

UNITED STATES PATENT OFFICE

2,097,754

STENCIL SHEET

George Burt Bradshaw, Wilmington, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

No Drawing. Application December 27, 1935,
Serial No. 56,320

5 Claims. (Cl. 41—38.6)

This invention relates to new and useful improvements in flexible articles and has more particular reference to the production of stencil sheets such as those employed in the reduplication of manuscripts, drawings, typewritten or similar matter, through impact of type, impress of stylus or by other suitable means upon a surface or facing of a blank stencil sheet.

More particularly the invention is directed to the production of flexible stencil sheets coated, surfaced, or impregnated with a polymerizable substance containing as a constituent thereof a polymer or interpolymer of an acrylic acid derivative, such as the esters, amides, anhydrides, anilides, etc.

In a more specific sense the invention is concerned with the employment of the polymers or interpolymers of alpha-substituted acrylic acid derivatives, such as the alpha-substituted acrylic acid esters, amides, anhydrides, chlorides, anilides, etc. as coating and/or impregnating substances in a stencil sheet. In a specific and preferred embodiment of the invention methyl methacrylate polymers or interpolymers are employed as the coating and/or impregnating agent for said flexible stencil sheet articles.

In the manufacture of stencil sheets heretofore, the practice has been to coat or impregnate a suitable sheet of open-texture, porous base material, such as bibulous or yoshino paper, or the like, with soft wax or gelatin, or with a cellulosic substance such as cellulose nitrate or acetate in solution with a volatile solvent. The resultant articles from such prior practice, particularly in instances where gelatin or wax reagents are employed, possess many disadvantages, including, among others, an objectionable stickiness on handling, lacking sufficient softness or pliability, and prone to become brittle when stored or subjected to non-use for prolonged periods of time.

It is among the objects of the present invention, therefore, to overcome the foregoing, as well as other disadvantages existing in prior art sheets, and to provide a stencil sheet adapted to greater efficiency and possessed of improved characteristics in texture, finish, flexibility and softness.

In adapting the invention commercially any suitable type or conventional form of fibrous, open-texture, porous base sheet material, such as the yoshino paper referred to, may be advantageously treated with a solution, emulsion and/or suspension containing a polymeric, acrylic acid derivative to effect its coating and/or impregnation. While, as stated, the invention is more broadly directed to the employment of polymeric, acrylic acid derivatives or mixtures thereof, very satisfactory results have been obtained, and it has been found preferable, therefore, to employ as an ingredient of the coating and/or impregnating material, one or more poly-

meric, alpha-substituted acrylic acid esters, such as the alpha-alkyl and alpha-aryl acrylic acid esters. Among specific examples of these may be mentioned the esters of alpha-phenyl acrylic acid, alpha-ethyl acrylic acid, alpha-butyl acrylic acid, and alpha-methyl acrylic acid. Of this group, alpha-methyl acrylic acid esters will be found preferable, in view of their greater ease and adaptability to polymerization; and in general, most beneficial results will be procured when alpha-methyl methacrylate is employed as one specific ester.

Additionally, interpolymers of the different esters of acrylic or alpha-substituted acrylic acid, particularly interpolymers of different or unlike esters of acrylic or alpha-methyl acrylic acid, may be advantageously employed in the invention. Examples of such interpolymers include those of methyl methacrylate and isobutyl methacrylate, methyl methacrylate and n-propyl methacrylate, methyl methacrylate and cyclohexyl methacrylate, methyl acrylate and methyl methacrylate, etc. These interpolymers may be obtained in accordance with the processes described in the co-pending application of Harold J. Barrett, Serial No. 50,711, filed November 20, 1935.

In order that the invention may be more clearly understood, the following specific examples are given wherein the proportions and parts set out are all by weight:

1		Parts
Methyl methacrylate polymer (high viscosity).....	10	35
Dibutyl phthalate.....	15	
Palm wax.....	5	
Olive oil.....	5	
Oil-soluble dye (Sudan red-7-B).....	0.25	
Ethyl alcohol.....	15	40
Acetone.....	15	
Butyl acetate.....	50	
Benzene.....	140	
Ethyl acetate.....	165	45
2		Parts
Methyl methacrylate polymer (high viscosity).....	5	
Dibutyl phthalate.....	10	50
Palm wax.....	5	
Olive oil.....	5	
Oil-soluble dye (Sudan red-7-B).....	0.25	
Ethyl alcohol.....	15	
Acetone.....	15	55
Butyl acetate.....	50	
Benzene.....	140	
Ethyl acetate.....	165	

It is to be understood, of course, that the foregoing examples are merely illustrative of

one specific embodiment and that the invention is to be in no wise limited thereby since, obviously, variance in the proportions and ingredients employed may be resorted to without departure from the spirit or scope of the invention.

In carrying the invention into effect the ingredients employed in and going to make up the ultimate, polymerized coating and/or impregnating composition may be admixed or incorporated with each other to form a solution by any desired and well-known means. This solution may then be applied to one or both surfaces of a fibrous base material by suitably drawing or otherwise passing the same over the base material, or, alternatively, passing the base material itself through a bath of such solution, and thereafter removing any excess thereof from such material in any suitable manner. Thereafter, the coating and/or impregnating operation may be completed by applying pressure upon the treated material in the presence or absence of heat as desired or the sheet otherwise treated to effect its drying preparatory to use.

In lieu of employing directly the acrylic acid derivative polymer, it may be advantageous to treat the base material with compositions analogous to those of the examples containing the monomer, preferably in the presence of a polymerization catalyst such as benzoyl peroxide, and thereafter subjecting the article to polymerizing conditions, e. g., heat and/or light. Irrespective of whether the original composition contains monomer and/or polymer, it is to be understood that the auxiliary constituents thereof should be so selected and apportioned that a homogeneous composition will result.

As an ingredient of the coating and/or impregnating composition, mono or polyhydric alcohols or their substitution compounds, such as mono-ethyl ether of ethylene glycol, or the like, may be employed, whereby permanent softening and flexibility characteristics may be imparted to the resultant sheet. Similarly, various tempering agents, such as olive oil, castor oil, as well as numerous penetrating, homogenizing, and/or dispersing agents, may be employed as ingredients of the composition. These latter agents include the higher molecular weight fatty alcohols and their derivatives containing six or more carbon atoms. Among specific examples of the alcohols so included may be the higher molecular weight saturated primary alcohols such as octyl, decyl, dodecyl, tetradecyl, cetyl, octadecyl, eicosyl, etc.; unsaturated primary alcohols such as decenyl, tetradecenyl, 9,10-octadecenyl, eicosenyl, etc.; cyclo aliphatic alcohols such as the naphthenyl alcohols; ethers of glycols and polyhydric alcohols, such as the naturally occurring selachyl alcohol (glycerine mono-octadecenyl ether), batyl alcohol (glycerine mono-octadecyl ether) and chimyl alcohol (glycerine monocetyl ether) as well as synthetic ethers such as ethylene glycol monocetyl ether, poly-glycerine mono-tetradecyl ether, etc.; as well as polyhydric alcohols such as octadecenediol and octadecanediol, might also be mentioned. Furthermore, suitable solvents, such as acetone, methyl acetone, toluol, benzol, ethyl acetate,

butyl acetate, etc., or mixtures thereof, may be suitably selected and advantageously employed in the coating composition. Additionally desired and suitable stabilizers, such as fatty acid anhydrides, including those of lauric, myristic, palmitic, stearic, coconut oil fatty acids, sperm oil fatty acids, etc., may likewise be employed in the coating composition, whereby a tough and impervious sheet will result. Also, in order to render the coated sheet readily penetrable to the cutting effect of type or stylus pressure, suitable proportions of glycerini triacetate and analogous compounds may be employed, if desired, in the coating composition.

Furthermore, it may be desirable to frequently incorporate one or more plasticizers and/or softeners in the coating solution, whereby the properties of the resultant stencil sheet may be varied and controlled to any desired degree. Among plasticizers and softeners suitable for such purpose may be mentioned the phthalates, such as dibutyl phthalate, diethyl phthalate, cyclohexyl butyl phthalate, dimethoxyethyl adipate, etc. However, in instances where the higher alpha-alkyl acrylic acid esters are employed in the invention, it will be found preferable if little or no plasticizer is employed, since these esters lack the desired property of ready and easy polymerization which the alpha methyl acrylic acid esters possess.

Other desired solvents, plasticizers, softening and/or dispersing agents may be similarly employed in the invention such as those more particularly set forth and described in the patent of Daniel E. Strain, No. 2,046,886, issued July 7, 1936.

As many widely different and varied embodiments of the invention may be had without departing from its spirit and scope, it is to be understood that the invention is not to be limited to the specific embodiments hereinbefore set out, but only as defined in the appended claims.

I claim as my invention:

1. A stencil sheet, comprising an ink permeable base sheet having a coating of a plasticizer and methyl methacrylate, said coated sheet being capable of being cut by type.
2. A stencil sheet, comprising an ink permeable base sheet having a coating of a plasticizer and polymerized methyl methacrylate, said coated sheet being capable of being cut by type.
3. A stencil sheet comprising a flexible, ink permeable base sheet having a coating of a plasticizer and a methyl methacrylate polymer, said coated sheet being capable of being cut by type.
4. A stencil sheet comprising a flexible, ink permeable base sheet having a coating of a plasticizer and a methyl methacrylate interpolymers, said coated sheet being capable of being cut by type.
5. A stencil sheet comprising a flexible, ink permeable base sheet having a coating solution applied thereto, comprising a plasticizer, a tempering agent, and methyl methacrylate, said coated sheet being capable of being cut by type.

GEORGE BURT BRADSHAW.