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UNITED STATES PATENT OFFICE

ALEX BROOKING DAVIS, OF CINCINNATI, OHIO, ASSIGNOR TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

ART OF STENCIL MANUFACTURE

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This invention relates to the art of stencil manufacture, and more particularly relates to stencil sheets for stencil duplicating machines and to a process of making the same.

The principal object of this invention is to provide a stencil sheet which is inexpensive to manufacture, durable, of good quality, capable of being cut by typewriter and stylus, and whereby excellent results may be obtained. Another object of my invention is to provide a process for manufacturing such stencil sheets with uniform high quality, quickly and inexpensively.

Other objects of my invention will be in part obvious and in part pointed out hereinafter.

Many forms of type and stylus impressible stencils have been made and a description of them appears in the literature bearing on the prior art, and of these, a considerable number have been made from cellulose and its compounds. Of the particular group of cellulose compounds which are desirable for the manufacture of stencils, the cellulose ethers are applicable, and of the ether group, I have found that the benzyl ethers are apparently the least expensive, probably most easily prepared, and the quality of stencil sheets obtained therefrom is such as to make this compound highly desirable for the purpose and a valuable addition to the art.

The structure of cellulose is such that it possesses a number of free hydroxyl groups in the molecule, and several of these are points of attack. The replacement of one or more hydroxyl hydrogen atoms by the benzyl radical $C_6H_5CH_2$ will yield a series of benzyl ethers of cellulose, any one of which in our experience, by the use of proper solvents and modifiers, will give satisfactory sheets when their solutions are deposited upon a porous base sheet by means of a volatile solvent. The resulting stencil sheets are readily type and stylus impressible and yield large numbers of copies when used with the usual types of duplicating machines.

Of the several isomeric benzyl ethers which may be prepared, we prefer to use one which may be made approximately as follows:

500 grams of refined cellulose is digested for two days at room temperature with a solution 1,000 grams of sodium hydroxide in 3,000 cc. water. 3,000 grams of benzyl chloride is now added and the mixture heated to 100 degrees C. for seven hours, either by direct fire or upon a boiling water bath to which salt has been added to raise the boiling point. The excess of benzyl chloride is now distilled off with steam, and the resulting pulpy, fibrous mass washed with water, then with alcohol and finally with ether to dehydrate it and is then dried. This material is now again treated with caustic soda in the same proportion and for the same time, and this treatment is followed with a second treatment with benzyl chloride in the same proportion, and after removal of the excess of benzyl chloride by steam, is washed and dehydrated in the same manner as previously described. The ultimate dried product shows a yield of approximately 700 grams, most of which is readily soluble in ethyl acetate, and this ethyl acetate solution can now be directly compounded with other modifying agents to produce masses from which stencils can be made by drawing over or floating upon the surface thereof porous base sheets such as Japanese yoshino paper, and a satisfactory stencil results immediately the volatile solvents have evaporated.

In detail, the stencil mass may be compounded as follows:—

The ethyl acetate solution of the cellulose benzyl ether made as above described is adjusted to a concentration of 5%. Into 200 grams of this solution, 40 grams of castor oil, 40 grams of benzoyl butyl tartrate and 15 grams of halogenated hydrocarbon, such as tetra or hexa chlor naphthalene, are added. The castor oil and benzoyl butyl tartrate readily mix with the solution, and the halogenated hydrocarbon, usually solid, quickly dissolves in the mass, or a solution is brought about by warming, if necessary. Pigments or soluble dyestuffs may now be added to lend any desired color to the mass in order to obtain a colored stencil sheet and afford visibility to the type or stylus impressions upon the sheet.

The mass is now poured into suitable trays

or pans and there are floated or drawn over the surface porous base sheets such as Japanese yoshino paper, and the excess removed by drawing the sheets over a rod or wire. The sheets are now hung up to allow the volatile solvent to evaporate, after which they are found to be highly satisfactory for use on duplicating machines and are either type or stylus impressible. They possess good tensile strength and wearing qualities, are not subject to deterioration from the action of molds or bacteria and possess the advantage of being only slightly inflammable in comparison with sheets of the same character made from nitrocellulose.

I do not restrict myself for the purpose of this invention to the particular isomeric benzyl ether resulting from the process given above, since cellulose benzylated to a lesser or greater extent will yield satisfactory stencil sheets. Moreover, other aralkyl ethers of cellulose which are suitable for present purposes may be formed by the process described herein or by other known methods from compounds, such as parachlor benzyl chloride, which contain substituted benzyl radicles, as well as from compounds, such as phenyl ethyl alcohol, which contain benzyl radicles having additional carbon atoms in their side chains. The expression "a benzyl ether of cellulose" is, therefore, intended to cover broadly all such compounds. Nor is the invention to be otherwise limited save by the scope of the appended claims.

What I claim is:—

1. A type impressible stencil sheet coating including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose.

2. A type impressible stencil sheet coating including a benzyl ether of cellulose.

3. A type impressible stencil sheet coating including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose and a modifying agent.

4. A type impressible stencil sheet coating including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose, a modifying agent and a lubricant.

5. A type impressible stencil sheet coating including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose, a modifying agent, a lubricant and coloring matter.

6. A type impressible stencil sheet coating including a benzyl ether of cellulose and a modifying agent.

7. A type impressible stencil sheet coating including a benzyl ether of cellulose, a modifying agent and a lubricant.

8. A type impressible stencil sheet coating including a benzyl ether of cellulose, a modifying agent, a lubricant and coloring matter.

9. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose.

10. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a benzyl ether of cellulose.

11. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose and a modifying agent.

12. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose, a modifying agent and a lubricant.

13. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a material selected from the benzyl, parachlor-benzyl and phenyl ethyl ethers of cellulose, a modifying agent, a lubricant and coloring matter.

14. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a benzyl ether of cellulose and a modifying agent.

15. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a benzyl ether of cellulose, a modifying agent and a lubricant.

16. The process of manufacturing a type and stylus impressible stencil sheet by depositing upon a porous base sheet by means of a volatile solvent a homogeneous film including in its composition a benzyl ether of cellulose, a modifying agent, a lubricant and coloring matter.

This specification signed this 26th day of July, 1926.

ALEX BROOKING DAVIS.