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STENCIL SHEET AND METHOD OF MAKING SAME

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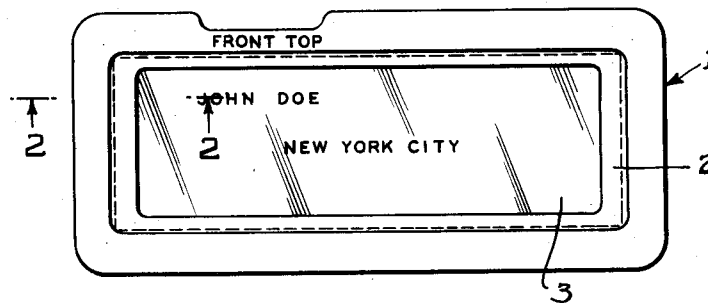


Fig. 1.

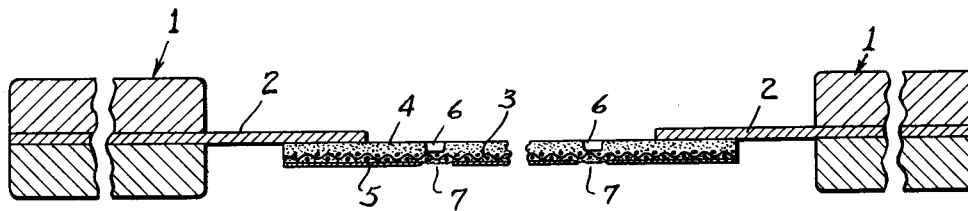


Fig. 2.

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STENCIL SHEET AND METHOD OF
MAKING SAME

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22 Claims. (Cl. 41—38.6)

This invention relates generally to stencil sheets adapted for conversion into a stencil by impact thereon of type, or type plates, or by pressure of a stylus thereon, such sheets comprising an open texture base such as yoshino having a type-impressible coating, which can be successfully cut to form the stencil while dry, i. e. without the preliminary moistening formerly required; but more particularly the invention is designed to produce a stencil sheet of that character, the uncut portions of which shall be impervious to liquid ink even when applied under great pressure, and which shall be sufficiently rugged to withstand during a long period of use the rough handling to which it will be subjected in standard types of addressing machines employing card stencils.

For a long period of time stencil sheets and card stencils made out of yoshino coated with a coagulated gelatine compound were successfully and universally used both in ordinary duplicating machines by which copies of letters and other documents are made, while employing relatively light pressures to force paste ink through the stencil sheet, and in card form in addressing machines where relatively high pressures are applied by reciprocating platens, or rotating sectors or rollers to force liquid ink through the stencil cards.

These stencil blanks, whether in sheet or card form, however, unless fresh made and still moist, always had to be artificially moistened before their coatings would flow properly under the impact of the type blow employed to "cut" or form the stencil by exposing practically uncoated yoshino fibres wherever the type face had struck. In "cutting" scores of millions of stencils every year much time was therefore wasted in performing the same number of these moistening operations, and the rust caused on typewriting machines and other metal tools by surplus moisture was also objectionable. Both these loss factors ran higher in addressing operations than in straight duplicating work, because of the enormous number of little card stencils used in the former; but the problem of the production of a coated paper stencil which could be cut without such moistening defied solution entirely until the process of the Hill Patent No. 1,526,982, dated Feb. 17, 1925, developed the idea of substituting a yoshino coating formed with a cellulose ester and tempering agents, in place of the prior coagulated protein and tempering agents, and gave the answer so far as ordinary duplicating work was concerned.

So far as the addressing machine business was concerned, however, the problem was left still unsolved by the Hill patent.

While the cellulose coated sheet in which the typed matter of a letter or other document has been cut operates satisfactorily in a slow moving duplicating machine, preventing any of the paste ink there used under light pressure from reaching the sheet to be printed, except where the type impressions have previously displaced such coating; and while such coating will stand up during the number of operations usually required in ordinary duplicating operations, when card stencils made of such cellulose coated paper alone are run through an addressing machine, and heavily pounded by a rapidly reciprocating platen, or roller, or sector, carrying liquid ink and operating under relatively high pressure, the entire cellulose coating soon becomes charged and saturated with ink, and after about the fourth time a given magazine full of such stencils have been run through the machine the envelopes or postcards come out each with a complete smudge of ink on its face, instead of the desired clearly printed name and post office address. This results from the high platen pressure having driven the liquid ink through all the pores of the uncut coating, as well as between the exposed yoshino fibres at the cut portions. Also, the cellulose coated panel is more delicate in structure than the old well tanned panel of the coagulated protein type of card stencil, and is before long punched bodily out of its frame by the platens or rollers jumping roughly on it, or the inked panels are soon stretched by such treatment and begin to bag so that they offset ink from one to another when stacked in the magazines and filing cases. As a consequence the old style stencil card with its coagulated gelatine coating on the yoshino panel still triumphantly holds the addressing machine portion of the field against its cellulose rival, in spite of the waste of time and labor consumed in moistening each blank before stencilizing it.

I have discovered, however, and this is the substance of the present invention, that if such cellulose coated stencil blank, whether in sheet or card form, is given a backing film of a proper shellac-like composition which will, while unbroken, prevent liquid ink from passing through the panel after it has been applied to the face thereof even under the full pressure required in the best addressing machine practice, but which will be sufficiently broken and in part removed by the impact of the stencil cutting type applied

to such panel face, so that the ink under such pressure will pass through such partially cut or broken areas to practically the same extent as though no such backing film had been applied, complete success can be achieved in the best addressing machine practice with such cellulose coated and shellac-backed card stencils which can still be easily cut or stenciled on the ordinary typewriting machine without previous moistening.

The present invention is the result of a discovery that a film of the character described in my Patent No. 1,937,751 dated Dec. 5, 1933 also containing coloring matter will, when applied to the back of a stencil blank made in accordance with the teachings of said Hill Patent No. 1,526,982 primarily for the purpose of increasing the legibility of the stencil when subsequently cut, also, and quite unexpectedly, qualify such cellulose coated stencil for successful continued use with liquid ink in any of the standard stencil addressing machines.

By way of a more detail description of the preferred method of carrying out my invention I may proceed as follows: A bath is formed of any suitable cellulose ester, such as cellulose nitrate or acetate dissolved in a suitable solvent, such as amyl acetate, the cellulose content of the solution running from 5 to 8%, and to this is added about 50% by weight of a suitable tempering agent such as castor oil or soya bean oil, and from 3 to 5% of a fatty substance such as lard or cottonolene (all as described in said Hill patent). The yoshino sheets are then drawn across the surface of such bath and hung up to dry.

After such cellulose coating has set the coated sheet is similarly drawn again across the surface of a bath of varnish-like solution which when transferred to the surface of the cellulose coated yoshino and allowed to set will form a film thereon which while unbroken will be practically impervious to liquid printing ink, but areas of which will be so broken up by the impact of a type striking the other face of the sheet that small portions of such film will be forced away from the remainder thereof and caused to adhere to any backing surface on which the coated sheet is resting during such stenciling operation.

I prefer to use for such film-forming bath shellac dissolved in alcohol or other volatile vehicle, though other varnish-like solutions might be substituted. Also a coal tar derivative held in solution or suspension by the alcohol may be added. If it be desired to give an orange color to such backing film to add to the legibility of the completed stencil in the manner described in my said Patent No. 1,937,751 hydrochloride of benzene-met-toluylene-diamine may be the coal tar derivative selected, and other coal tar dyes may be used to produce other colors. Also, if a more transparent, uncolored stencil is desired, the dye may be omitted. The essential point is that a backing film shall be applied to the cellulose-coated panel which shall be substantially impervious to liquid printing ink so long as it is undisturbed, but shall be capable of being broken away to a considerable extent by the type-produced impact applied to the face of the panel in the stenciling or "cutting" operation, so that the portions of the film remaining on the type compressed areas shall present no substantial obstacle to the passage of ink under pressure, through the stencil. That a considerable portion of the film material subjected to type impact is thus removed is shown by the fact that when a

coal tar dye is incorporated in the film, enough of it is transferred to any backing sheet by the stenciling operation to clearly reproduce thereon the typed legend in the color of such dye.

Stencils made according to my invention may also, of course, be used with paste ink such as is now employed on standard stencil duplicating machines, but, so far as I am at present advised, better results in the appearance and legibility of the printed page, envelope or post card can be obtained with the use of liquid ink, and as such liquid ink dries more quickly and completely on the printed surface of whatever character, it consequently will not smudge nor rub off when subsequently handled. Liquid ink also will produce good printing on bond or glazed surface papers, while paper with a more absorbent or dead surface is usually required for good work when paste ink is employed.

The above suggested and other variations in the materials and methods of procedure may be employed in carrying out my invention so long as the principles of operation above outlined are retained and the desired results secured in substance, and the resulting stencil sheet or card is within any of the definitions of the appended claims.

Thus, fabric bases of suitable loose or open texture other than yoshino might also, of course, be substituted for the latter, when desired, for any special reason, but as at present advised, I believe that yoshino most generally meets the requirements for successful commercial embodiments of the present invention.

Also, while the best results from the use of my invention are realized when the thin, liquid proof but relatively frangible film is applied to a "dry" stencil having the cellulose base coating described in the above mentioned Hill patent, the said invention can also be applied with advantage to stencils having other coatings which remain permanently soft enough to permit their being stenciled or "cut" at any time in a typewriting machine without previous moistening. As examples of such other dry stencils in the prior art I may mention those having a coating mixture of protein and oil described in U. S. patents to Richard Land No. 1,584,951, dated May 18, 1926, and Nos. 1,604,886 and 1,604,887, dated Oct. 26, 1926, and those having a casein base coating such as described in British Patent 5,717 of 1928, among others.

All of these and other dry stencils necessarily have base coatings which are relatively soft, as compared with the older coagulated protein, otherwise they could not be displaced while dry by the type blows. Consequently they are all necessarily more or less readily permeable to liquid ink applied under the pressures used in addressing machines, and are also somewhat permeable to such ink even when used in the ordinary stencil duplicating machines producing only lighter degrees of pressure; and as a result paste ink now has to be employed with each and all of them. The application to any or all of these dry stencil sheets of the thin, liquid proof but sufficiently frangible backing film deposited thereon by drawing the dry coated sheet over the surface of a bath of shellac dissolved in alcohol, and across the edge of the vessel containing such bath, overcomes this defect of permeability to liquid inks after said film has hardened, and renders the stencils subsequently cut therefrom usable with both liquid and paste inks, and in addressing machines.

It is clear, therefore, that the underlying novelty of my present invention involves the application to the relatively soft base coating of any practical dry stencil (i. e. one which can be stencilized by type blows while free from other than hygroscopic moisture), of a thin, liquid proof and relatively frangible film which can be broken away by the blow of the type sufficiently to thereafter let the ink pass through the coated sheet at that point. The base coating or filling for the yoshino is thick because it soaks into and through the loose fibre thereof, while the shellac film is thin because it is applied by contact to the surface of such dry, and only slightly absorbent base coating or filling.

In the preferred embodiment of my invention the stencil blank which is to be "cut" to form the completed stencil has the construction shown and described in my hereinbefore noted Patent No. 1,937,751, except that a relatively soft base coating which can be cut by the type without previous moistening of the sheet is substituted for the older coagulated coating assumed in my said patent specification to be used, though not specifically described, nor specifically claimed.

In both cases, however, the base coating is preferably applied by drawing the yoshino sheet across the surface of the bath, as hereinbefore stated, and the result with the present invention will be the same as that specifically described in my said patent so far as concerns depositing a major portion of the coating material upon one face of the yoshino, said more heavily coated surface thereafter forming the face of the stencil when it is being cut, as well as when it is being used for printing. In both cases also the thin film of frangible varnish (whether colored or not) will be applied to the back of the sheet or card, i. e. to the yoshino surface having the thinner layer of base coating.

A specimen card stencil made according to my present invention is shown in the accompanying sheet of drawings in which

Fig. 1 is a front view of such card stencil and

Fig. 2 is a cross section on line 2—2 of Fig. 1 with the respective thicknesses of the various layers of materials greatly exaggerated both relatively and absolutely.

In said drawings 1 indicates generally the card frame having a welt-strip extending around its inner border, to the under side of which latter a panel of thin but heavily coated paper is cemented. 2 indicates generally the welt-strip, 3 a sheet of yoshino paper, 4 a heavy coating of easily displaceable material (such as the cellulose compound hereinbefore described) the major portion of which is on the upper surface of the yoshino, and 5 is the backing film of ink-proof varnish, such as shellac, which has been broken away more or less completely as indicated at 7, 7 by type impact applied to areas 6, 6 of the coated yoshino, which areas have been rendered susceptible of penetration by ink as a result of lateral displacement of major portions of one coating 4 caused by such impact from above. The unbroken areas of the varnish film 5 retain their original impermeability by ink.

Having described my invention, I claim:

1. As a new article of manufacture a stencil blank comprising a thin sheet of loose-fibered paper supporting a layer of relatively soft composition capable of being laterally displaced by type-produced impact to form a stencil while the coated sheet is free from other than hygroscopic moisture, the major portion of which base coat-

ing material is located on one side of the paper, and a film of material on the other and more thinly coated surface of said sheet substantially impervious to liquid ink but capable of being broken away to a considerable extent by such type-produced impact.

2. An article such as defined in claim 1 in which said backing film comprises a coal tar derivative mixed with shellac.

3. An article such as defined in claim 1 in which said backing film comprises a coal tar derivative such as hydrochloride of benzene-metaltoluylenediamine mixed with shellac.

4. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising a base having a type-impressible coating including a cellulose compound and a tempering agent, and a backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by such type-produced impact applied to the face of the sheet.

5. An article such as defined in claim 4 in which said backing film consists mainly of shellac.

6. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising a base having a type-impressible coating including a cellulose compound, a tempering agent and a fatty material, and a backing film of varnish substantially impervious to ink when undisturbed but capable of being broken away to a considerable extent by such type-produced impact applied to the face of the sheet.

7. An article such as defined in claim 6 in which said varnish is mainly composed of shellac.

8. As a new article of manufacture, a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising a base having a type-impressible coating including a cellulose compound, a tempering agent and a fatty material, and a backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by such type-produced impact applied to the face of the sheet.

9. An article such as defined in claim 8 in which said tempering agent is castor oil and said backing film comprises coal tar derivative mixed with shellac.

10. An article such as defined in claim 1 in which said base comprises yoshino fabric.

11. An article such as defined in claim 1 in which said base comprises yoshino fabric and said backing film comprises a varnish.

12. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising an open, porous base having a coating including a compound of cellulose which is soluble in a volatile solvent and tempering material, and a backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by such type-produced impact applied to the face of the sheet.

13. An article such as defined in claim 12 in which said backing-film is formed of a varnish.

14. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising an open-texture base having a coating including a cellulose ester, and a backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by

such type-produced impact applied to the face of the sheet.

15. An article such as defined in claim 14 in which said film is mainly composed of shellac.

5 16. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising an open-texture base having a coating including a cellulose ester and a tempering agent, and a
10 backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by such type produced impact applied to the face of the sheet.

15 17. An article such as defined in claim 16 in which said backing film comprises a coal tar derivative mixed with shellac.

18. As a new article of manufacture a stencil-sheet adapted for conversion into a stencil by the impact of type thereon, the same comprising
20 an open-texture base having a coating including a cellulose ester in admixture with a tempering agent and a fatty material and a backing film of material substantially impervious to ink but capable of being broken away to a considerable extent by such type produced impact applied to
25 the face of the sheet.

19. An article such as defined in claim 18 in which said backing film comprises a coal tar derivative mixed with shellac.

10 20. The herein described method of producing a sheet adapted for conversion into a stencil by the impact of type upon one face thereof without

previous moistening thereof, which comprises saturating a yoshino base with a coating solution including a cellulose compound and tempering material, allowing the same to set, applying to the other surface of such coated sheet a thin
5 backing film of varnish and allowing such backing film to set.

21. In a stencil comprising a panel of loose-fibred paper provided with a relatively soft base coating which is type-impressionable while free
10 from other than hygroscopic moisture, the combination therewith of a film of material substantially impervious to liquid ink, but capable of being broken away to a considerable extent by type-produced impact, located on the back face of
15 said stencil.

22. The herein described process of producing a stencil which comprises embedding a sheet of thin loose fibred paper in a layer of relatively soft composition which, after being freed from other
20 than hygroscopic moisture, can still be displaced laterally by the impact of type-blows so as to substantially expose the paper fibre beneath, allowing the sheet to dry, applying to one surface of such dry sheet a film of material substantially
25 impervious to liquid ink but capable of being broken out by such type-produced impact sufficiently to permit such ink to pass through the sheet at those points, and finally indenting by type impact against the other surface of said
30 sheet, the legend to be stenciled.

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