

1

2,726,164

STEREOTYPE MAT

Russell R. Eichmeier, Freeport, Ill., assignor to Burgess Cellulose Company, Freeport, Ill., a corporation of Delaware

No Drawing. Application February 28, 1952,
Serial No. 274,070

9 Claims. (Cl. 117—5.1)

This invention relates to improvements in stereotype mats, and particularly to a stereotype mat having upon its molding and casting surface an absorbed coating of a composition which imparts improved molding and casting properties to the stereotype mat.

The present invention relates to the conventional type stereotype mat which is in common use and which consists of a relatively thick sheet of felted cellulose fibers, which may be composed of rag stock, cotton linters, wood fibers produced by chemical pulping processes, such as alpha, sulfite, soda pulp fibers, or the like. Following conventional practice, an aqueous slurry of the fibers is formed in the wet machine of a paper-making machine and is felted out in the form of a web on the screen of the wet machine and the web is transferred to a roll upon which the web is wound until a multiplicity of layers has been built up to form a sheet or mat of the desired thickness. A filler such as powdered clay, silicate, talc, etc. is usually mixed with the fibers in the wet machine and thereby incorporated with the fibers in the body of the sheet.

The built-up sheet is removed from the roll and dried and compressed until the thickness is suitable for a stereotype mat, which, in usual practice, is approximately .015 inch to .040 inch. During the compressing operation, the surface of the mat which is to receive the impression from the form and against which the molten stereotype metal is to be cast is calendered, whereby it is dense and very smooth and there are no projecting fibers. The opposite surface of the mat is usually maintained against a porous surface such as a woven fabric belt to permit the ready escape of moisture, and said opposite mat surface is relatively porous and irregular. The impression receiving surface is usually called the face and the opposite surface the back, and these terms will be used herein.

The face of the stereotype mat may have a coating composition, composed, for example, of a salt of a higher fatty acid, clay, and starch, dextrin, or the like applied to it for the purpose of enhancing its smoothness, uniformity and toughness and promoting the release of the metal after the casting operation. A suitable composition for this purpose is disclosed in United States Patent No. 1,863,731.

To be made ready for use, the stereotype mat is moistened with water to render it plastic and it is essential that the mat be capable of ready absorption of water. The usual water content for use is approximately 10% to 50%, based on the total weight of the mat. In this moistened and plastic condition the form or pattern containing the type, cuts, half-tones, etc. is impressed against the face of the mat and the latter takes a deep and well-defined impression of the form, including the details thereof.

After the impression has been taken, all of the moisture is rapidly driven out of the mat by subjecting it to heat in what is called a "scorcher." An essential property of the mat is that it permits the moisture to escape very rapidly without undergoing rupture due to the formation of steam. For this purpose, the back of the mat is rela-

2

tively porous and irregular as described hereinbefore. The moisture escapes from the back, and during the moistening of the mat the moisture is absorbed principally through the back.

After the mat is dry, the face containing the impression of the form is hard, tough, smooth and finely detailed and adapted to impart an accurate reproduction of the form to the cast type metal. The reproduction is made by casting molten type metal against the face of the mat in a casting box, and allowing the metal to cool and solidify. Most printing is done by means of cylindrical presses, and in such case the casting box is of curved shape and the dried mat is curved to conform to the shape of the box. It is of utmost importance that the face of the mat be hard, smooth and tough and free of any roughness or projecting fibers. Otherwise the molten metal will flow around the projecting fibers and adhere at the rough areas, and when the solidified metal is separated from the mat it will pull such fibers from the mat and tear away the surface material at the rough areas, with the result that the face of the mat is marred and the mat is rendered unsuitable for the taking of additional casts. It is essential for satisfactory performance that a large number of reproductions be obtained from the same mat. It is not uncommon for as many as thirty reproductions to be taken from a single mat.

In accordance with the present invention, the stereotype mat is caused to have present at the face thereof an absorbed coating of a composition which imparts friability to the fibers and promotes the ready release of the cast plate. The action by which friability is imparted is mild rather than drastic, whereby the hardness, smoothness, toughness and durability of the face of the mat are not impaired in any appreciable extent, while at the same time a substantial friability of the surface fibers is produced whereby any projecting fibers or any minutely rough surface portions, which become attached to the molten metal during the casting operation, are broken off without tearing into or marring the face of the mat. In addition, the composition facilitates the release of the solidified metal from the mat. The cast metal having penetrated into the indentations of the mat, there is naturally considerable friction which needs to be overcome in separating the mat from the metal. It is customary practice to provide a substance at the face of the mat, such as the composition of Patent 1,863,731, to promote release of the metal from the mat, and the composition of the present invention exhibits superior properties in reducing friction and promoting such release.

In accordance with the present invention, the composition which is applied to the face of the mat comprises a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms. The compound is described in United States Patent No. 2,273,040, dated February 17, 1942. A detailed description of said compound is contained in said patent and will not be repeated herein, but is hereby incorporated herein by reference. The nomenclature used in said patent of designating particular acyloxy groups by adding the suffix "ato" to the first portion of the name of the carboxylic acid corresponding to the acyloxy group will be adopted herein. For example, the acyloxy group corresponding to stearic acid will be designated the "stearato" group, that corresponding to palmitic acid the "palmitato" group, and that corresponding to lauric acid the "laurato" group, etc. As in said patent, it is preferred herein that the ratio of the number of trivalent chromium atoms to the number of acyloxy groups having at least ten carbon atoms will not be more than approximately ten to one.

The said patent embraces complex compounds of the Werner type in which trivalent nuclear chromium atoms

3

are co-ordinated with both saturated and unsaturated acyloxy groups having at least ten carbon atoms, but for the present invention only those compounds in which the trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups are suitable. The preferred compounds are the stearato, palmitato and laurato compounds. Stearato chromic chloride is the name by which one of such compounds has been designated, and it is a preferred compound for the purpose of the present invention. The said compounds are soluble in water and are also soluble in organic solvents such as methanol, ethanol, isopropanol, butyl carbitol, tertiary butyl alcohol and butyl acetate.

In accordance with the said patent, the compositions thereof are used for the purpose of increasing the hydrophobic properties of surfaces; for example, they are used for the purpose of imparting a water-proof character to the surface of paper. In accordance with the present invention, the complex compounds of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms are not employed for the purpose of imparting water-resistance or a water-proof character to the stereotype mat, but rather for the purpose of imparting a mild friability to the surface fibers thereof and for the purpose of promoting the release of the metal plate from the stereotype mat after the casting operation. Any water-proof character which is imparted to the stereotype mat is incidental and is neither beneficial nor detrimental. The compound is applied as an absorbed coating at the face of the mat, and the moisture for imparting plasticity is absorbed through the back, and this property of the mat is not appreciably affected by the presence of the compound.

It is, therefore, the object of the invention to provide an improved stereotype mat the face of which is smooth and hard and at which the fibers possess a mild friability such that separation of the mat from the cast metal is obtained without fracture of the surface or tearing of the fibers at the surface, and in which the release of the cast metal from the stereotype mat is promoted and the separation is accomplished with less effort.

The object is obtained by having present at the molding and casting surface of the mat an absorbed coating of a composition comprising a complex compound of the Werner type in which a trivalent nuclear chromium atom is co-ordinated with a saturated acyloxy group having at least ten carbon atoms.

It is also objects of the invention to provide a method for improving the casting properties of a stereotype mat by contacting the molding and casting surface thereof with a composition comprising the complex compound described and to provide a coating composition for stereotype mats comprising said compound.

The complex compound is applied to the face of the mat in solution in a suitable solvent. It is an important advantage of the invention that the composition is applied in the form of a solution, because the solution is absorbed into the surface portion of the mat where it is firmly held and utilized to the fullest extent. This is not the case with the release-promoting and friability-producing agents used in the past which are insoluble and are applied in the form of emulsions or suspensions. With agents of the latter type it is difficult to secure a sufficient bond to the mat to prevent substantial loss during handling, molding and casting.

The compound may be applied in solution in water or a mixture of water and an organic solvent for the compound such as has been described hereinbefore. The proportions of the solvent mixture may vary from those in which the water component predominates to those in which the organic component predominates. A solvent mixture which has been found to be suitable is one composed of about 10% to 20% isopropanol and the remainder water. While any concentration of

4

the compound in the solvent may be used as desired, dilute solutions are preferred since only a small amount of the compound is required to produce the beneficial effect in the stereotype mat, and more satisfactory spreading and control are obtained with dilute solutions. Solutions containing about 3% to 30% of the compound have been found to be suitable. An example of a solution which is quite satisfactory is one containing approximately 5% to 8% of the compound in water or a mixture of water and isopropanol. All proportions given herein are on a weight basis.

The amount of the composition which may be used may be varied. As stated heretofore, only a small amount is required to provide beneficial results in accordance with the invention and it has been found that an amount of the compound of the Werner type in which a trivalent chromium atom is co-ordinated with a saturated acyloxy group having at least ten carbon atoms of about .0003 to .008 gram per square inch of stereotype mat face produces satisfactory results. More than .008 gram per square inch may be used but will not result in appreciably improved results.

The composition may be applied to the face of the stereotype mat at any time prior to the casting of the stereotype plate, and very good results are obtained when it is applied after the molding operation and before the drying operation which is carried out in the scorcher.

There is also preferably present in the coating composition an adhesive which assists in bonding the cellulose fibers together at the face portion of the mat and renders the face portion more tough, dense and compact and decreases the tendency of individual fibers to project from the surface of the mat. In the presence of the adhesive, fibers which may project and become embedded in the cast metal are broken off rather than pulled out when the plate is separated from the mat, whereby injury to the mat is avoided. The water-compatible adhesives may be used, by which is meant those which are dissolved or softened by water or can be emulsified with water or are otherwise affected by water so as to be effective for the adhesive purpose. Suitable adhesives are starch, both oxidized starch and unoxidized starch, dextrin, polyvinyl alcohol and the like. The adhesive may be present in the same coating composition with the complex compound of the Werner type in which trivalent chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms, or a separate liquid coating composition may be made containing the adhesive and this may be applied separately to the stereotype mat face. The adhesive is preferably applied to the mat prior to the molding operation.

The following are several examples of the improved stereotype mat of the present invention including the methods of their manufacture. It is to be understood that these specific examples are given by way of illustration and not of limitation and that various changes and modifications may be made as will occur to those skilled in the art.

Example 1

An aqueous slurry of coniferous alpha pulp fibers is placed in a beater and beaten until the fibers are well separated and there is a suitable hydration thereof. A suitable amount of a filler, in this case approximately 15% of powdered talc, based on the oven dry weight of the fibers, is added to the slurry, and the mass agitated until a thorough, intimate mixture of the fibers and filler is obtained. The slurry is then transferred to the wet machine of a paper-making machine and the mixture of fibers and filler is felted out on the screen in the form of a web and the web transferred to a roll upon which it is wound until a sheet of the desired thickness is obtained. The sheet is then removed from the roll and dried and compressed to the desired thickness of between .015 and .040 inch, for example .027 inch. The compression and drying are carried out with

5

a porous woven fabric sheet against the back of the mat and with a calendering roll operating across the face of the mat, whereby the face is compressed to a relatively dense, smooth, uniform surface, while the back is relatively porous and irregular.

A coating is applied to the calendered face of the stereotype mat of the following composition in parts by weight:

Powdered oxidized starch -----	1.5
Stearato chromic chloride -----	7.5
Water -----	91

The oxidized starch is first heated with the water until it is dispersed. The stearato chromic chloride is then added and the liquid composition is thoroughly mixed in a Waring blender and is then cooled to room temperature. The oxidized starch forms an emulsion and the stearato chromic chloride goes into solution in the water in this operation. The resulting composition is a fluid liquid.

The composition is applied to the face of the mat by a spraying apparatus which applies a uniform coating over the surface of the mat. The amount of coating is controlled so that the amount of stearato chromic chloride is equal to approximately .0015 gram per square inch of the face of the mat. The oxidized starch serves as an adhesive which assists in bonding the fibers together as described hereinbefore.

A stereotype mat so prepared was humidified so as to contain approximately 20% of water, based on the dry weight of the mat, and was then subjected to the usual molding procedure in which a printing form containing type, cuts and half-tones was impressed against its face. The mat took a deep and sharply defined impression of the form. Thereafter it was dried in a scorcher and placed in a casting box and molten type metal was cast against it and then allowed to cool and solidify in accordance with usual casting procedure. An exact, finely-detailed reproduction of the original form was made, and the cast plate was readily separated from the stereotype mat. After this separation, the face of the stereotype mat remained smooth and hard and free of roughness and fractures. A number of such reproductions were made from this stereotype mat and the latter retained its excellent condition.

For comparison purposes, a second stereotype mat which had been made in the manner described in the foregoing was treated upon the calendered face thereof with a composition of the preferred formula set forth in Patent 1,863,731 instead of the composition containing stearato chromic chloride. The composition consisted of starch, dextrin, clay, bentonite, sodium stearate, potassium chromate and water and was applied by the procedure set forth in Patent 1,863,731. This mat was molded and cast in the same manner as the first, employing the same printing form. The mat having the coating containing stearato chromic chloride showed a marked superiority in casting release as was evidenced by its easier removal from the stereotype plate, its smoother and less fuzzy appearance. Said mat also showed a superior adherence of the coating to the mat face as was evidenced by absence of any coating composition on the original printing form, whereas a substantial amount of the composition was present on the printing form after it had been separated from the mat treated in accordance with Patent 1,863,731.

Additional stereotype mats were treated with the composition given in Example 1 containing stearato chromic chloride in which compositions ordinary starch and polyvinyl alcohol respectively were used as adhesives in place of the oxidized starch. Each of the mats exhibited the superior release properties and coating adherence described hereinbefore.

Example 2

A stereotype mat is formed in the manner described

6

in connection with Example 1 through the operation of drying and compressing by a calendering operation to the desired thickness. A coating composition such as is described in Patent 1,863,731 is then applied to the face of the mat, and after this has been absorbed and the surface of the mat is not wet, a solution composed of 7.5% stearato chromic chloride and 92.5% water is applied uniformly to the face of the mat in an amount so as to provide approximately .0015 gram of stearato chromic chloride per square inch of mat surface. The resulting stereotype mat exhibits superior molding and casting performance in the same manner as described in connection with the stereotype mat of Example 1.

In this mat the starch and dextrin of the coating first applied serves as the adhesive for assisting in binding together the fibers.

Example 3

A stereotype mat is formed and treated in the same manner as described in connection with Example 2 with the exception that the second coating composition was composed of 7.5% stearato chromic chloride, 77.5% water and 15% isopropanol. The resulting mat exhibited the same excellent molding and casting properties as did the mat of Example 2.

Example 4

A stereotype mat is formed as described under Example 2 through the operation of applying the coating composition such as is disclosed in Patent 1,863,731. This mat is then molded in the manner described heretofore and after the molding operation a coating composition composed of 7.5% stearato chromic chloride, 77.5% water and 15% isopropanol is applied to the molded face of the mat. The mat is then dried in a scorcher, after which it is subjected to a casting operation as described above. Such a stereotype mat exhibits the same excellent casting properties as does the mat of Example 1, and is capable of forming a large number of casts.

A considerable amount of the benefit of the present invention may be obtained by local application of the coating composition to those areas of the mat where the impression is relatively deep and the detail is relatively fine. The following is an example of such an application.

Example 5

A stereotype mat is prepared as described under Example 4 with the exception that the coating containing stearato chromic chloride which is applied after the molding operation is applied only to those areas where the impression is deep and the detail is fine. The mat is then dried in the scorcher and subjected to a casting operation as described above. The mat exhibits substantially the same excellent casting properties as does the mat of Example 1.

As stated heretofore, the improved casting properties of the stereotype mat are due to a friability characteristic which is imparted to the mat at its face. Such friability-producing action is mild and is not accompanied by degradation of the cellulose fiber as occurs when friability or shortening is accomplished by means of an acid. Another factor which contributes to the improved casting properties is the friction-reducing or lubricating effect upon the face of the mat which is produced by the complex compound of the Werner type which has been described herein, which effect markedly promotes the ease of separation of the cast plate from the stereotype mat. As a result, a large number of casts of exceptionally high quality can be obtained from a single mat.

What is claimed is:

1. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding

7

and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

2. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms, the ratio of the number of chromium atoms to the number of saturated acyloxy groups being not greater than ten to one, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

3. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms in an amount equal to approximately .0008 to .008 gram of the compound per square inch of said molding and casting surface, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

4. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with stearato groups, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

5. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with palmitato groups, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

6. A stereotype dry mat capable of undergoing the

8

molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with laurato groups, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

7. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof an absorbed coating of stearato chromic chloride, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

8. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having a thickness of approximately 0.015 inch to 0.040 inch and having a smooth, densely compacted calendered molding and casting surface and a relatively irregular porous opposite surface, said molding and casting surface having present an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

9. A stereotype dry mat capable of undergoing the molding and casting operations of stereotyping procedure and comprising co-felted cellulose fibers and discrete particles of a filler, said mat having present at the molding and casting surface thereof a water-compatible adhesive and an absorbed coating of a composition comprising a complex compound of the Werner type in which trivalent nuclear chromium atoms are co-ordinated with saturated acyloxy groups having at least ten carbon atoms, the surface of said stereotype mat opposite said molding and casting surface thereof being readily moisture-absorbent.

References Cited in the file of this patent

UNITED STATES PATENTS

58,944	Hurlbut	Oct. 16, 1866
1,863,731	Schorger	June 21, 1932
2,112,023	Hosking et al.	Mar. 22, 1938
2,273,040	Iler	Feb. 17, 1942
2,378,193	Cummins et al.	June 12, 1945
2,410,414	Johnson	Nov. 5, 1946
2,549,220	McLaren	Apr. 17, 1951