

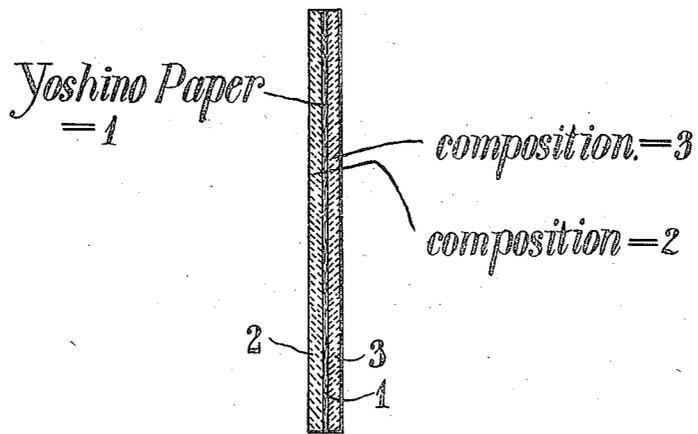
Nov. 9, 1926.

1,606,217

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DUPLICATING

Filed Feb. 26, 1926



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DUPLICATING.

Application filed February 26, 1926, Serial No. 90,930, and in Great Britain January 21, 1925.

This invention relates to duplicating with the aid of stencils formed by the local application to a stencil sheet, consisting of a highly porous material furnished with an ink-resisting coating, of a material adapted to soften the coating or otherwise change its character so that by subsequent treatment the portion of the coating so treated may be removed.

The production of stencils for use in the duplication of handwriting, drawings and the like in this particular manner has not been wholly successful owing to the tendency of the materials employed for locally softening and removing the coating composition (and which will hereinafter be referred to as "liquefying agents") to spread.

For coarse work the spreading of the liquefying agent may not constitute a serious defect but when it is desired to produce impressions of handwriting, drawings or the like the spreading of the liquefying agent has a most unfavourable result, the lines in the impressions obtained being heavy or coarse and blurred at their edges.

An observation upon which the present invention is based is that when intimate contact between the stencil sheet and an absorbent or relatively absorbent support or backing is obtained, by securing adhesion between the stencil sheet and the support or backing, when applying the liquefying agent to the stencil sheet, the spreading of the liquefying agent and the consequent irregular action thereof could be minimized.

This observation suggests that the desirable results obtained when adhesion between the stencil sheet and backing or support is secured were to be attributed solely to the fact that by securing such adhesion the passage of excess of liquefying agent into the substance of the backing sheet was facilitated and thus the lateral spreading of the same was minimized.

Further experiment carried out with the object of finding a suitable composition for stencil sheets of the character in which, to take a specific instance, a gelatine composition was applied to one face of a sheet of yoshino paper while a wax composition was applied to the other, showed that while there was thus obtained a certain degree of adhesion between the stencil sheet and backing quite good results were secured even when the support employed was quite impermeable. The use of a coloured wax composition showed that the pressure of the pen used in writing caused the composition to be transferred locally to the support and this seemed to indicate that the wax composition might actually constitute the effective ink-resisting medium of the finished stencil.

The adhesive or transferring composition would seem to be preferably one which will not be affected by the liquefying agents used, while it would seem essential that the degree of adhesion obtained should at least be of such character that where pressure is exerted locally on the stencil sheet by the instrument used in applying the liquefying agent the transferring composition would be caused to adhere to the support for the stencil sheet if only to a degree to secure the local transference of the said composition to the support.

It furthermore appears desirable generally to employ an absorbent or relatively absorbent support for the stencil sheet during the operation of forming the stencil so that the excess of liquefying agent applied or a proportion of such excess will be caused to pass through the stencil sheet and be absorbed by the absorbent or relatively absorbent support.

The invention extends to the method and means for forming stencils in which the results of these observations are embodied.

The method of forming stencils in accordance with the invention, by the use of stencil sheets coated with a composition adapted to be liquefied or solubilized, comprises securing adhesion between the back of the stencil sheet and the support or backing therefor during the operation of applying the liquefying or solubilizing agent locally to the stencil sheet.

The desired degree of adhesion may be secured in any convenient manner as, for instance, by providing between the stencil sheet and the backing a film of material adapted to cause the stencil sheet to adhere to the backing.

Normally, if not invariably, the material employed to secure adhesion is of such character that the pressure of the implement used in delineating the characters, lines or signs on the stencil sheet causes the back of the latter to adhere to the support

only at or adjacent to those points where such pressure has been applied.

Generally it will be found preferable to employ as a support of backing a material
5 which is porous or absorbent or relatively porous or absorbent so that any of the liquefying or solubilizing agent passing through the stencil will be taken up by the backing or support.

10 The invention is not confined to particular methods of securing the location of the adhesive material between the stencil sheet and the support but generally it will be found convenient either to coat suitably the
15 back of the stencil sheet or the face of the support with the adhesive material or both.

A wide variety of adhesive or transferring materials may be used without exceeding the scope of the application. For instance,
20 waxy compositions or water-insoluble adhesives may be employed and while these it might be thought would impede the absorption of the liquefying agent by the porous or absorbent support when such are used it is
25 found that they do not do so to any material extent, this being probably due to the fact that the liquefying agent is absorbed by the portions of the absorbent support in the immediate vicinity of those to which the coating
30 of adhesive or transferring material adheres or to which it is transferred in the stencilizing operation.

In carrying the method in accordance with the invention into effect the back of the
35 stencil sheet or the adjacent face of the support may be treated to secure the desired adhesion immediately prior to the operation of forming the stencil. Considerations of a practical nature, however, render it desirable
40 for the manufacturer to place in the hands of the user an article which needs the minimum of manipulation or treatment.

The invention also extends to improved stencil sheets adapted to be stencilized by
45 the local application of a liquefying agent.

A stencil sheet in accordance with the invention comprises an ink-resisting film adapted to be softened by a liquefying agent
50 used in forming the stencil, coated on a highly porous material or material of openwork texture, the back of which is provided with a coating or layer of an adhesive character, being preferably sufficiently adhesive to adhere to the backing in contact with which
55 the stencil sheet is secured only at or adjacent to those points where pressure is applied to the sheet in the operation of forming the stencil, or with a coating which is not necessarily adhesive but which will be transferred
60 to the support at or adjacent to such points.

The invention also consists in a combined stencil sheet including a stencil sheet comprising an ink-resisting film adapted to be softened by the action of an agent used in
65 forming the stencil, coated on a highly

porous material or material of openwork texture, a backing sheet detachably connected therewith and a film of adhesive or transferring material between the stencil sheet
70 and the backing sheet.

In a combined stencil sheet in accordance with the invention the adhesive or transferring material will usually be applied to the face of the stencil sheet in contact with the
75 backing sheet.

In some cases, however, the adhesive material may be applied in a suitably attenuated form to the backing sheet.

As adhesive or transferring material any convenient composition adapted to maintain
80 or have imparted to it a tacky consistency may be employed.

As transferring materials, compositions which are not in some senses adhesive may be used; such compositions must, however,
85 be of such character that they may be transferred and will hence adhere to the support.

Wax compositions which are not sticky but resemble the wax compositions used in coating co-called carbon papers may be
90 cited as examples of materials which may be employed in accordance with the invention which are not sticky or tacky.

Where the ink-resisting layer or coating of the stencil is adapted to be softened by
95 an aqueous liquefying agent the adhesive material may be water soluble or it may be insoluble in water.

A mixture comprising glucose (corn syrup) and glycerine may be mentioned as an
100 example of an adhesive material of a tacky nature soluble in water; elemi, Canada balsam, polymerized fatty oils, nitrated non-drying oils, waxes and compositions derived
105 from these materials may be mentioned as examples of materials of an adhesive character which are insoluble in water. It is, however, to be understood that the invention is not confined to the use of the specific materials mentioned as adhesives, as many other
110 substances or compositions than those mentioned may be employed, although preferably where the liquefying or solubilizing agent is of an aqueous character adhesive or transferring materials insoluble or relatively
115 insoluble in aqueous media are employed.

A further feature of the invention consists in impregnating the absorbent or relatively absorbent backing with a material adapted to render the same translucent or
120 transparent without inhibiting its capacity to absorb the softening, liquefying or solubilizing agent.

In accordance with this feature of the invention the backing may be treated with
125 wool wax (adepts lanæ) or an equivalent material.

A combined stencil sheet embodying this feature will be adapted for use in tracing
130 as the treated backing sheet being transpar-

ent or translucent will enable the matter below the sheet to be seen and therefore traced and the material with which the backing is treated will prevent the liquefying or solubilizing agent passing through it.

Another feature of the invention consists in incorporating in the ink-resisting coating of the stencil sheet a proportion of a solid material insoluble in the ingredients of the composition employed in forming the coating.

The addition of kieselguhr, china-clay or a highly colloidal clay, such as the material known as Bentonite, or of zinc oxide, lithopone or the like, appears to have a desirable effect in reducing the tendency of the liquefying agent to spread.

In part, this effect may be due to the fact that the materials in question impart a matt surface to the coating.

In addition, certain materials which are suitable for use tend to neutralize the action of the liquefying agent and such materials may be included also in the adhesive or transferring composition. Thus when, for instance, a solution of sulphuric acid is employed as the liquefying agent, gelatine being the main constituent of the ink-resisting composition of the stencil sheet, the presence of zinc oxide in the composition will neutralize the acid tending to spread itself laterally in the ink-resisting coating.

The invention is not confined to the employment of any specific material in forming the coating composition; generally, however, a gelatinizing organic colloid will be used and conveniently a protein is employed.

With proteins, a variety of bodies included in the so-called Hofmeister series may be used as the liquefying agent.

A 50 per cent solution of sulphuric acid suitably coloured may, for example, be employed as the liquefying agent.

The highly porous material which is furnished with the ink-resisting coating may be yoshino paper, now universally used in the manufacture of stencil sheets for use in duplicating; alternatively, fine lawn may be employed should the character of the material to be reproduced admit of the use of a woven fabric.

In forming a stencil in accordance with the invention it will be found that the softening agent rapidly penetrates the ink-resisting medium, the excess being absorbed by the backing in which it usually spreads laterally without, however, the absorbed material detrimentally affecting the portions of the ink-resisting medium on the adjacent portions of the stencil sheet.

The absorptive properties of the backing need not be considerable, paper which when written on in the ordinary way with ink absorbs merely the ink normally delivered by the pen without the absorbed ink spread-

ing materially in a lateral direction being quite suitable, the use of highly absorbent paper such as blotting paper being unnecessary.

In fact, the use of absorbent material as the support or backing may be dispensed with in some cases, as has been pointed out above.

The ink-resisting composition of the stencil sheet must be employed as a very thin layer or coating if the best results are to be secured.

In some cases it may be desirable or convenient to incorporate in the adhesive material a pigment, for instance a light-coloured opaque pigment, which will have the effect of rendering the material cut in the stencil visible when the latter is mounted in contact with the inking means of a duplicating machine.

The following particulars are given by way of example for the purpose of describing a convenient manner of carrying the invention into effect:—

Yoshino paper in sheets is coated by drawing over a roller partly immersed in the following composition:—

	Parts by weight.	
Gelatine -----	25	
Water -----	670	95
Alum -----	0.25	
Glycerine -----	15	
Potassium oleate -----	7	
Kaolin -----	10	
Titanium white pigment -----	5	100

The treated sheets when the coating has set are then similarly coated on the reverse side with the following composition:—

	Parts by weight.	
Rosin oil -----	120	105
Montan wax -----	110	
Canada balsam -----	150	
Paraffin wax -----	150	110
Titanium white pigment -----	64	
Magnesium oxide -----	32	

or with a composition consisting mainly of waxes and of a non-tacky character.

The coated sheets may be mounted upon backing sheets of a suitably absorbent paper or not as desired but they will in any case be associated with a relatively porous support in forming the stencil with the aid of an "ink" which may consist essentially of a dilute solution of sulphuric acid suitably coloured.

After the matter has been written, drawn or otherwise produced upon the stencil sheet, the stencil may be removed from the backing and without further treatment employed in the production of impressions.

Where in the specification the expression "adhesive material" is used, the expression is intended to include where the context al-

lows or permits compositions which are not tacky or sticky but which are caused by the pressure applied locally in the stencilling operation to adhere to the backing.

5 A stencil sheet in accordance with the invention is illustrated by way of example in the accompanying drawing, in which 1 indicates a sheet of yoshino paper, 2 the coating of a composition adapted to be rendered soluble by the local application of suitable liquefying agents, 3 a coating of a composition which when pressure is locally applied to the stencil sheet will be transferred to a support on which the stencil sheet is placed.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of duplicating with the aid of stencils which comprises applying locally to a sheet of highly porous material furnished with an ink-resisting coating and supported on a backing sheet an agent adapted to soften the coating and at the same time securing adhesion between the stencil sheet and the support or backing.

2. The method of duplicating with the aid of stencils which comprises applying locally to a sheet of highly porous material furnished with an ink-resisting coating and supported on a backing sheet an agent adapted to soften the coating so that by subsequent treatment the portion of the coating so softened may be removed, while securing adhesion between the stencil sheet and the support or backing by the pressure of the implement used in stencilling the stencil sheet.

3. The method of duplicating with the aid of stencils which comprises applying locally with the aid of a delineating implement to a sheet of highly porous material coated on one side with a composition of a character adapted to be rendered removable by the local application of a liquefying agent and coated on the other side with a transferable composition, while said sheet is supported on a backing, an agent adapted to render soluble the first-mentioned coating.

4. The method of duplicating with the aid of stencils which comprises applying locally to a sheet of yoshino paper furnished with an ink-resisting coating and supported on a backing sheet an agent adapted to soften the coating and at the same time securing adhesion between the stencil sheet and the support or backing.

5. The method of duplicating with the aid of stencils which comprises applying locally to a sheet of yoshino paper furnished with an ink-resisting coating and supported on a backing sheet an agent adapted to soften the coating so that by subsequent treatment the portion of the coating so softened may be removed, while securing adhesion between

the stencil sheet and the support or backing by the pressure of the implement used in stencilling the stencil sheet.

6. The method of duplicating with the aid of stencils which comprises applying locally with the aid of a delineating implement to a sheet of yoshino paper coated on one side with a composition of a character adapted to be rendered removable by the local application of a liquefying agent and coated on the other side with a transferable composition, while said sheet is supported on a backing, an agent adapted to render soluble the first-mentioned coating.

7. A stencil sheet for use in duplicating comprising a sheet of highly porous material, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilling, and on the other face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent.

8. A stencil sheet for use in duplicating comprising a sheet of highly porous material, on one face of said sheet a coating of material sufficiently adhesive to adhere to a support in contact with which the stencil sheet is secured in stencilling adjacent to those points where pressure is applied to the sheet in the stencilling operation and on the other face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent.

9. A combined stencil sheet for use in duplicating comprising a sheet of highly porous material, on one face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent, an absorbent backing sheet detachably connected therewith and a film of adhesive material between the stencil sheet and the backing sheet.

10. A stencil sheet for use in duplicating comprising a sheet of highly porous material, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilling, on the other face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent and a backing sheet semi-permanently connected to the stencil sheet with one of its faces adjacent to the first-mentioned face of the stencil sheet.

11. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilling, and on the other face of said sheet a coating of a composition adapted to be liquefied

by the local application of a liquefying agent.

12. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of material sufficiently adhesive to adhere to a support in contact with which the stencil sheet is secured in stencilizing adjacent to those points where pressure is applied to the sheet in the stencilizing operation and on the other face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent.

13. A combined stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent, an absorbent backing sheet detachably connected therewith and a film of adhesive material between the stencil sheet and the backing sheet.

14. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilizing, on the other face of said sheet a coating of a composition adapted to be liquefied by the local application of a liquefying agent and a backing sheet semi-permanently connected to the stencil sheet with one of its faces adjacent to the first-mentioned face of the stencil sheet.

15. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilizing,

and on the other face of said sheet a coating of a gelatinous composition adapted to be liquefied by the local application of a liquefying agent.

16. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of material sufficiently adhesive to adhere to a support in contact with which the stencil sheet is secured in stencilizing adjacent to those points where pressure is applied to the sheet in the stencilizing operation and on the other face of said sheet a coating of a gelatinous composition adapted to be liquefied by the local application of a liquefying agent.

17. A combined stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a gelatinous composition adapted to be liquefied by the local application of a liquefying agent, an absorbent backing sheet detachably connected therewith and a film of adhesive material between the stencil sheet and the backing sheet.

18. A stencil sheet for use in duplicating comprising a sheet of yoshino paper, on one face of said sheet a coating of a material adapted under the action of pressure to adhere to a support on which the stencil sheet is placed in the operation of stencilizing, on the other face of said sheet a coating of a gelatinous composition adapted to be liquefied by the local application of a liquefying agent and a backing sheet semi-permanently connected to the stencil sheet with one of its faces adjacent to the first-mentioned face of the stencil sheet.

In testimony whereof I have signed my name to this specification.

DAVID GESTETNER.