Sept. 11, 1934. P. H. MURPHY 1,973,151

PROCESS OF MAKING STENCILS

Filed May 16, 1932 2 Sheets-Sheet 1

FIG. 1.

FIG. 2.

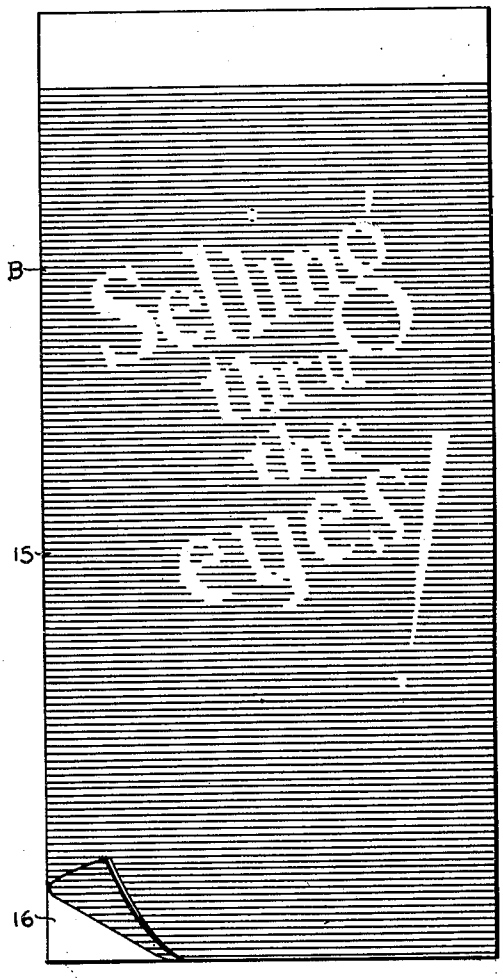
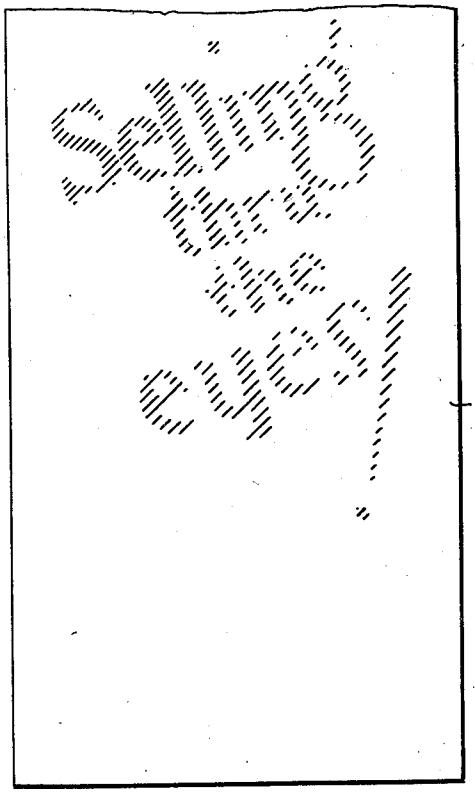


FIG. 3.



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PROCESS OF MAKING STENCILS

Filed May 16, 1932 2 Sheets-Sheet 2

FIG. 4.

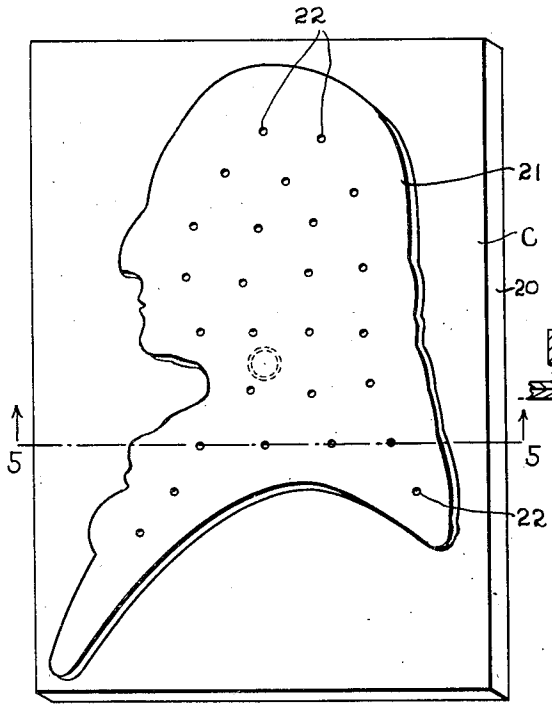


FIG. 5.

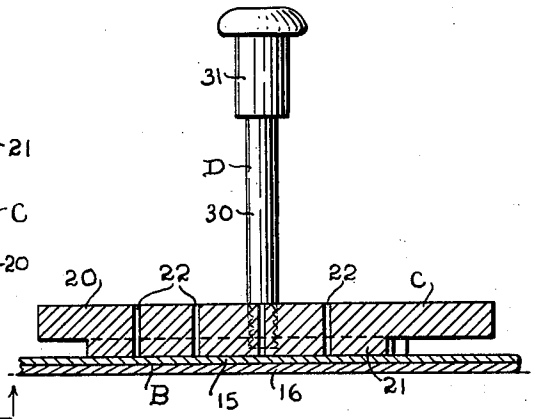
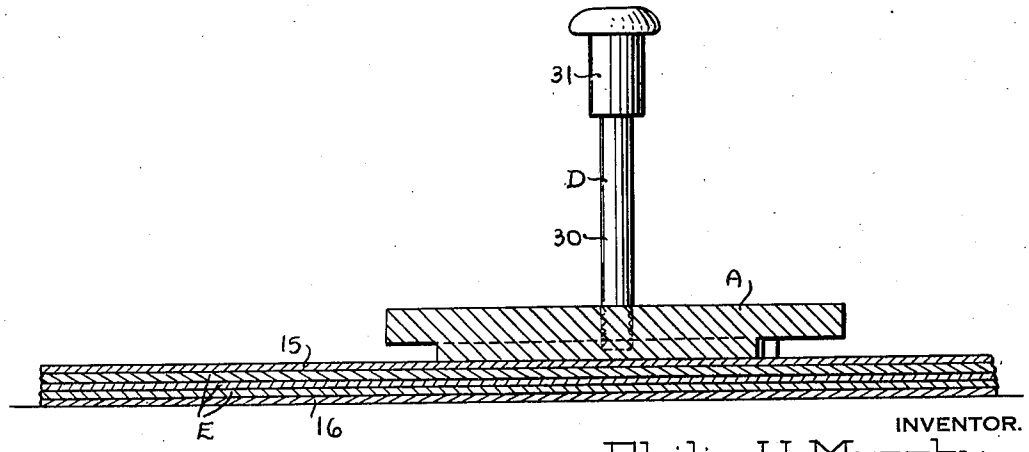


FIG. 6.



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1,973,151

PROCESS OF MAKING STENCILS

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Application May 16, 1932, Serial No. 611,683

12 Claims. (Cl. 41—38.5)

This invention relates to the art of stencil making and more particularly to a process of stencil making where a heated instrument is applied to a stencil sheet.

In the past, three major types of stencil sheets have been in use in the United States. These are represented first by the early paraffin or wax coated sheet, second by the later, so-called indestructible stencil sheet having a coating of colloidal proteins, such as gelatin, combined with a tempering agent such as sugar or glycerine, third the modern cellulose ester treated Yoshino paper stencil sheet.

The first type was superseded by the second mainly because the paraffin or soft wax coated sheet required extraordinary care in handling, every minor crease, fold or scratch in the sheet showing up in the printing. However, the second type or gelatin coated sheet was in general use only until about 1925 principally because it was discovered that the coating hardened after a comparatively short period and the sheet could then be employed only after a laborious and somewhat not very effective application of a moistener to re-soften the coating.

As an example of the modern stencil sheet, which may be employed in this process, reference is had to United States Patent No. 1,526,982, dated February 17, 1925.

However, it should be understood that by the term modern stencil sheet, it is intended to designate a stencil sheet comprising an ink-penetrable base, coated or impregnated with a heat-resisting ink-impervious substance, such as pyroxylin enamel, which will not change its ink-impervious properties during a temperature range of between 100° and 600° Fahrenheit.

Again referring to the first type of stencil sheet, the wax or paraffin coating could be readily melted, since paraffin melts at approximately 120° Fahrenheit, so as to produce lines and dots by the use of a heated stylus, but when a heated instrument was employed which had a larger surface area as, for instance, large face type, the heat melted the wax surface beyond the edges of the type surface area, since it was found necessary to apply the heated instrument for a longer period than when mere lines or dots were required. Often the melted wax would again run into the de-coated area and render the sheet useless. Instruments heated to temperatures above 120° Fahrenheit, and particularly temperatures of 650° Fahrenheit or thereabout, when brought close to the wax coating, as when applying the instrument, melted the coating before the instrument touched the same, the melted area extending beyond the area of the heated surface.

As for the second type of stencil sheet, it was discovered that when applying a heated instrument to the gelatin coated sheet, a heat above 120° Fahrenheit was required but the de-coated area could not be successfully freed of protein residues which interfered with successful printing from such sheet. In addition, the heat necessary was such that the base of porous paper charred before the melting was accomplished. As a result, the use of heated implements in making stencils was practically abandoned and the pressure method, employing lines and dots, was substituted. This method called for the use of considerable pressure of the instrument upon the coated surface and it was soon discovered that only lines and points or dots could be employed, rendering a solidly inked surface or area impossible. It was also discovered that the Japanese Yoshino paper which came into general use as a base for the stencil sheet, did not respond well to the use of a stylus since the fibers became loosened, were picked up by the stylus, collected the ink-impervious coating and were hard to remove from the de-coated line.

In the employment of modern stencil sheets, I have discovered a process whereby any selected area of the ink-impervious coating thereon may be removed so that any desired inked area may be printed from the stencil.

Another object of the invention is to provide a process for the simultaneous removal of a plurality of areas of ink-impervious coating from a modern stencil sheet.

Another object is to provide a process for the removal of a selected area, in contradistinction to lines or dots, of the ink-impervious coating of a modern stencil sheet.

Still another object is to provide a process for the simultaneous removal of a plurality of areas of ink-impervious coating from a modern stencil sheet, the removal requiring substantially less than two seconds of time.

Another object is to provide a process whereby the removal of areas of different sizes of the ink-impervious coating of modern stencil sheets will leave sharp edges to the de-coated area, rendering the prints resulting from their use, closely resembling standard printing matter.

Another, and important, object of the invention is to provide a process whereby modern stencil sheets, which have lost their usefulness in making ordinary stencils due to hardened coatings, loss of tempering agent, and the like, may be

readily employed in making stencils as are fresh stencil sheets.

Yet another object is to provide such a process which may be carried out practically anywhere and which does not require the use of expensive apparatus or the employment of highly skilled workmen.

Still another object is to provide a process whereby a stencil may be prepared by the application of a suitable ink-impervious coating to selected areas of an ink-pervious base.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts thruout the several views:

Figure 1 is a perspective view of an instrument employed to remove an ink-impervious coating from a stencil sheet, as in the improved process.

Figure 2 is a stencil sheet assembly employed in the process, showing the ink-impervious coating thereof removed by the instrument shown in Figure 1.

Figure 3 is a fragmentary view of a backing sheet forming a part of the stencil sheet assembly.

Figure 4 is a perspective view of another instrument employed for removing the ink-impervious coating from a modern stencil sheet, employed in the improved process.

Figure 5 is a view substantially on the line 5—5 of Figure 4 with the fragments of a stencil sheet assembly beneath, shown in cross section.

Figure 6 is a view similar to Figure 5 but showing an imperforate instrument employed in the process, having a contact surface of particularly large area, applied to a stencil sheet and cushioning material shown in cross section.

In the drawings, wherein similar reference characters designate corresponding parts thruout the several views, the letter A designates one instrument employed in the process, the letter B a modern stencil sheet, the letter C a second instrument employed in the process, the letter D a handle for the instruments A and C, and the letter E a cushioning means.

As for the instrument A, the same is preferably of copper or brass or a suitable substance which will not melt if subjected to a temperature of 650° to 900° Fahrenheit. This includes a preferably solid base 10 about one quarter inch thick, and provided with a raised contact face bearing suitable delineations or indicia 11 which are preferably raised between $\frac{1}{32}$'' and $\frac{1}{8}$'' from the surface of the base 10. Thus it will be seen that ordinary printers' type or electro-type will not be applicable for use for the removal of the ink-impervious coating of the modern stencil sheet, since printers' type generally are of lead (which becomes soft at about 600° Fahrenheit and this metal is not a good conductor of heat) and electrotypes of copper plated lead (which were found unsatisfactory since the lead commences to ooze from the back of the face of the electro-type upon heating about 600° Fahrenheit and applying slight pressure). These instruments A may be cast or engraved. However, it should be understood that the instrument employed need not be limited to a solid one since a suitable electric resistance unit might be incorporated therein for the purpose of properly heating the same, the heating of instruments adapted to transmit heat by incorporating therein a heating unit being well known.

The stencil sheet B includes a base 15 of any suitable ink-pervious material such as Yoshino paper, coated or impregnated with a suitable ink-impervious composition of matter such as a cellulose ester and a suitable solvent, requiring a temperature of at least 650° Fahrenheit to remove in order to render the stencil sheet ink-pervious over the lines, dots and large areas exposed by removal of the ink-impervious coating. Usually an ink-pervious tempering agent such as castor oil is provided and forms with the cellulose ester and its solvent a homogeneous body. Ordinarily this covers or impregnates the whole of the base. This base is generally suitably secured at one end to a backing sheet 16 usually of oiled paper.

The instrument C is provided where large wide or unbroken areas of ink-impervious coatings are to be removed from a stencil sheet, and includes a base 20 about ¼'' thick and provided with a raised contact face bearing suitable indicia or delineations 21 preferably raised between $\frac{1}{32}$'' and ⅛'' from the surface of the base 20. Spaced about one-half inch apart over the area of the face are a plurality of perforations 22 extending thru the base 20 and opening into the outer surface of the base. Since this instrument C will be subjected to temperatures as high as that of the instrument A, it will be made of preferably brass or copper, cast or engraved.

The handle D may be of any suitable material which does not readily conduct heat and includes a shank 30 ending in a knob 31 and is preferably detachable from the instruments A and C.

The cushioning means E may be any fairly porous material, such as several sheets of uncoated Yoshino paper, silk and the like. What is required is a material which, when placed between the base 15 and backing sheet 16 will permit gas and air or vapor to pass thru and around the cushioning means and be dissipated.

In carrying out the process, where an ink-impervious coated or impregnated modern stencil sheet is employed, the stencil sheet with the backing sheet beneath is laid upon any suitable flat surface and a suitable instrument such as A is heated to a temperature at or above 650° Fahrenheit and laid upon the stencil sheet with the surface of the area of the instrument bearing the delineations in contact with the stencil sheet. If the sheet is a fresh one, with a considerable quantity of the tempering agent still in the mixture, the heated instrument should remain about only one second and then removed by a movement at a right angle to the surface of the stencil sheet. It is important that the instrument not be moved laterally after it is in contact with the sheet. No pressure upon the instrument A is required and the instrument is of course applied and removed by the operator grasping the handle D.

Upon removal of the instrument, it will be found that the ink-impervious coating has been removed from the stencil sheet over an area corresponding to the raised face area of the instrument A as shown in Figure 2, the lines being sharp and the area being clean and well defined. The ink-pervious tempering agent will be found to be temporarily liquefied but this interferes in no way with the subsequent use of the stencil sheet since it has been found that this liquefied tempering agent may be either wiped off, allowed to evaporate or again harden, dependent upon its composition, or the stencil sheet with the liquefied tempering agent thereon may

be at once used. The base will be found uncharred and while the backing sheet may have a faint delineation thereon as shown in Figure 3, this is but due to the heat affecting the oil in the backing sheet and does not interfere with the process. In fact, it has been found that the backing sheet may be dispensed with and the stencil sheet, minus its backing sheet, placed upon even a glass base and the process carried out as outlined above.

Upon removal of the instrument A, a film of the residue of the ink-impervious coating having physical and chemical characteristics different from the coating will be found upon the face of the instrument A. This film may be readily removed by the employment of a suitable scouring composition made into a paste, rubbed over the face of the instrument A, and then washed off.

If desired, the stencil sheet may now be further stenciled in a typewriter or the like.

However, the process is equally as applicable to modern stencil sheets which have deteriorated, due to loss of the tempering agent, and are consequently otherwise unusable. The ink-impervious coating on these sheets may be removed as outlined above, but the heated instrument should be applied for a shorter period,—approximately one second. This will remove the coating where desired but will not char the base. Thus it will be seen that the value of the tempering agent insofar as this process is concerned is negligible.

It has been found that where a solid area, above a half inch square, is to be de-coated as outlined above, it is desirable to provide some means for a plentiful supply of heated oxygen from the air to come into contact with the area to be de-coated as well as to provide means for the escape of entrapped gases, vapor, air or the like which may collect between the instrument and the stencil sheet and which are liable to cause the instrument to slip over the stencil sheet, since some little pressure on the instrument is desirable in de-coating large areas. For this reason, the perforated instrument C is employed, the entrapped gases and vapor arising from the action of the heat upon the substances comprising the stencil sheet passing off thru the perforations while the oxygen of the air will have access to the coating thru the perforations.

As an alternative for the perforated instrument C, the instrument A may be employed, having a large face area to be used, and the cushioning means E used in conjunction therewith, between the base 15 and backing sheet 16. The entrapped air, gases and vapor will then pass off and thru and about the cushioning means and the oxygen of the air will also be able to reach the coating thru the cushioning means E and base 15.

It is sometimes desirable to have a stencil which may be used to print colorless indicia upon a colored background. For that purpose, the process embraces employing an ink-pervious base such as Yoshino paper, and coating printers' type, or any suitable device having the desired indicia thereon, with a suitable ink-impervious coating such as pyroxylin enamel and then transferring the coating to the base by applying the device to the base. As an example, the raised base of the instrument A might be coated with a plastic ink-impervious pyroxyline enamel and at once the coating transferred to a sheet of Yoshino paper where it would appear as shown in Figure 3. Then the print resulting therefrom would show up similarly to Figure 2 with the lettering colorless and the background suitably colored.

By the employment of this process, stencils may be provided in only a fraction of the time necessary to scribe the same by the employment of a stylus, stencils may be provided having large de-coated areas and not merely dotted or lined areas, and by the process the areas will be sharply defined.

Various changes in the steps of the process herein described, may be made without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. Those steps in the process of making a stencil from a stencil sheet carrying an adhering ink-impervious cellulose ester, which consists in bringing an instrument in contact therewith, heated to at least 650° Fahrenheit, causing substantially all of said cellulose ester in contact with said instrument to be changed physically and chemically, and removing the instrument.

2. Those steps in the process of making a stencil from a stencil sheet having a coating including a cellulose compound, which consists in bringing an instrument in contact therewith, heated to at least 650° Fahrenheit, causing substantially all of said cellulose compound in contact with said instrument to change its physical and chemical characteristics, and removing the instrument.

3. Those steps in the process of making a stencil from a stencil sheet having a coating including pyroxylin enamel, which consists in bringing an instrument in contact with said enamel, heated to at least 650° Fahrenheit, causing substantially all of said enamel in contact with said instrument to change its chemical and physical characteristics and removing the instrument.

4. Those steps in the process of making a stencil from a stencil sheet having a coating including an ink-impervious substance requiring a heat above that of the melting point of paraffin for its removal by oxidation, which consists in bringing an instrument in contact therewith, heated to a temperature above the temperature of the melting point heat of paraffin, and in the presence of air, causing oxidation of said substance by the oxygen of the air while in the presence of the heat of said instrument and removing the instrument.

5. Those steps in the process of making a relatively large, solid area ink-pervious on a stencil sheet having an ink-impervious coating, which consists in laying a heated instrument thereon, with a relatively large solid contact area of said instrument in contact with said coating, causing said ink-impervious coating under said area to change its characteristics and adhere in part to said instrument, causing substantially the balance of said ink-impervious coating under said area to change its characteristics and dissipate to the atmosphere, and removing the instrument.

6. Those steps in the process of rendering a relatively large solid area ink-pervious on a stencil sheet having an ink-impervious coating, which consists in laying a heated instrument thereon, with the surface area of said instrument in contact with said stencil sheet relatively large and solid, causing a portion of the coating residue resulting from said step to change its physical and chemical characteristics and adhere to said instrument and removing the instrument, the heat of said instrument being such that a portion of the residue of said coating in contact

with said contact area of said instrument will come away upon said instrument.

7. Those steps in the process of simultaneously rendering a plurality of relatively large solid areas ink-pervious on a stencil sheet having an ink-impervious coating, which consists in laying a heated instrument thereon, with the surface areas of said instrument in contact with said stencil sheet relatively large and solid, causing a portion of the coating residue resulting from said step to change its physical and chemical properties and dissipate to the atmosphere, and removing said instrument.

8. Those steps in the process of making a stencil from a stencil sheet including a base carrying an adhering ink-impervious composition of matter, which consists in heating an instrument to a temperature necessary to cause oxidation of said composition of matter, applying said heated instrument to said sheet in the presence of the oxygen of the air, permitting the oxygen of the air to reach said coating thru said instrument and the gaseous products arising from the action of the oxygen and heat upon the composition of matter to pass off thru said instrument, and removing the instrument before it chemically affects said base.

9. Those steps in the process of de-coating a relatively large solid area of a stencil sheet having a base coated with an ink-impervious coating, and with an ink-pervious tempering agent, which consists in heating an instrument to a temperature necessary to promote oxidation of said ink-impervious coating, applying said instrument to said coating in the presence of the oxygen of the air with the surface area of said instrument in contact with said coating relatively large and solid, permitting air to pass thru said instrument to said coating and the gaseous products arising from the action of the oxygen of the air upon the ink-impervious coating to pass off thru said instrument, and removing the instrument with substantially the remainder of said oxidized coating thereon.

10. Those steps in the process of de-coating a relatively large solid area of a stencil sheet having a base coated with an ink-impervious coating, which consists in heating an instrument to a temperature necessary to promote oxidation of said ink-impervious coating, applying said instrument to said coating in the presence of the oxygen of the air with the surface area of said instrument in contact with said coating relatively large and solid, permitting air to pass thru said instrument to said coating the gaseous products arising from the oxygen of the air and the action of the heat upon the ink-impervious coating to pass thru said instrument, and removing the instrument with substantially all of the remainder of said oxidized coating thereon.

11. Those steps in the process of making a stencil from a stencil sheet having a porous base carrying an adhering ink-impervious composition of matter, which consists in cushioning said stencil sheet upon a relatively flat porous cushion in the presence of the oxygen of the air, heating an instrument to a temperature necessary to promote oxidation of said composition of matter, applying said instrument to said stencil sheet, permitting the gaseous products arising from the action of the heat and oxygen of the air upon the composition of matter to pass off thru said cushion, and removing the instrument.

12. Those steps in the process of making a stencil from a stencil sheet having a porous paper base carrying an adhering impervious composition of matter and an ink-pervious tempering agent, which consists in cushioning said stencil sheet upon a relatively flat porous cushion, adapted to permit the circulation of air and gases therethru, heating an instrument to a temperature necessary to promote oxidation of said composition of matter, applying said instrument to said stencil sheet in the presence of the oxygen of the air, permitting the gaseous products arising from the action of the heat and oxygen of the air upon the composition of matter and tempering agent to circulate thru said cushion, and removing the instrument.

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