a proteid material of animal origin, a peptizer of such material and a filler, drying and calendering the coated mat to the desired thickness and hardness.

4. The step in the preparation of a stereotype mat which consists in conditioning a dry, coated and calendered sheet of cellulosic material by treatment with a suitable conditioning liquid.

5. The process of preparing a stereotype mat which comprises coating a sheet of cellulosic material with a mixture of glue, a peptizer thereof and a filler, drying, calendering the coated sheet to the desired thickness and surface, then conditioning it for treatment with a liquid containing a constituent which acts chemically upon at least one constituent of the coating, and finally removing excess water from the sheet.

6. The process of claim 5 in which the conditioning liquid has a tanning effect upon at least one constituent of the coating material.

7. The process of preparing a stereotype mat which comprises coating a sheet of cellulosic material having a cellulose base with a mixture of animal glue, an amino compound which peptizes

the glue, and a filler, drying, calendering the mat to the desired thickness and surface, and then submitting it to the action of a conditioning solution which consists of a 1 per cent solution of formaldehyde.

8. The process of claim 7 in which the amino compound that peptizes the glue is urea.

9. As an article of manufacture, a stereotype mat having a smooth, even and tough surface, carrying a coating comprising a filler, the reaction product of a mixture of glue, urea and formaldehyde, and of proper moisture content for immediate use.

10. As an article of manufacture and commerce, a mat, having a coating upon both sides, a smooth and even surface uniform thickness and conditioned ready for use in the stereotype process.

11. As an article of manufacture, a stereotype mat in flexible condition and having a firm, even surface, maintained in such condition by a coating comprising the reaction products of a filler, glue and urea.

12. The process of claim 1 in which the coating mixture is applied to but one surface of the mat.

13. The process of claim 1 in which the coating mixture applied to the back of the mat is not the same in composition as that applied to the face thereof.

14. A composition of matter adapted for use in coating sheets of cellulosic material, comprising a viscous mixture of proteid material of animal origin, a peptizer thereof, a filler and water, which mixture, when coated upon said sheet and the sheet is calendered gives to said sheet a smooth, tough surface and maintains it in a flexible condition.

15. A composition of matter adapted for use in coating sheets of cellulosic material, comprising a viscous mixture of proteid material of animal origin, a peptizer thereof and a filler, which mixture when existing as a coating upon such sheet, and the so-coated sheet is passed through a tanning solution and heated to 350 degrees to 450 degrees Fahrenheit, renders the sheet rigid and hard.

16. The process of preparing a sheet for printing in Braille which comprises conditioning a sheet of cellulosic material to the proper moisture content for the reception of a coating mixture which mixture comprises a viscous mixture of proteid material of animal origin, a peptizer thereof, and a filler, applying such mixture, drying the coated sheet, calendering it to the desired thickness and surface conditioning it to receive the impression of Braille dies, impressing it upon said dies and scorching it to necessary hardness while in contact with said dies.

17. The process of embossing sheets of cellulosic material which comprises conditioning such sheets to the proper moisture content for the reception of a coating mixture which mixture comprises a viscous mixture of proteid material of animal origin, a peptizer thereof, and a filler, applying such mixture, drying the coated sheet, calendering it to the proper thickness and surface, conditioning it to receive embossing impressions embossing it by passage between treated embossed rollers.

18. The process of claim 17 modified by an ornamentation of the sheet after it has been calendered and before it has been conditioned.

19. The step in the preparation of a sheet of material for embossing, which comprises conditioning a dry, coated and calendered sheet of cellulosic material, the coating of which contains a tannable constituent, by treatment thereof with a conditioning liquid which contains a constituent having tanning properties.

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