UNITED STATES PATENT OFFICE.

WILLIAM G. FUERTH, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNDERWOOD TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

STENCILING.

1,398,013. Specification of Letters Patent. Patented Nov. 22, 1921.

No Drawing. Original application filed November 29, 1912, Serial No. 734,027. Divided and this application filed October 29, 1915. Serial No. 58,694.

To all whom it may concern:

Be it known that I, WILLIAM G. FUERTH, a citizen of the United States, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Stenciling, of which the following is a specification.

This invention relates to typewriter and other stencil sheets, and this application is a division of my application No. 734,027, filed November 29, 1912 (now Patent No. 1,238,906.)

One of the principal objects of the present invention is to provide for the softening or mollifying of a stencil sheet which is coated with a hardened gummy substance and which, in its original condition, is not suitable for being acted upon by a stylus or by the types of the writing machine, without decreasing the fitness of the sheet for subsequent use in a stenciling machine or a duplicator.

Certain softening materials, such as glycerin for instance, if used upon a hardened gum-coated sheet (gelatin or other gum) will render the coat permanently soft, whereas, according to one feature of the present improvements, the coating is softened only temporarily and will harden again, so that its usefulness as a stencil sheet is not impaired by softening it preparatory to writing a stencil thereon.

Another feature of the invention is the use of an emollient for temporarily softening a stencil, which will have the effect of making the sheet even harder, tougher and more impermeable than before.

It has been proposed to use glycerin to soften the hardened coating of a yoshino sheet, for the purpose of making a stencil (see U. S. patent to Zuccato, 548,116, British patent to Zuccato 12,136 of 1894, and other patents cited in my application hereinafter mentioned. But where any gelatinous hardened coating is softened by such means, the coating is rendered permanently soft and objectionable. One of the features of my invention is a softener or emollient, which will not only render the gelatinous coating soft for typewriting purposes, but will permit the coating to re-harden; and in fact the mollifying agent may have such characteristics that it will make the stencil sheet harder, tougher, more durable and more impermeable than before. Furthermore, the new mixture may be used to harden a sheet upon which the stencil has already been written, even though the sheet may have been hardened previous to writing thereon, as for instance in treating a gummy sheet with formaldehyde.

One of the advantages of my invention is that a stencil made in accordance therewith is not liable to become punctured in running through the stenciling machine; and in fact by actual test more than one thousand stencil copies of the best character have been made from a single stencil without apparently wearing it out, the last copy appearing as good as the first, even though the stencil sheet had been taken out of the stenciling machine and washed several times.

Although the hard film or membrane is rendered soft for operating upon the same with the typewriter, still the re-agent which does the softening contains a hardener to replace or restore the hard face or finish to the sheet, and render the stencil harder than it was before being softened.

I employ a stencil sheet consisting of yoshino paper preferably coated with fish-isinglass; the latter being prepared from fish bladder. The fish-isinglass is soaked in a little water, which is absorbed by the substance, and has the effect of making the substance easily soluble. Then the mixture thus partly prepared is placed in water and boiled until a thorough solution is made; the entire quantity of water used being about 40 parts by weight to one part of the fish-isinglass (see my pending application No. 728,411, now Patent No. 1,293,077, patented February 4, 1919). Preferably I use Russian fish-isinglass because of its superiority for this purpose to the domestic isinglass, the latter being made partly from fish bladders and partly from other parts of fish. The coating so prepared is preferably applied to the yoshino sheet over a water bath.

This coating meets the peculiar requirements of filling up the pores of the yoshino sheet for the purpose of making a stencil sheet. The sheet so prepared is thin and extremely flexible, and not liable to crack, practically impermeable, and has great strength.

The durability of such stencil sheet may be increased by subjecting it during the process of manufacture to a hardening bath, which may be formaldehyde. Either two per cent. by weight of formaldehyde may be added to the aforesaid coating solution, or (preferably) the formaldehyde may be added to the sheet after passing through said solution. Other hardening materials well-known in the stenciling and photographic art are usable in the place of formaldehyde, as for instance hyposulfate of soda, chrome alum, bichromate of potassium, etc.; reference being hereby made to said application No. 728,411 for full particulars as to the process, construction, use, etc.

I employ an improved softener or emollient for this membranous stencil sheet, which enables the types to perforate the same, one of the results of the use of this softener being that when the sheet dries, it becomes harder and tougher than before it was softened, so that it becomes very durable and capable of stenciling an enormous number of copies and will withstand repeated washing, and rough handling, and is otherwise substantially improved.

The emollient for use with the previously hardened stencil sheets, to soften them for use on the typewriter, preferably comprises sulfonated castor oil (Turkey red oil) one part; chemically pure glycerin two parts; distilled water four parts; and formaldehyde (5% solution) one part; the liquid being flavored with essential oils, q. s. Turkey-red oil, as is well known to those skilled in the art, is the material in common use as a softener in the textile industry. The use which gives it its name is in the dying of Turkey red on cotton goods. The necessary anti-fermentative, which is needed to insure its keeping qualities (diluted as it is with water), is furnished by the formaldehyde.

This mixture will temporarily soften the hardened coatings of paper or printing plates, so that they may be written upon by the typewriter or other means for making the stencils.

The foregoing mixture is extremely hygroscopic, which condition may be modified as desired, by reducing the proportion of glycerin, or varying the proportion of sulfonated oil. If a softening mixture is to be used for softening hardened sheets coated with ordinary animal gelatin there should be an increase in the proportion of the sulfonated oil.

It will be understood that the fish-isinglass coatings require smaller proportions than animal gelatin coatings, of both sulfonated oil and glycerin in the emmollient because such sheets are relatively slow to dry or set.

The foregoing emollient is especially useful in softening coatings of paper which have been hardened or rendered insoluble, among which coatings may be enumerated those having various essential bases such as gelatins composed of farinaceous or vegetable or animal substances, and including soluble and insoluble albumen. The emollient is valuable when the coating consists of isinglass made from fish (acepinas) and hardened; and is especially valuable where the sheet is coated with fish-isinglass made of the swimming bladder of the sturgeon.

The aforesaid emollient contains a hardening agent whose proportions may be varied according to the character of the coating of the stencil sheet which it is desired to soften. It will be understood that other hardening agents than formaldehyde may be used, as for instance any of the re-agents well-known in the arts, such as bichromate of soda or of potash, hyposulfates, carbonates of ammonia, etc.; different substances being best adapted to accord with the different bases of the stencil coating, to re-act for the purpose of again hardening or increasing the hardness and toughness of the stencil coat or film or membrane which has been mollified by a mixture in accordance with my invention. It will be found that the stencils will be rendered hard and impermeable, and in most instances more concrete than they were prior to the mollification process.

The invention is not limited to the exact substances of the foregoing formula, nor do I desire it to be understood that the proportions must be strictly adhered to, as there may be variations adopted in applying the mollification process to various components of coatings of sheets, or to produce any specially desired hygroscopic condition of the sheet. In some cases it may be desired to use a coating which will keep the sheets moist and ready for use for a long period; while in other cases it may be only desired to keep the sheet moist for the very short time needed while the stencil is being written on the typewriter or by other means.

The invention is not limited to the exact conditions above set forth, nor is it restricted in all cases to its use or application for mollification purposes alone.

If desired, the emollient liquid or mixture herein described may be applied by a brush or sponge to both sides or surfaces of a stencil sheet, either preparatory to writing a stencil thereon, or for eventually hardening the same after the stencil has been written.

Another way to use the emollient is to moisten a bibulous or absorbent sheet of paper with the liquid preparation, and employ the moistened sheet as an interleaving sheet or insert between the stencil sheet and the backing, using for this purpose such paper as is commonly used for making letter-press copies, preferably of the grade designated as

Soudanese, West India or India copying paper. The interleaving sheet is Arabian tissue, such as is commonly used for a base in making wax paraffin stencil sheets for use in making hand-written stencils. This interleaving sheet absorbs the moisture of the emulsion or mixture, but does not freely exude the same, so that it does not get smeared over the typewriting machine on which the stencils are written. This paper is moistened with this oily, saponaceous or glycerinated mollifying hygroscopic liquid, and remains moist for a long time. This sheet so moistened may be inserted between the stencil sheet and a backing, for introduction into the typewriting machine. The intermediate sheets may, before using, be pressed between blotters to take up the excess moisture. These intermediate sheets may be kept in piles or packs in a moist condition ready for use. The backing may have a waterproof or insoluble face, and may consist of a sheet of Manila paper or wood-fiber paper coated with varnish or other waterproof sizing, which may be of a dark color, so that the typewritten stencil will be legible to the operator; the intermediate moistened sheet being rendered transpicuous by the liquid.

The emulsion may be termed a saponaceous emollient with an astringent, and it works upon a membrane, consisting preferably of yoshino coated with fish-isinglass and hardened at the time of manufacture in the manner set forth in my said application No. 728,411. The coating on the yoshino sheet is a membraneous coating, which is softened by the emollient, and the astringent in the emollient emulsion finally closes up the fine pores, to make the same impervious to the stenciling ink, or substantially so.

Although the emollient contains glycerin and oil, nevertheless, owing to the use of the formaldehyde therewith, the stencil sheet becomes stronger and better than before using the emollient. The formaldehyde solution or other astringent or hardening agent may be applied if desired without the castor oil or the glycerin, merely for hardening and toughening the sheet after the stencil is written.

This emollient can be applied to either of the before-described sheets, one of which consists of a yoshino sheet coated with fish-isinglass, while the other is of harder and tougher texture, owing to the original hardening treatment thereof by formaldehyde or other substances. My emollient is not limited in all cases to the use of the exact stencil sheets described in this specification.

It will be apparent that stencil sheets which may or may not have been originally treated with a hardening agent may be typewritten or otherwise formed into stencils, and then the complete stencils may be moistened with a liquid according to my invention for the purpose of rendering them hard, insoluble, tough, durable, etc.

It will also be perceived that where the stencil was originally prepared with or without a hardening agent, it may be softened by water or other means preparatory to writing a stencil thereon, and that after the stencil is written, and either while the stencil remains soft or after it has dried and set, it may be subjected to the action of a liquid or mixture prepared according to my invention, and thereby eventually rendered harder and more durable, etc. The invention is capable of hardening and toughening a stencil sheet, but may be employed for the purpose of temporarily softening a stencil sheet preparatory to writing a stencil thereon.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

A hygroscopic emollient adapted to soften a hardened stencil sheet, comprising an oil, and also having an astringent or hardener for the stencil sheet.

WILLIAM G. FUERTH.

Witnesses:
W. O. WESTPHAL,
JOHN F. RULE.