J. A. BAILEY & H. E. KALUSOWSKI.

METHOD OF PREPARING STENCIL EMULSIONS.

APPLICATION FILED JUNE 27, 1916.

**1,231,554.** Patented July 3, 1917.

Fig. 1.

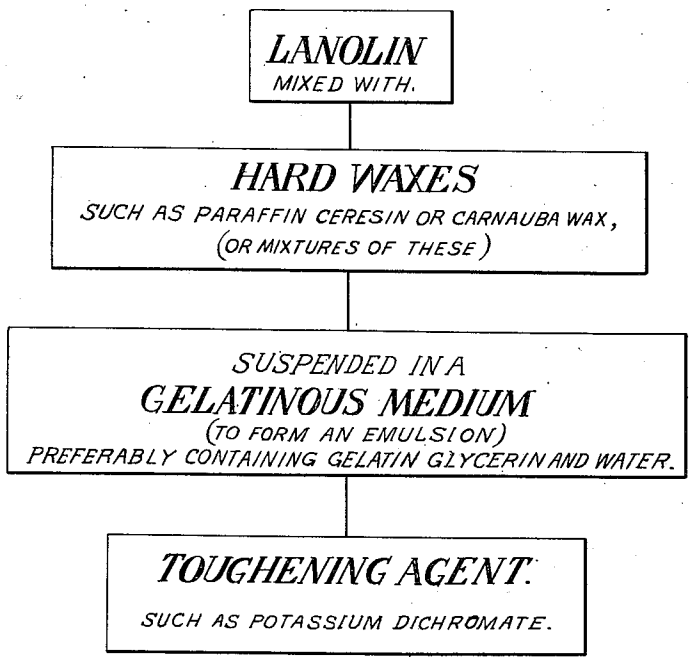
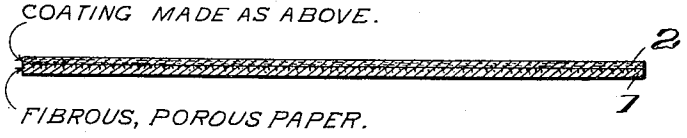



Fig. 2.




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## METHOD OF PREPARING STENCIL EMULSIONS.

1,231,554. Specification of Letters Patent. Patented July 3, 1917.

Original application filed March 19, 1915, Serial No. 15,557. Divided and this application filed June 27, 1916. Serial No. 106,289.

*To all whom it may concern:*

Be it known that we, JAMES A. BAILEY and HENRY E. KALUSOWSKI, citizens of the United States of America, and residents of Washington, District of Columbia, have invented a new and useful Improvement in Methods of Preparing Stencil Emulsions, which invention is fully set forth in the following specification.

The present invention is a division of our application Serial No. 15,557, filed March 19, 1915, for improvements in paper stencils and baths for making the same.

The object of the present invention is to provide an improved method of preparing stencil-sheet emulsions whereby a stencil-sheet made in accordance with our process will possess the characteristic property of retaining its susceptibility of taking stencil impressions without requiring the application of moisture to soften the sheet; and will retain the characters impressed therein, thereby enabling repeated use of the stencil; will be ink-resisting; and will enable ink solvents to be used in cleaning the stencil-sheet without injury thereto.

Heretofore stencil-sheets have been made for producing multiple copies by applying to a porous fibrous base, such as Japanese Yoshino paper, a solution of gelatin in water and glycerin, together with a toughening agent for the gelatin, such as potassium dichromate. Stencil-sheets have also been made by saturating tissue paper with paraffin or wax. Sheets thus prepared, when impressed by a stylus or by typewriter type characters, are expected to give a stencil through which ink will readily pass at those portions of the sheet so impressed but where the paper has not been impressed, no ink should pass through the sheet. Gelatin stencil-sheets yield good printing results when the sheet is freshly prepared, or if subsequently moistened, but the tendency of the sheet to dry and harden and to necessitate moistening just before each sheet is used, has proven a serious drawback to the practical use of this form of stencil. The objection to the paraffin or wax stencil resides in the susceptibility of the wax to soften in summer temperatures and render the characters illegible under printing conditions.

We have discovered that lanolin, a product of wool fat or wool wax, and certain hard waxes mixed therewith, such as paraffin, ceresin, or carnauba wax or mixtures of the same, when suspended in a gelatinous medium to form an emulsion, are capable of producing a stencil composition which possesses in a marked degree the characteristics above described.

Our process consists in preparing a coating bath in the form of an emulsion by making with a volatile solvent, such as carbon tetrachlorid, $CCl_4$, a solution of lanolin, preferably anhydrous, ceresin and carnauba wax, alone or mixed, and separately preparing a gelatinous solution preferably containing gelatin, glycerin and water. The two solutions are thoroughly incorporated while warm to form an emulsion, and a toughening agent, such as potassium dichromate, then added. The emulsion is now ready for applying to the fibrous, porous paper, such as Yoshino paper.

The following composition has been found satisfactory and is given by way of example.

Parts are given by weight:—

| | |
|---|---|
| Ceresin | 3.6 |
| Lanolin anhydrous | 0.9 |
| Carnauba wax | 0.5 |
| Glycerin | 18.0 |
| Gelatin | 4.0 |
| Potassium dichromate | 0.28 |
| Carbon tetrachlorid | 18.0 |
| Water to make | 80.0 |

The bath is prepared from the above ingredients by incorporating them preferably in the following manner. The ceresin, carnauba wax and lanolin are placed in a receptacle, which is preferably adapted to be closed, and the temperature raised sufficiently to melt the materials. The carbon tetrachlorid is next added to effect a solution. The gelatin is dissolved separately in water and glycerin; the mixture is then emulsified and the potassium dichromate

added to the emulsion. The two solutions are incorporated at a temperature of between 26° and 33° C. to form the emulsion.

In the accompanying drawings—

Figure 1 is a skeleton diagram setting forth the elements of applicants' composition; and

Fig. 2 is a vertical section through the sheet of paper coated with said composition.

Referring to Fig. 2, 1 is a sheet of paper, and 2 is a coating applied thereto.

The emulsion or bath may be applied to the porous, fibrous paper, such as Yoshino paper, in various ways, but the preferred way is to float the paper on the surface of the warm bath and remove the excess of liquid by drawing the coated side over a smooth edge, such as a rod supported above the bath. The coated paper is then permitted to yield up its volatile solvent and excess of moisture in any suitable manner. The sheet is then ready for receiving stencil impressions and is strong and durable. The temperature of the room in which the coating is applied should be sufficient to prevent too rapid setting of the ingredients of the emulsion. A room temperature of about 21° C. is suitable. If a single ply stencil-sheet is desired, as indicated diagrammatically in cross-section in Fig. 1, each sheet is permitted to dry separately.

In the preparation of the stencil-sheet, the lanolin plays an important part, both in making the bath and in the completed stencil. Because of the capability of lanolin to combine with water in a marked degree to form an emulsion, and also to blend with the waxes, it materially facilitates in emulsifying the waxes. In the finished stencil the minute particles or globules held in the gelatinous matrix consist of a blend of hard wax and lanolin which holds water and glycerin. These wax bodies in the gelatin act to seal the moisture in the coating, while in themselves they have the property of keeping the coating alive or in a plastic state for receiving stencil impressions without adding moisture to the surface. The lanolin also enables the content of glycerin to be increased without rendering the stencil surface sticky.

The carnauba wax gives stability to the impressions under printing conditions, especially when the temperature is elevated, as in summer.

The emulsion applied to the paper is plastic and is readily displaced by the type of a typewriter leaving a network of fibers of the paper through which ink readily penetrates. The surface where the stencil characters are not formed is impervious to, and is practically insoluble in, all forms of ink and most solvents to which the sheet would be apt to be subjected.

The emulsion composition, when applied by the flotation method, has the peculiar property of depositing a coating of waxy particles, mainly on the surface of the paper, which do not penetrate through or to the opposite side, or to any material extent into the body of the paper, but which are retained by a matrix of gelatin on and near the surface. It has been found that better results are attained in stenciling by localizing the composition on the surface than by permitting the composition to disseminate through the paper.

When it is desired to produce a stencil-sheet of greater strength, it is found preferable to locate the coating between two sheets and in this case the emulsion may be made slightly thinner with a view of reducing the thickness of the plastic coating. This form of stencil sheet has the additional advantage of protecting both sides of the coating and of interposing between the coating and the type-characters a protecting layer of fiber which enables the type to present clean faces after prolonged use.

It is to be understood that the proportions given above may be varied within quite wide limits. For instance, to increase the hardness, the carnauba wax may be increased or even replace the ceresin. Toughness may be varied by varying the proportions of gelatin and potassium dichromate. In lieu of potassium dichromate, other toughening agents may be substituted, such as formaldehyde. While we prefer to use and do use a toughening agent, it is to be understood that it may be omitted without sacrificing all the advantages of our invention.

Instead of carbon tetrachlorid, other volatile solvents may be used, such as xylol, chloroform, benzin, or the like, but the ingredients named in the formula are preferred.

While we have mentioned lanolin as possessing qualities which peculiarly adapt it for use in our process, to wit, the qualities of absorbing water in a marked degree and of facilitating the formation of wax emulsions, we desire it to be understood that we consider other waxes possessing these characteristics as the equivalent of lanolin for the purpose of our invention.

What is claimed is:—

1. The method of preparing a stencil emulsion consisting in melting together a hard wax and lanolin, dissolving the mixture in a volatile solvent and emulsifying the solution in a solution of gelatin, water and glycerin to which has been added a toughening agent.

2. The method of preparing a stencil emulsion consisting in melting together a plurality of waxes one of which is a hard wax and another of which is characterized

by absorbing water, dissolving the mixture in a volatile solvent and emulsifying the solution in a solution of gelatin, water and glycerin to which has been added a toughening agent.

3. The method of preparing a stencil emulsion consisting in forming a solution of a plurality of waxes one of which is characterized by absorbing water in a volatile solvent and emulsifying the solution by mixing the same with a gelatin medium.

4. The method of preparing a stencil emulsion consisting in forming a solution of a plurality of waxes one of which is characterized by absorbing water in a volatile solvent and incorporating therewith an emulsifying agent to form the emulsion.

In testimony whereof we have signed this specification.

JAMES A. BAILEY.
HENRY E. KALUSOWSKI.