

UNITED STATES PATENT OFFICE.

JOHN M. GOODWIN, OF SHARPSVILLE, PENNSYLVANIA.

PROFILE-PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 270,657, dated January 16, 1883.

Application filed August 31, 1882. (Specimens.)

To all whom it may concern:

Be it known that I, JOHN M. GOODWIN, a citizen of the United States, residing at Sharpsville, in the county of Mercer and State of Pennsylvania, have invented certain new and useful improvements in those devices for facilitating the making of drawings of certain kinds, known to civil engineers and others using the same as "profile-papers," "cross-section papers," and "diagram-papers," respectively; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable any person skilled in the arts to which it appertains to make and use the same.

The engineer or artist using the profile-paper, cross-section paper, or diagram-paper heretofore manufactured has necessarily made his drawing upon that surface of the paper upon which the lines that give the paper its distinctive character are printed. These lines in ordinary profile paper occupy about seventeen per cent. of the whole surface of the paper. They are printed on the paper from engraved plates or rolls, and are colored, varied as to thickness, and arranged as to spacing and relative position, so as to produce one of those conventional combinations of lines universally used by civil engineers for facilitating the making of those drawings designated by the technical term "profiles." The ink used in producing the lines lies upon the surface of the paper, and each line is in effect a ridge on that surface. The ink contains more or less of oil. In the operation of drawing a line with a pen or of coloring a space with a brush upon this surface thus rendered uneven, and as to about seventeen per cent. of it oily, inequalities in thickness and intensity of line and in shade of color are unavoidably made. Neither the ink used in the pen nor the color used in the brush will lie upon the printed lines as well as upon the unprinted paper between the lines. Of late years most of the profile-paper made has been printed with engraved rolls, as aforesaid, and the paper used in this process is spongy and soft and deficient in strength. The use of rubber upon it to erase a pencil-mark or of a knife to erase an ink-mark destroys the surface and obliterates the printed lines wherever the same are involved. No erasure may be made on the printed surface without defacing

the paper. When profile-paper is printed in sheets from plates instead of from rolls the paper is ordinarily much firmer than that used in the roll-printing process, and is finished with a surface that bears rubbing better than that of the softer roll-paper; but the objectionable conditions found in using the roll-paper, arising as aforesaid from the presence of the printed lines upon the surface, exist in the sheet-paper as fully as in the roll-paper, and in cross-section paper and diagram-paper as fully as in profile-paper. Furthermore, on whatever paper used, the lines printed as aforesaid on the surface of the sheet or roll of paper, when rubbed, give off some of the ink of which they are composed, and this ink smears the paper and irremediably defaces the same and the drawing made thereon.

In producing a duplicate of any drawing made on the profile-paper, cross-section paper, or diagram-paper heretofore used the artist has to plot off the duplicate drawing point by point and line by line upon the duplicate sheet of paper—an operation consuming ordinarily as much, if not more, time than did the making of the original drawing. In making a "tracing" of such a drawing he has to trace not only the drawing proper, but the printed lines of the paper on which such drawing is made—an operation that is tedious and costly.

The object of my invention is to provide for use in the making and copying of profiles, cross-sections, diagrams, and other like drawings of railroad and other work a material prepared so that the surface thereof intended to receive the drawing shall be entirely blank and plain and of uniform texture and finish throughout, while at the same time lines, in number, color, variety, and arrangement such as are necessary or convenient for the guidance of the artist in plotting and forming the drawing to be made or produced in duplicate, shall be distinctly visible at the plain and blank working-surface aforesaid of the material, the actual substance of those lines being below said working-surface and by the same protected from obliteration and defacement, and so that when the material, prepared as aforesaid, is superimposed upon a drawing of which a duplicate or copy is desired, the drawing may be made distinctly visible at the working-surface

of the superimposed material, and the original drawing being upon any profile-paper, cross-section paper, or diagram-paper the guide-lines on which register with those in the superimposed material, a complete reproduction of the original may be made simply by tracing the drawing upon the superimposed sheet, no tracing of the guide-lines being necessary, and so that the material prepared as aforesaid shall be much firmer and stronger than the profile-papers heretofore used, while at the same time thinner and of less weight for equal surface than the same, by the use whereof cost, inconvenience, and defective work referable to the existence of the hereinbefore-specified defects and objectionable qualities found in profile-papers and other like papers heretofore in use may be avoided and improved results attained. I effect my aforesaid purpose in the manner below described.

Upon a sheet of tough, firm, transparent material, preferably paper having the qualities of that known to paper-makers and printers as "bond-paper," I print or rule lines colored, varied as to thickness, and arranged as to spacing and relative position so as to produce one of those conventional combinations of lines used by civil engineers in the construction of those drawings by them called "profiles." This printed or ruled surface I cover with a paste prepared so that it may be, when dry, very tough, and at the same time pliable and transparent. Upon the printed or ruled surface thus covered with paste I impose a second sheet of material of quality like the first, and press the two sheets firmly and evenly together. When the paste becomes dry the combined sheets are ready for use as a sheet of profile-paper. The combined thickness of the two sheets of paper and the paste included need not be as great as that of a sheet of profile-paper such as has heretofore been made, and the weight of the sheet made as above described need not be as great as that of a sheet of ordinary profile-paper of equal surface.

The lines printed or ruled as aforesaid on the first sheet will be distinctly visible at either surface of a compound sheet made in the manner and of the materials above described; but I prefer to use the exposed surface of the second and unprinted sheet as the working-surface of the profile-paper, as when this is done the printed or ruled lines on the first sheet are protected against obliteration and defacement by the whole thickness of the said second sheet. This surface, preferred for a working-surface as aforesaid, is entirely plain and blank, and, except for possible inequalities not referable to the ruling or printing of the lines on the first sheet, uniform in texture and finish throughout, and, being made in the manner aforesaid, will bear washing, rubbing, or scraping as well as the best drawing-papers; and, let the quality of the surface-paper as a drawing-paper be what it may, no rubbing, scrap-

ing, nor washing applied to the surface-paper will obliterate or deface the guide-lines by it protected as aforesaid.

In making cross-section sheets and diagram-sheets I proceed in the manner described in the case of making profile-sheets, the arrangement of the printed or ruled lines being varied to suit the case in hand.

If a duplicate or copy of any profile be desired, such duplicate may be very readily made upon a sheet of my profile-paper by placing the original drawing upon a tablet of plate-glass, the under side of which is presented to a good light, and thereafter imposing upon such drawing a sheet of my paper the lines in which are drawn to the pattern of those on the profile to be duplicated. Pressing the imposed sheet closely upon the other, the drawing will be distinctly visible through the imposed sheet, and may be thereupon reproduced by the operation of "tracing." In duplicating cross-section or diagram drawings the same operations may be performed.

I prefer to make my improved profile and other like sheets in the manner above specified, because in the product thus obtained the guide-lines are completely protected, so that they will not be obliterated nor defaced should the sheet be accidentally or otherwise wetted or rubbed on the inferior surface; but in order to provide sheets that may be produced at a cost less than that necessary to the making of the two-ply sheets aforesaid, while at the same time having all the distinguishing characteristics and useful qualities of the two-ply sheets, except that of protecting the guide-lines against the action of wettings and rubbings to which the inferior surface of the sheet may be subjected, I have made profile-sheets (and cross-section and diagram sheets as well) in which the guide-lines aforesaid are printed or ruled upon any suitable tough, firm, transparent paper, and have used the paper so prepared without the covering-sheet or surface-sheet, which in the two-ply paper before described is pasted upon the sheet bearing the guide-lines, and I have made such profile and other sheets by printing or ruling the guide-lines aforesaid on material specially treated for the purpose of rendering it transparent—viz., the "tracing-linens" and "tracing-papers" of commerce—and have used these sheets without the covering-sheet aforesaid; and where no covering-sheet is used copies of profiles, &c., may be made by imposing the single thick sheet upon the drawing to be copied and making a tracing of such drawing without placing the original on a plate of glass in order to illuminate the same. I have, also, by pasting a transparent paper upon the printed surface of a sheet of ordinary profile-paper, made a two-ply profile-paper having a smooth, firm, blank working-surface at which the guide-lines are distinctly visible, and ordinary profile-paper, when so surfaced, is much improved, although, because of the opacity of the original

sheet, it is not applicable to all the uses to which a two-ply paper of which both plies are transparent may be put.

5 The nature of my invention is such that it does not admit of illustration by a drawing. Consequently I do not make a drawing a part of this application.

What I claim is—

10 1. A sheet composed of several plies or films of material transparent through treatment specially intended to make it so, or selected because of its inherent quality of transparency, for use in the making of profiles, cross-sections, diagrams, or other like drawings, in which
15 sheet the lines for the guidance of the person making such profile or other like drawing are printed or ruled upon one leaf or ply of the material of which the sheet is composed, and permanently covered and protected by another
20 leaf or ply thereof, substantially as described, and for the purposes set forth.

2. In a sheet for use in the making of profiles, cross-sections, diagrams, or other like

drawings, the combination, with a leaf or surface carrying lines for the guidance of the person making such profile or other like drawing, 25 of a covering sheet or film of transparent material imposed upon and permanently pasted or fixed upon the leaf or surface carrying such lines, substantially as described, and for the 30 purposes specified.

3. In a sheet prepared for use in the making or reproduction by tracing of profiles or cross-sections of works in engineering, or of diagrams constructed as are such profiles and cross-sections, the combination, with a material trans- 35 parent through treatment specially applied to render it transparent, or selected because of its inherent quality of transparency, of lines of graduation printed or ruled thereon, substantially as described, and for the purposes and 40 uses specified.

JOHN M. GOODWIN.

Witnesses:

C. L. WILLIAMS,
W. H. DUNN.