July 7, 1942. D. M. WALLACE ET AL 2,288,860

METHOD OF SURFACE ORNAMENTATION

Filed June 4, 1940

Fig. 1.

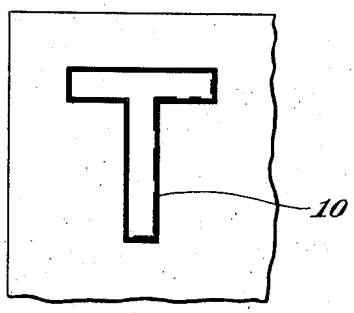


Fig. 2.

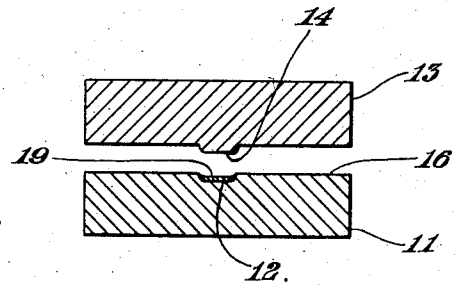


Fig. 3.

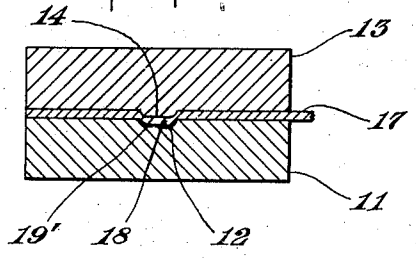


Fig. 4.

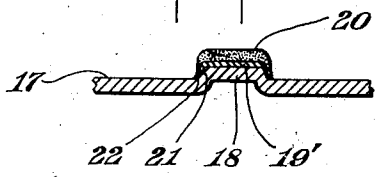


Fig. 5.

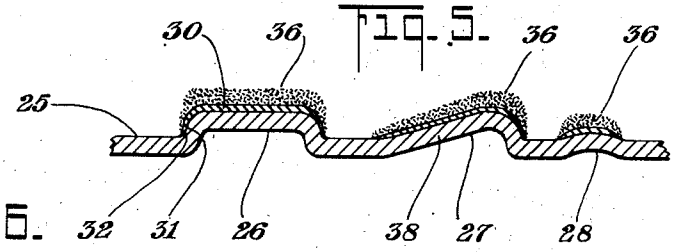


Fig. 6.

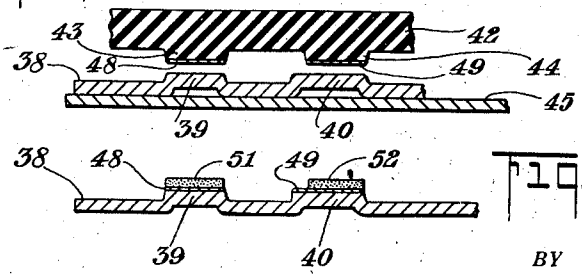


Fig. 7.

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METHOD OF SURFACE ORNAMENTATION

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4 Claims. (Cl. 41—24)

The present invention relates broadly to the graphic arts or to the art of surface ornamentation, including the printing of words, figures, characters, and other indicia, and relates more particularly to an improved type of "raised printing" as well as to an improved process of "flock printing." The term "printing" as used hereinafter is deemed to include any reproduction of characters, designs, lines, or the like, on an impressible surface of any character.

Under existing practices the art of raised printing, which is known variously as plateless engraving, thermography, and the like, usually includes the process of setting type or forming a plate with letters or characters in high relief, and then applying to the upper surfaces of such letters or characters a special ink having somewhat more pronounced adhesive characteristics than usual printing ink. When the type is brought into engagement with the printing surface there is thus deposited thereon, within the areas defined by said type surfaces, the special ink. While the ink is still wet the entire surface of the paper or other printing surface is dusted with a compound which may be granulated shellac, or any natural or synthetic resinous material, such powdered substance adhering to those portions of the surface of the paper having previously received the special ink.

The surplus powdered material is then dusted from the sheet, or otherwise removed by suction, or by means of a blower, and the sheet is then placed in a suitable heating chamber or oven having a sufficient temperature to melt the resinous compound, thereby causing the particles to become fused and producing a generally "raised" effect.

Similarly, the art of flock printing includes the depositing on the material to be ornamented, within certain defined areas corresponding to the design to be reproduced, an adhesive substance, usually in the nature of glue, and then applying to the adhesive field by means of a blower or other suitable distributing means a coating or layer of some finely comminuted fibrous material, such as ground artificial silk fibres, silk, cotton, wool, or the like. Finely ground rubber, cork, leather, sand, or any other subdivided material may also be employed. This material thus adheres to the adhesive field, and the surplus material overlying portions not having the adhesive applied thereto is then removed by means of a blower, suction means, or otherwise. When the adhesive dries the flat material consists of a smooth base formed with spaced, ornamental pile figures.

The adhesive material is applied to the paper or other material to be ornamented while the latter is in a flat condition, and the silk screen method has been in general use for so applying the adhesive substance. The adhesive may also be applied by a suitable plate having figures in high relief corresponding to the design to be reproduced.

In following the foregoing method of raised printing and of flock printing, a certain raised effect is obtained, although the height of the raised portions is necessarily definitely limited in view of the fact that both the finely powdered resinous material and the finely comminuted fibrous material can form an adhesive layer of only a predetermined maximum thickness.

One of the principal objections to printing and/or surface ornamentation by the foregoing methods is in the fact that the edges are seldom clean and well defined, particularly in instances wherein a raised effect of considerable height is desired. In practicing the foregoing methods it is also impossible to secure any variation in the height of the various portions, and accordingly the resulting effect is not greatly unlike typical flat printing or other flat surface ornamentation.

It is accordingly another object of the present invention to provide a novel method of raised printing and/or flock printing wherein printed or ornamented portions of substantial height can be obtained, and wherein the lines defining the edges of the design or printing are clear, sharp and clean, and wherein any desired variation in the height of the several portions of the design may be obtained.

A further object of the invention is the provision of an improved method of printing and ornamenting of this general character wherein the height of the raised impressions can be positively controlled, and wherein any given figure may have portions of varying height. A still further object of the invention is the provision of an improved ornamentation method whereby highly ornamental and artistic effects can be secured at a cost which compares favorably with ordinary raised printing and flock printing.

In the drawing:

Fig. 1 is a top plan view of a conventional character, to wit, the letter "T," which has been reproduced in accordance with the method of the present invention.

Fig. 2 is a transverse section taken through

the complemental dies used in printing and forming the raised letter.

Fig. 3 is a transverse section taken through the same dies after they have engaged the paper.

Fig. 4 is an enlarged transverse section taken through one portion of the finished letter.

Fig. 5 is an enlarged transverse section taken through a finished flock printing specimen made in accordance with the method of the present invention.

Figs. 6 and 7 show the steps required in employing a modified method of carrying out the invention.

As was previously pointed out, raised printing has heretofore been practiced by printing from a surface in high relief. In accordance with the present invention the printing upon the surface of the paper or other material is done from inked lines lying below the surface of a flat plate of copper, steel or other material. The depth of the engraving may vary depending upon the desired height of the letters or characters, and a complemental male die or counter is employed to produce a positive embossing or raised impression upon the printing surface which is independent of the ink employed, which latter lies on the upper surfaces of such raised impressions.

In the instance shown, the letter "T," indicated by the reference numeral 10, is to be reproduced, and such letter is formed in the engraved die or intaglio plate 11, recesses 12 corresponding to such letter. After the die has been formed in the usual manner a positive plate or counter 13 is formed with raised portions 14 corresponding to the recessed portions 12 in the engraved plate 11. The counter may be formed of metal, just as plate 11, or it may be formed of paper or other material reduced to a plastic state and then molded to correspond with the recesses in the intaglio plate 11. In accordance with usual engraving practice, intaglio plate 11 is positioned below the counter 13, although this arrangement may be reversed if desired.

Ink is now applied to the upper surface 16 of plate 11, such ink being of the type normally used for raised printing, and after the ink has been applied to all portions of the surface such ink is removed, except for the portions 19 residing in the recesses 12, by means of wiping paper or by means of a doctor blade, all as is well known in the art.

The sheet 17 is now placed between the complemental dies 11 and 13, and sufficient pressure exerted on the upper die 11 to emboss the design or letter upon the paper 17, as shown in Fig. 3, thus forming the raised portion 18 corresponding to such character and upon which raised portion the ink has now been deposited, such ink being shown at 19' in Fig. 4. The sheet is now removed from the dies and the finely divided resinous material applied to the upper surface of the paper 17 in the usual manner, thus depositing a layer shown at 20 in Fig. 4. The sheet is next transferred to a heating chamber having a sufficiently high temperature to bake or fuse the resinous material.

It will be noted from an examination of Fig. 4 that the side wall, designated as 21, of the raised letter is substantially vertical, and in accordance with the practice of the present invention the ink 19 extends down such side wall substantially to the base thereof, as indicated at 22. The ink is deposited on such side wall in a somewhat thinner layer than on the top wall, and such thickness on the side wall decreases as it approaches the point 22. The same is true of the finely powdered material 20 which is dusted upon the letter after it has been formed in the manner previously described, and it will be apparent that the edges of the finished letter are thus sharp and well defined.

In practicing the present invention in connection with flock printing, the material to be printed upon is designated in Fig. 5 by the reference numeral 25. This material is usually paper, although any other impressible material may be employed, all as is well known in the art. Similar dies are used in forming the raised portions, three of which are illustrated in Fig. 5 and are numbered 26, 27 and 28, respectively.

In the case of flock printing the material initially printed upon the embossed surfaces is a glue or other similar adhesive, indicated at 30, and such adhesive likewise extends along the side walls 31 of the letter down to the point 32 adjacent to the upper surface of the material 25. The flock material 36 is dusted or blown upon the adhesive surfaces in a manner well known in the art, such flock adhering to all portions which have been previously printed with the adhesive material.

Raised portion 26 is a flat, elevated area of substantially the same height throughout all parts of its surface, whereas raised portion 27 is shown as including a diagonally inclined portion 38, such portion being formed by a proper formation of the dies. Portion 28 is somewhat similar to portion 26, except that it has a lower elevation.

A modification in the foregoing process is illustrated in Figs. 6 and 7 wherein the paper or other material to be printed upon is designated by the reference numeral 38, and in this instance the paper is embossed in the manner previously described, except, however, that no ink is applied to the paper during the embossing operation. There are, nevertheless, formed one or more raised portions 39 and 40, which may, if desired, be of varying heights. The ink is now applied by means of a male inking plate 42 having projections 43 and 44 formed in accordance with the design to be printed.

The printing surfaces 43 and 44 are inked in the usual manner and such plate is then brought into contact with the paper 38 having the embossed areas 39 and 40, while the paper rests upon a flat support 45. The die or plate 42 in this instance is desirably formed from rubber or other resilient material, and since no counter is employed, nor in fact needed, the die 42 does not forceably engage the embossed surfaces but rather gives the paper what is known in the art as a "kiss" impression.

The raised or embossed areas 39 and 40 are, of course, depressed to a limited extent as this impression is given, although by using a rubber die of the character described and by employing this "kiss" impression the raised portions spring back to their position shown in Fig. 6 immediately after the pressure of the die is released. There is accordingly deposited upon such part of the raised portions as are touched by the printing surfaces of the die the special ink which is designated by the reference numerals 48 and 49 in Fig. 6.

Fig. 7 shows the ink having been deposited at 48 and 49 upon the raised portions, and in the case of embossed portion 39 this ink is shown as covering the entire upper surface thereof, whereas in the case of raised portion 40 the ink is shown as covering only part of such raised por-

tion. The paper 30 is removed from the press and the entire surface of the paper dusted with the resinous material indicated at 51 and 52. This process involves, of course, one extra step since it requires one operation for the embossing and the second operation for the depositing of the ink. Nevertheless, it has the advantage of securing new and unusual effects in that any desired part of the raised portion may thus be printed.

In most cases work of this character can best be performed by the use of a rubber die for depositing the ink or adhesive. Nevertheless, for certain types of work a metal die may be used, with or without a counter or male die for supporting the raised areas.

The foregoing methods have been described principally in connection with the ornamentation or printing of characters on paper, although it will be appreciated that the method may be employed in connection with any material, including silks and other fabrics, leather, and even metal. Also, in the case of the raised printing, whereas a special ink is preferably employed, it will nevertheless be apparent that ordinary ink may be used and that one or both of the embossing plates may be round as well as flat. Furthermore, in the case of the flock printing any material having adhesive characteristics may be employed in the printing operation, which may include paint, lacquer or the like.

The foregoing are only a few of the many modifications which may be employed in carrying out the present invention. In other words, the specific steps described are illustrative only and are not to be taken in any limiting sense.

What we claim is:

1. The method of producing raised printing effects on paper or like fabric which consists in forming raised areas corresponding to the characters to be printed, such areas having adhesive inking material on the upper surface and side edges thereof, and then depositing on such raised, inked areas, while the ink is still wet, a powdered fusible material which adheres to such areas including the side walls thereof, and then subjecting the latter material to sufficient heat to cause it to fuse, the inking material being applied by means of an intaglio plate having such material deposited in its recesses, and a male counter die corresponding to the intaglio plate, the printing fabric being compressed between the counter and the intaglio plate.

2. The method of producing raised printing effects on paper or like fabric which consists in forming raised areas corresponding to the characters to be printed, such areas having adhesive material on the upper surface and side edges thereof, and then depositing on such raised, adhesive areas, while the adhesive is still wet, a finely comminuted fibrous material which adheres to such areas including the side walls thereof, the adhesive material being applied by means of an intaglio plate having such material deposited in its recesses, and a male counter die corresponding to the intaglio plate, the printing fabric being compressed between the counter and the intaglio plate.

3. The method of producing raised printing effects on paper or like fabric which consists in forming raised areas corresponding to the characters to be printed by compressing the printing fabric between complemental dies comprising an intaglio plate and a male counter die corresponding to the plate, then depositing inking material having adhesive characteristics on the upper surfaces of such raised areas by the use of a printing plate, applying such pressure to the printing plate as to avoid distortion of said raised areas, then depositing on such raised, inked areas, while the ink is still wet, a powdered fusible material, and then subjecting the material to sufficient heat to cause it to fuse.

4. The method of producing raised printing effects on paper or like fabric which consists in forming raised areas corresponding to the characters to be printed by compressing the printing fabric between complemental dies comprising an intaglio plate and a male counter die corresponding to the plate, then depositing fluid material having adhesive characteristics on the upper surfaces of such raised areas by the use of a printing plate, applying such pressure as to avoid distortion of said raised areas, and then depositing on such raised areas, while the adhesive material is still wet, a comminuted material which adheres to the surface upon the adhesive material drying.

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