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METHOD AND ARTICLE FOR PRODUCING SHADED DESIGNS

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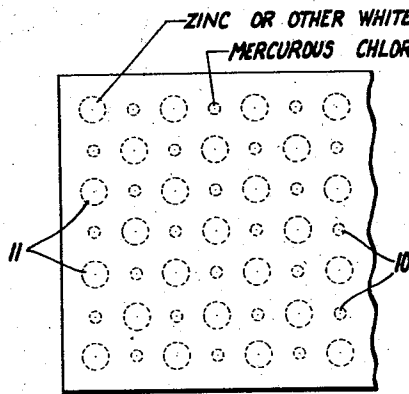


FIG-1

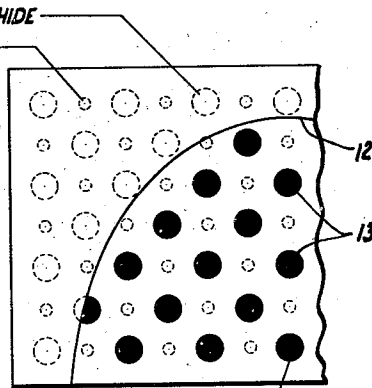


FIG-2

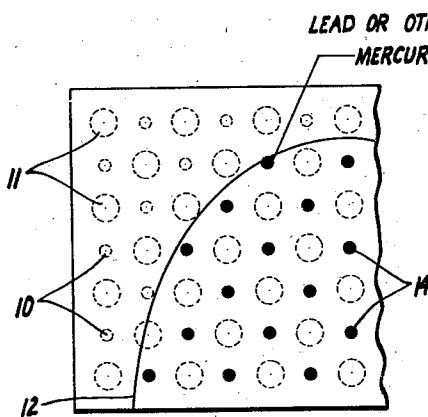


FIG-3

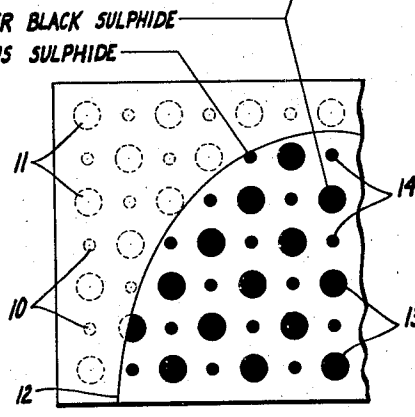


FIG-4



FIG-5



FIG-6

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METHOD AND ARTICLE FOR PRODUCING
SHADED DESIGNS

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6 Claims. (Cl. 41—41)

This invention relates to a method and article for producing shaded designs.

In preparing material for photographic reproduction it is often desirable to shade certain selected portions of an image so that the effect produced by photographing the prepared subject matter is similar to a Ben Day print. The present invention relates to an arrangement of the desired shading design photographically invisible on a prepared board adapted to receive an artist's line drawing or on a separate sheet of light-transmitting or transparent material adapted to be superimposed upon a simple line drawing of any sort and to a development of the design thereafter in a manner to provide a photographically visible design over certain selected portions of the line drawing.

One of the objects of the present invention is to provide a new and improved sheet with prepared discontinuous areas thereof forming stippling, shading, lines, cross-hatching or any desired species of design, together with a suitable developer for changing the photographic visibility of the shading design.

Another object of the present invention is to provide a sheet with a suitable design arranged in discontinuous areas thereon adapted for development in selected areas of a line drawing, together with a developer for changing the photographic visibility of the design and in which all of the materials involved are free from obnoxious odors or deleterious effect upon hair brushes and the like, all of which form objectionable features in products heretofore used in this art.

Another feature of the present invention is the provision upon my improved sheet of a suitable design in disconnected areas, said design being of such a nature that it does not deteriorate upon long exposure to atmosphere or to bright sunlight, together with a developer for changing the photographic visibility of said design, leaving said design in such a stable condition that it will remain indefinitely in its developed state.

Another object of the present invention is to provide new materials for printing white or light colored dots or other designs upon sheet material and new developers for changing the photographic visibility of said dots or designs.

Another object of my invention is to provide a prepared sheet with discontinuous areas of a photographically invisible shading design, these areas being of two different substances adapted to be separately developed. Such areas may be of different size and shape, if desired, and they may be developed selectively to provide two dif-

ferent designs or, if both are developed together, they will provide a third design. My invention covers the method of forming a design by such selective development of areas of different chemical composition.

Another object of the present invention is to provide a new method of forming a shaded design over desired portions of an image comprising printing designs upon sheet material with a photographically invisible sulphide and thereafter converting certain of the printed design areas to a photographically visible sulphide over desired portions of the image.

Another object of the present invention is to provide a novel method for affixing a translucent or transparent design-bearing sheet to an image-bearing surface.

The invention consists in the various forms of structure, chemical compositions and steps in method or process hereinafter described and illustrated in the drawing, and the essential features thereof will be set forth in the claims.

In the drawing, Fig. 1 represents a portion of a sheet with one form of my improved shading design in undeveloped condition thereon; Figs. 2, 3 and 4 are views of portions of sheets having the shading design partially developed; while Figs. 5 and 6 show portions of a sheet of drawing board illustrating a method of forming a shading design thereon. All of the views are greatly enlarged for the purpose of illustration.

In all sheets bearing a suitable invisible shading design which is later treated to produce the desired shade effects over certain portions of a line drawing heretofore used, so far as I know, wherever the variation in the shaded design has depended upon chemical developments of such design, other than by the use of silver salts and photographic processes, the materials used have had an obnoxious odor or a deleterious effect upon the brushes used in applying the chemicals or some other defect which has prevented their general adoption in the art. I have provided such a sheet having a design produced therein which is stable, and without obnoxious odor, together with a developer for changing the photographic visibility of selected portions of the design which produces a design of different color which is also stable, and both the developed design and developer used are without obnoxious odor and without other objectionable commercial defects.

My invention comprises novel substances and methods for the formation of white or light-colored dots or other shading design either upon

a prepared surface intended for the reception of a line drawing to be produced thereon by an artist, or the formation of dots or other shading designs upon a translucent or transparent sheet

5 which is later used as an overlay sheet superimposed upon any suitable image. In either case selected portions of the shading design are later developed to a darker color to produce the desired shading effect in such portions of the line drawing or other image.

10 In one manner of forming disconnected areas of a shading design such as dots, cross-hatching and the like, I use an insoluble salt of mercury such as mercurous chloride or mercurous sulphate or any other suitable salt of mercury which is 15 insoluble and of a color to produce the desired visibility. For instance, in Fig. 1 I have illustrated a portion of a prepared sheet in which the shading design takes the form of dots which are greatly enlarged for the purpose of illustration. 20 The dots shown in the various figures are of different sizes for a purpose later described and, while all of the dots may be formed in the same manner, I shall describe a specialized form in which certain of the dots indicated at 10 in Fig. 1 are printed from a salt of mercury such as I have just described. In preparing this sheet of Fig. 1, 25 the dots are printed either by mixing the mercury salt with a suitable printing varnish or the dots may be printed with a plain varnish and the mercury salt dusted on before the varnish dries. Mercurous chloride will form a white dot and the showing of Fig. 1 reproduces these dots with a dotted effect, whereas in actual practice they 30 would be substantially invisible. If the mercurous chloride dots of Fig. 1 are produced on a white drawing board or paper surface the artist may produce a line image on this surface and thereafter develop the dots lying within certain 40 selected portions of the area of the image so as to give a shaded effect thereto.

A suitable developer for the salts of mercury above described is one containing a reducing sulphur content so that the dots or shading designs are changed to a dark compound which 45 I presume to be a combination of mercury and mercurous sulphide. Such a suitable developer is found in metallic sulphites, hyposulphites and thiosulphates. For instance, sodium thiosulphate provides a suitable reducing sulphur compound and the addition of a certain amount of 50 sodium sulphite thereto makes the compound more stable. The reducing action of the sulphur compound is accomplished more rapidly in an alkaline solution and therefore I prefer to add an alkaline salt, such as sodium carbonate. I 55 avoid such compounds as sodium hydroxide because they eat the brushes which are usually used for applying the developer.

60 The white or light colored dots of mercury salts when developed and darkened by the use of the foregoing described developer are unstable unless I add a substance to prevent oxidation. Such a substance is found in sodium hypophosphites, aldehydes, stannous compounds or antimonious compounds. I prefer, however, a sugar, 65 such as dextrose or corn sugar, because it has no obnoxious odor and no other bad effects.

70 Where the dots are originally printed by mixing of the mercury salt with a suitable printing varnish, I find it advisable to add to the developer a small amount of a solvent for the printing varnish so that the developer may more easily attack the printed dots. I find that alcohol 75 is generally a suitable solvent for this purpose.

A typical developer solution for dots printed from a mixture of the insoluble mercury salts and printing varnish is the following composition:

	Ounces	
Sodium sulphite.....	1/8	5
Sodium thiosulphate.....	1/8	
Sodium carbonate.....	1/2	
Sugar.....	3/4	
Alcohol.....	1	10
Water.....	2	

When the sheet of Fig. 1 has been treated with a developer containing a reducing sulphur compound as described, the small dots will develop black in the treated area as illustrated in Fig. 3.

Another manner of forming the disconnected areas of a suitable shading design is to print the design on the desired surface using a white sulphide which may be later developed with a 20 soluble metallic salt of a sort which forms a black sulphide so as to change the visibility of the shading design areas. A suitable white sulphide is zinc sulphide and I have illustrated certain dots 11 of Fig. 1 as formed upon a suitable surface by printing. Here again the printing may be done with a plain varnish and the zinc sulphide in powder form dusted on before the varnish dries. Any soluble metallic salt carrying a 25 metal which forms a black sulphide may then be passed by a brush over the dots of zinc sulphide whereupon a chemical reaction occurs, changing the zinc sulphide or at least a portion thereof to another metallic sulphide of black or dark gray color. Such a result is shown in the 30 developed area of Fig. 2. A suitable developer is an acidified solution of lead acetate which will form a lead sulphide on the prepared spots. However I do not desire to limit myself to lead because there are other well known soluble metallic salts which provide suitable metals to produce 35 black sulphides, such as salts of copper, cobalt, nickel or others.

Where it is desired to prepare a white drawing board or other surface for later use by an artist 45 in preparing a line image thereon, I find a suitable method of forming the zinc sulphide dots in the paper is as follows:

A white soluble zinc salt such as zinc chloride or zinc acetate may be printed in suitable design 50 upon the surface of the paper or other fibrous material using a suitable vehicle such as glycerine. Obviously the surface of the areas coated with this material will be impregnated with a certain amount of the soluble zinc salt. Fig. 5 55 is an illustration greatly exaggerated showing a paper or other fibrous surface printed with such a white soluble zinc salt. Thereafter I wash the printed surface with ammonium sulphide, sodium sulphide or other suitable compound of 60 sulphur to convert the soluble zinc salt which has impregnated the surface of the paper into insoluble zinc sulphide. This being white is substantially invisible on the white drawing surface and, being embedded in the surface, does not 65 interfere with the later production of the line image on the paper surface by the artist. The prepared sheet is represented in Fig. 6. A selected area of such a prepared surface may be developed by the use of a water soluble metallic salt solution such as I have described above, for instance, lead acetate, which will change the zinc sulphide areas to a lead sulphide or other black sulphide area. This result is the same as shown in Fig. 2, except that a sheet prepared as in 75

Fig. 6 will have black or dark developed areas of a level with the rest of the sheet.

Either or both of the above described methods of producing shading designs and developing the same in selected areas may be utilized in connection with a transparent or translucent overlay sheet which is adapted to be affixed to another surface containing an image. This is a well known method for producing a composite sheet adapted to produce a Ben Day effect when photographed. No specially prepared surface is necessary but any line drawing of an image may be shaded in desired areas by superimposing the light-transmitting sheet bearing the shading design over the underlying image and thereafter producing the desired shading effect in selected areas of the image by development of the shading design. To this end the shading design is produced upon the overlay sheet in a color photographically invisible against the back ground of the underlying sheet. Thereafter by the application of a suitable developer, generally brushed on, selected portions of the shading design are chemically developed to render them photographically visible in selected portions of the area of the underlying image and thereafter the composite sheet is photographed for further reproduction.

In such a process using an overlay sheet the shading design is applied to a sheet of translucent or transparent material having suitable characteristics such as thinness, flexibility, non-stretchable and strong, such as a specially prepared paper "cellophane", or cellulose acetate product. My preferred method for producing the shading design upon such an overlay sheet is to first print the design which may comprise dots, stippling, lines, cross-hatching or any desired design using a plain printing varnish. The chemical substance forming the dots or design is then dusted on the varnish in powder form before the varnish dries. These shading areas may be covered with a white insoluble salt of mercury, such as the mercurous chloride or mercurous sulphate mentioned above, in which case they will be developed by the use of the above described developer containing a reducing sulphur compound which will provide darkened shading areas containing mercurous sulphide. Alternatively, the shading areas may be printed and prepared using a white sulphide which may be later developed with a soluble metallic salt which forms a black sulphide, for instance, a salt of lead, copper, cobalt, nickel, etc.

A suitable method for securing the overlay sheet to the underlying surface, particularly when the overlay sheet is of "cellophane", is to soften without dissolving the waterproof coating of the "cellophane" sheet as by the application of a suitable solvent, such as "methyl cellosolve" to the under surface thereof. The "cellophane" sheet when thus treated may be laid upon the base surface and pressed lightly with the fingers at various points, whereupon it will permanently adhere to the underlying surface.

Either of the above described combinations of a prepared shading design and its developer may be used separately either on the same surface used by the artist for producing a line drawing or upon an overlay sheet as described, or I may produce upon one surface shading designs produced partly by means of a white sulphide and partly by means of a white insoluble salt of mercury. In the latter case I provide a new process for producing a number of shading ef-

fects using a single sheet but developing the same in different manners in different areas of the image to be shaded. These effects may be produced because the developer for the white sulphide shading areas has no visible effect upon the insoluble mercury salts and the developer for the shading areas of insoluble mercury salts has no visible effect upon the white sulphide areas.

Referring now to Figs. 1 to 4, a sheet prepared as in Fig. 1 having dots 10 of mercurous chloride or its equivalent and dots 11 of zinc sulphide or other equivalent substance may be developed in selected areas in one of several ways. The line 12 may represent a line of an image produced either upon the same surface as the dots 10 and 11 in one manner suggested above, or an image on an underlying surface with the dots 10 and 11 produced upon an overlay sheet as suggested in a second manner of using my invention. In either case a selected area of the sheet delineated by the line 12 may have a suitable developer applied thereto, as by means of a brush, to change the photographic visibility of the dots 10 or of the dots 11, or of both dots. For instance, in Fig. 2 the dots 11 have been developed as shown at 13 using a water soluble metallic salt such as lead acetate or the like to render them black and photographically visible. However, as shown in Fig. 3 the dots 10 may be developed to a black or dark color by the use of a reducing sulphur compound as shown at 14 to produce a different shading effect, while in Fig. 4 by using two developers both series of dots have been developed to a dark color to produce still a third shading effect. It will be understood of course that one effect may be produced over one portion of the image, a second effect over another portion of the image and a third effect over still another portion of the image, if desired.

In the process described in the foregoing paragraph, I am able to develop one design in one portion of the sheet and another design in another portion of the sheet, each quite definitely and independently of any effect on the design which is to be left undeveloped in the area treated. This is obviously true where one portion of the sheet contains zinc sulphide adapted to be blackened by treatment with the water solution of lead acetate which will not attack the varnish vehicle used in printing, say mercurous chloride dots. On the other hand, a developer for the mercurous chloride design containing a reducing sulphur compound will not change the portion of the sheet treated with zinc sulphide.

I do not limit myself to shading designs of any particular shape or size, nor where I use dots do I limit myself to round dots or to dots of different sizes. For instance there might be two separate sets of dots identical except for the substance with which they are printed or coated, which, by selective developing according to my teachings, would produce different shading or stippling effects in different portions of the image.

What I claim is:

1. As an article of manufacture, a sheet having discontinuous areas covered with mercurous chloride and other discontinuous areas covered with zinc sulphide.

2. As an article of manufacture, a sheet having discontinuous areas covered with zinc sulphide.

3. As an article of manufacture, a sheet of fibrous material having discontinuous areas of

the surface thereof impregnated with zinc sulphide.

4. In a composite sheet for photographic reproduction comprising a surface containing an image and a shading sheet of substantially transparent material superimposed on said surface, said sheet having discontinuous areas covered with a composition of matter including mercurous sulphide and a substance adapted to prevent oxidation thereof upon exposure to atmosphere.

5. In a composite sheet for photographic reproduction comprising a surface containing an image and a shading sheet of substantially trans-

parent material superimposed on said surface, said sheet having discontinuous areas covered with a composition of matter including mercurous sulphide and a sugar.

6. The method of forming a shaded design in selected areas of a sheet having a liquid-permeable surface comprising forming said design on said sheet using a soluble surface-permeating zinc compound, and thereafter treating said compound to change the sheet-impregnating portion thereof to insoluble zinc sulphide whereby to form a design substantially wholly embedded within the normal surface of the sheet.

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