C. H. LITTLE.

DRAFTING MATERIAL.

APPLICATION FILED NOV. 7, 1910.

1,220,245. Patented Mar. 27, 1917.

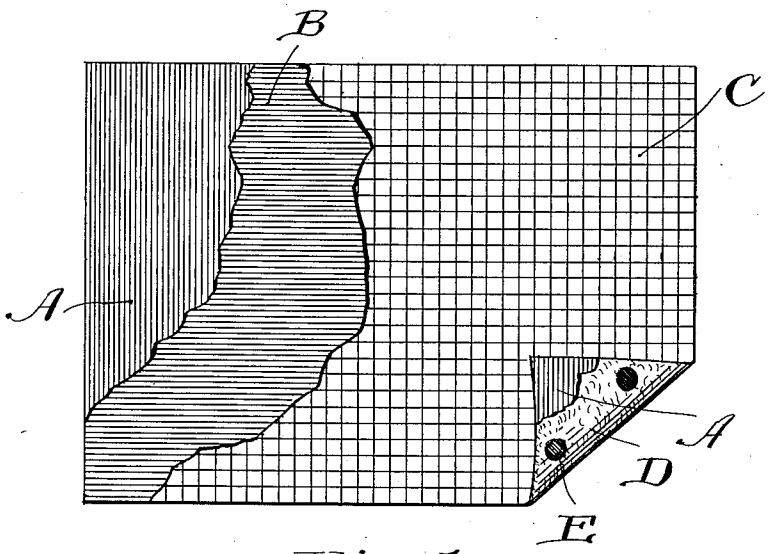


Fig. 1.

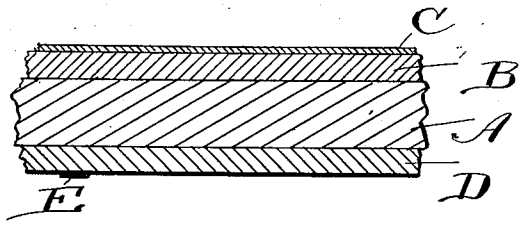


Fig. 2.

Witnesses.
E. B. Gilchrist,
H. P. Sullivan.

Inventor
Charles H. Little
by Thurston & Avis
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES H. LITTLE, OF EAST CLEVELAND, OHIO.

DRAFTING MATERIAL.

1,220,245. Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed November 7, 1910. Serial No. 591,022.

To all whom it may concern:

Be it known that I, CHARLES H. LITTLE, a citizen of the United States, residing at East Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Drafting Material, of which the following is a full, clear, and exact description.

In the graphic arts, the representation or setting forth of ideas by means of characters, such as lines, dots, figures, letters, etc., has been done almost exclusively by applying coloring matter of some description or other to a surface which gives a contrast with the coloring matter laid on. The most common method, especially in the making of shop drawings for which the present invention is most particularly, although not exclusively adapted, is by laying on black coloring matter, either in a solid form, as by a pencil, or in a liquid form, as by a pen, upon white or light colored paper.

The objections to this method of procedure are so many that it is difficult to know where to begin or end in attempting to catalogue them. It is impossible to get, under ordinary conditions all the contrast that is desirable; and especially so unless white paper is used; and this is objectionable because the reflection or glare from white paper injuriously affects the eyes of the draftsman. It is for this reason that buff paper is frequently used in drafting rooms and elsewhere; but, at best, this is only an unsatisfactory compromise, because while the eyes are less severely affected by the glare, the contrasts are less sharp, and therefore it requires a more intent gaze to see the drawing.

When a pencil is used, it is difficult to get clean lines or very fine lines or very heavy lines. Moreover, the point of the pencil requires frequent sharpening, because said point is always changing, as it wears in use, and this produces the added difficulty of accurately placing the lines, or of getting lines of uniform width or of the proper fineness or the reverse, according to circumstances. If, to avoid the undesirable results due to the rapid wearing away of the pencil point, a harder pencil is used, an indentation is commonly made in the surface of the paper which makes it difficult to make a clean erasure. In erasing pencil lines from most papers there is an undesirable roughening up of the surface; and with all papers there is a limit to the number of erasures which may be made in a given place.

It is exceedingly difficult to get a photographic print from a pencil drawing; and quite impossible to get a satisfactory one.

Additionally, the marks made by pencils will become blurred by contact with the hands or tools of the draftsman.

When a liquid form of coloring matter, such as ink is used, it is necessary to allow time for the ink to dry; the ink in most cases has a tendency to corrode the pen; and in all cases there is much bother with the inking and cleaning of the pen. Moreover, the ink is easily smeared or blotted, either by contact between the pen and the straight edge or by being touched with something before it is dried. In all cases where liquid coloring matter is used, there is always a great chance of ruining or nearly ruining the drawing by an excess of coloring matter accidentally applied.

The present invention is a sheet of drawing material intended to be used as a substitute for the white or light colored paper or tracing cloth commonly employed in the making of graphic representations.

The object is to produce a sheet suitable for the purpose which will have none of the objectionable features of the ordinary drawing paper or cloth, as above catalogued, and which will also have numerous positive advantages such as will be hereinafter pointed out.

A drawing sheet which embodies in its most satisfactory and best form the invention which forms the subject matter of this patent includes as its base a thin flexible sheet of fibrous material, such as paper or cloth. Upon the surface of this sheet is a thin flexible layer or coating of translucent matter of such character that clean lines may be cut in it by a stylus. There is also upon this thin translucent layer a very thin flexible relatively opaque dark colored coating made of material of such character that it does not much, if any, affect the flexibility of the sheet, and which is adapted to have clean lines (fine lines or heavy) cut through it by a stylus having a properly sharpened point. Additionally, on the reverse surface of this foundation sheet, there is a very thin coating of flexible transparent material which is impervious to moisture, such, for

example, as balsam shellac. The surface of the dark colored coating is preferably a mat surface in the best construction, because this will not reflect light into the eyes of the draftsman. It will be understood that an embodiment of the invention which may be exceedingly useful does not necessarily include all of the characteristics of construction above mentioned. They are mentioned because they are characteristics of a sheet of drawing material in which the present invention is embodied in its best and most serviceable form.

In the drawing, Figure 1 is a plan view of a small drawing sheet embodying the invention; and Fig. 2 is a greatly magnified transverse sectional view of a piece of said sheet.

I will now describe said sheet in the best form now known to me, and what I now believe, as the result of much experimenting, is the best method of preparing the same. It is to be understood, however, that it is not my intention or desire that the appended claims be directed to the precise construction shown, or to the described method of producing it.

A thin flexible base sheet A of a good quality of linen bond paper or tracing cloth is preferably employed. This thin sheet is preferably white, and therefore translucent. Insasmuch as one of the most desirable and valuable characteristics of my improved drawing material is its adaptability for commercial blue printing, the base sheet,—in order to serve this purpose, should have the degree of translucency possessed by a sheet which may be employed for tracing work and from which clear prints may be made. The base sheet which I prefer to employ may therefore be aptly defined as a tracing sheet, by which is meant a sheet having the light transmitting property or translucency of a sheet ordinarily used for making clear commercial blue prints. On the surface of this sheet is laid a very thin flexible layer or coating B of translucent material consisting of finely pulverized white or light colored pigment mixed with a suitable binder. I have obtained the most satisfactory results by making this layer of finely pulverized kaolin and a binder of water, to which a very small percentage of glue has been added. When this has dried, then the dark colored opaque coating C referred to is applied. This is preferably made of some dark colored (brown being preferable) pigment finely pulverized and mixed with water and a small percentage of glue; and preferably this coating is applied by means of an air brush, because the coating so produced, when dry, will have a mat surface. This coating may be applied with a brush, if desired, and it will be quite satisfactory, except that it will not have a mat surface. Or it may be applied in any other manner. This coating has in a high degree one essential characteristic, viz., after it has dried, a sharp pointed stylus will cleanly cut through it and make a substantially fine smooth line, the width of which is dependent upon the width of the cutting edge or point of the stylus, and with some points upon the degree of pressure applied. The inner layer has the important characteristic which enables smooth lines to be cut in it by the stylus in cutting smooth lines through the outer coating, and by reason of this characteristic, the inner layer may be described as a kaolinic layer. Moreover the layer and coating are strongly adhesive, wherefore they will not be accidentally scratched or rubbed off by the draftsman's tools, or fingers, or cuffs, or other things.

On the reverse side of this sheet a very thin coating D of flexible balsam shellac may be applied, which being impervious to water, will in coöperation with the top coatings prevent any dampness from getting to the sheet and fulling it.

In order that this sheet may be used, it is desirable that it be smoothly applied upon a very hard surface, as, for example, a glass surface. In order that this may be easily and quickly done, patches E of a potential cement may be applied to the under surface of the sheet,—this cement being dry and not sticky ordinarily, but capable of being rendered so by being wet with a suitable solvent, which solvent may be applied directly to the patches of cement, or to the glass or other hard substance upon which the sheet is to be cemented. If the moisture resisting coating D upon the bottom of the sheet is made thick enough, it will furnish the hard surface which is required in order that the stylus may cut cleanly through the top coating without making local indentations in the base sheet.

While the foregoing accurately describes the invention in its best form, it is to be understood that it may be changed, to its disadvantage as I believe, but without departure from the fundamental invention. For example various materials and various binders may be used in forming the translucent layer and opaque coating referred to; such layer and coating may be applied in various ways. With a stylus having a V-shaped cutting point or edge the width of the lines through the opaque coating may be varied by varying the depth of the cut in the translucent layer. The translucent layer therefore serves as a layer which protects the foundation sheet from being injured by the stylus.

The water resisting coating on the lower surface of the foundation sheet may also be omitted, or may be made thicker than specified, and the patches of cement may also be omitted.

There are a great many advantages to the described sheet. The contrast between the lines drawn thereon and the surface is very much sharper than with lines produced by the laying on of coloring matter on the surface of the paper or cloth. The surface of the sheet is dark and agreeable to the eye, while the lines themselves reflect the light. This makes work in the graphic arts much easier on the eyes; and it renders it possible also for the draftsman to do good work and to plainly see the work he is doing in a much dimmer light than is possible with the old method. It might be observed here that if the foundation sheet were transparent, the light would not be reflected back from the lines, but would pass through them, and the drawings would be far less readable than are drawings made by the old methods referred to.

The process of erasure is very much simplified with the described sheet, because a line may be erased by laying on more coloring matter. This may be done by a colored crayon or by using coloring matter dissolved or suspended in a rapidly drying liquid which may be applied in various ways. The erasure does not harm the sheet, and a number of erasures at the same place may be made without doing any harm.

The described sheets are moreover such that the dark colored surfaces will not be accidentally scratched by the clothing, cuffs or fingers of the draftsman, or by his tools. The dark surface of the sort described will not smut the hands, and if it did, the application of the soiled fingers to the sheet would do no harm. Dust and dirt, which may get onto this surface does not injure it, as does dust and dirt which gets onto the surface of ordinary drawings.

One of the valuable functions of the described sheet is that the drawings made upon it may be used directly for the making of prints with practically the same speed as from tracings. This is of great importance, particularly in the engineering department of a manufacturing concern, because it saves the time and the expense of tracing a drawing, and of checking the tracing to the drawing, and of making the required corrections on the tracing. Additionally, it eliminates the chances of error in making the tracing, due to faulty checking and neglected corrections. The described sheet is moreover one which cannot be spoiled or put out of commission by some superior engineer coming along and marking all over it.

It is observed also that since one in making the lines on such sheet will use a metal stylus, there will be no necessity for constant sharpening of the tool as there is when a pencil is used. There are so many advantages of this sheet that it is thought that further cataloguing of them is unnecessary.

It might be stated, however, that it is desirable to a practical embodiment of this invention that the foundation sheet used shall be one which is not susceptible to a permanent and continuing shrinkage, as is the case, for example, with celluloid or gelatin. Drawings, and especially mechanical drawings, are made to scale, and when once made, they should remain to scale for all time, which would not be the case with a foundation sheet of celluloid or gelatin, or any other material which is constantly, if slowly, shrinking.

It might be said in conclusion that a drawing sheet embodying the present invention in the best form now known is as practically and completely flexible as is ordinary paper. The translucent light colored layer should be about one one-thousandth of an inch thick; the dark colored top coating should be as thin as possible, and may be as thin as two ten-thousandths of an inch. The moisture resisting bottom coating may be about one one-thousandth of an inch in thickness. These thicknesses as stated are not of the essence of the invention, and may be varied to any extent required. But it is thought that these various layers should be made as thin as they can be made and still serve the stated purposes. These drawings may be stored away without occupying any substantially greater space than ordinary paper does. It will not occupy as much space as the brown paper drawings, which are frequently made in engineering rooms. They will not smut or soil; the lines will not get blurred.

The described sheet is adapted to have very dark colored, preferably black, lines printed on its dark top surface (which as stated is preferably brown) in such manner as to produce what is known as profile, or section paper. The advantage of doing this is that those dark lines will not show in a solar print of the drawing made thereon, as above described.

The term opaque as herein applied to the top coating is used relatively and in comparison with translucency of the material below it. So are the terms light and dark used relatively,—the essential conditions being that the lower surfaces shall be lighter than the top surfaces so as to furnish the required contrast when lines are cut through the top coating; and that the top surface be dark enough to be easy and agreeable to the eye.

In many of the appended claims the opaque colored top surface is referred to as being of such character that smooth sharp lines may be cut through it by a stylus. It is difficult to give an affirmative definition of this characteristic, but perhaps the characteristic of the coating referred to by the language above mentioned may be understood from the following. The coating must

not be brittle to such a degree that the stylus will cause it to chip off along the edges of the line which the stylus cuts. Moreover, it must not be soft so that the coating will run back into the line cut by the stylus.

It will be apparent that a comparatively soft or waxy dark colored coating which might be scraped cleanly off a sheet of paper by a stylus would be wholly unsuitable and impracticable for ordinary drafting room purposes, because a draftsman frequently works on a drawing for days and sometimes weeks, often leaning on the drafting sheet with his elbows, or scratching the sheet with his cuffs or rubbing various tools over it. For this and other equally obvious reasons, it is necessary to provide the sheet for drafting purposes with a much harder and much more strongly adhering coating. In order, however, that lines may be cut in such a coating, a sharp edged stylus must be employed and the draftsman must apply a greater degree of pressure than would be required with a comparatively soft or waxy coating, and a comparatively dull stylus, such as would be utilized with a coating of that type.

The hard coating therefore necessitates a protective layer between the paper or fibrous base sheet and the coating, in order that the sharp point of the stylus will not, on account of the pressure applied, cut into the fibers of the base sheet. Not only does this comparatively thick layer, into but not through which the stylus cuts, serve as a protection against the stylus cutting into the base sheet, but as before stated, it permits lines of different widths to be drawn or cut by a V-pointed stylus into the top coating by simply varying the depth of cut into the protective layer, and it has an additional very important function when a liquid erasure is used, the term "eraser" in this instance, meaning the application of color to a line previously drawn, or cut so that it will no longer contrast in color with the surface, and will not show on the blue print. The particular advantage in regard to the eraser lies in the fact that part of the layer which has not been cut into, or that part between the base or bottom of the line and the fibrous sheet prevents the eraser being absorbed by the fibers of the base sheet. If the eraser were applied directly to the fibrous sheet, even though the latter might be glazed, it would to a certain extent be taken up by the fibers, and therefore if it were desirable to redraw the line, a clean smooth line could not be obtained for either part of the eraser must be left in the fibers, or else the stylus must cut into the fibers and cause the line to be roughened at that point.

In the claims I have used the expression "smooth-cutting" to concisely define that important characteristic of the material or materials composing the coating C and layer B, which enables smooth, clean lines to be cut into the same by a stylus.

Having described my invention, I claim:

1. A sheet of drafting material comprising a translucent base sheet carrying a strongly adhering translucent layer of smooth-cutting material having a strongly adhering relatively opaque coating of smooth cutting material in which smooth lines may be cut by a stylus, the translucent layer affording substantial protection against the stylus cutting into the base sheet.

2. A sheet of drafting material comprising a translucent base sheet carrying a strongly adhering layer of translucent material having a relatively opaque hard coating, the layer and coating being of contrasting color and both being composed of smooth-cutting material in which smooth lines may be drawn by means of a stylus cutting through the coating, and partially into the layer.

3. A sheet of drafting material comprising a translucent fibrous base sheet carrying a strongly adhering layer of firm, smooth-cutting translucent material having a strongly adhering relatively opaque coating of smooth cutting material, the layer and coating being adapted to give smooth lines when cut by a stylus and the layer being of such thickness that the stylus may cut through the coating, and into the layer without cutting through the latter.

4. A drafting material comprising a translucent base sheet carrying a strongly adhering medium in which smooth lines may be cut by a stylus and including an inner translucent smooth-cutting sheet protecting layer having a relatively opaque outer coating of dark colored smooth-cutting material, the layer being of such thickness that the stylus may cut through the coating and into the layer without cutting into the base sheet.

5. A sheet of drafting material comprising a flexible sheet of translucent fibrous material carrying a strongly adhering medium in which smooth lines may be cut by a stylus, said medium including a thin outer coating of relatively opaque smooth-cutting material, and a comparatively thick inner layer of translucent smooth-cutting material.

6. A sheet of drafting material comprising a translucent base sheet carrying a strongly adhering layer of translucent material havng a relatively opaque hard coating, the layer and coating being of contrasting color, said medium composed of smooth-cutting material in which smooth lines may be drawn by means of a stylus by cutting through the coating and partially into the layer, the layer being of such thickness that by varying the depth of cut into the layer,

lines of different widths may be cut into the coating.

7. A sheet of drafting material comprising a translucent fibrous base sheet provided with a strongly adhering translucent kaolinic layer having an outer relatively opaque colored surface.

8. A drafting material comprising a translucent base sheet provided on one side with a strongly adhering medium in which smooth lines may be cut by a stylus, including an inner translucent smooth-cutting layer and a relatively opaque smooth-cutting outer coating, said sheet having on its opposite side a hard translucent coating.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

CHARLES H. LITTLE.

Witnesses:
E. L. THURSTON,
H. L. SULLIVAN.