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PLANOGRAPHIC PRINTING PLATE AND METHOD OF USING SAME

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Fig. 1

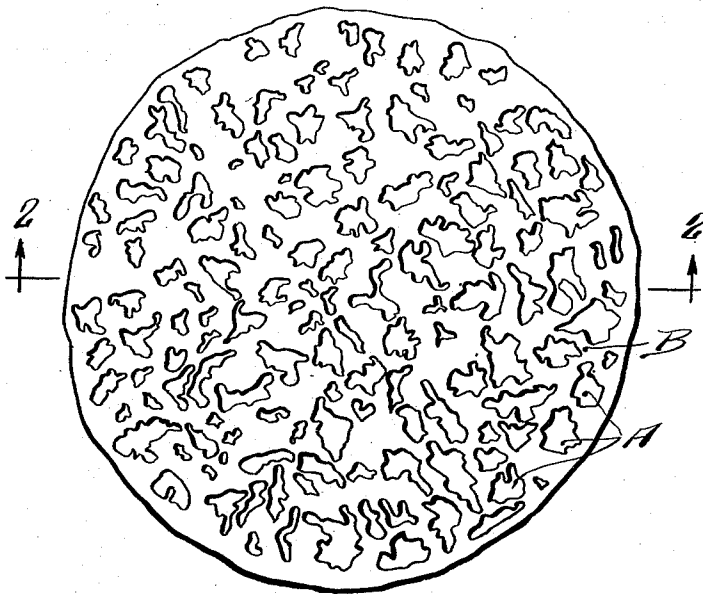
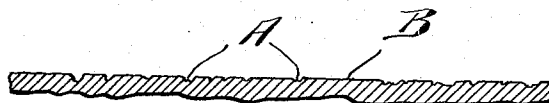


Fig. 2



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UNITED STATES PATENT OFFICE

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PLANOGRAPHIC PRINTING PLATE AND
METHOD OF USING SAME

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3 Claims. (Cl. 101-401)

This invention relates to improvements in planographic printing plates and a method of using them, and it comprises a planographic printing plate having a metallic surface characterized by a plurality of randomly disposed irregularly shaped minute pits in an otherwise unilateral and substantially smooth surface, and it also comprises a method of maintaining the non-printing areas of such a plate in an ink-repellent condition by means of a fountain solution containing glycerin and having a viscosity substantially greater than that of water.

So far as I am aware, all metallic planographic printing plates have heretofore been prepared for use by abrasive attrition of the printing surface whereby a multiplicity of intercrossing abraded scratches finally eliminate in its entirety the original surface and leave in its stead a vast number of minute peaks and valleys. The purpose of the so-produced "grain" is to increase the area of contact between the metal and the dampening fluid and to provide minute traps for the latter and thus prevent its entire displacement by the rolling action of the ink rolls. The presence of sharp peaks or apices of abrasively produced grain is objectionable in the non-printing areas of the plate since they tend to cut through the film of dampening fluid under the pressure exerted by the ink rolls and to thus become contaminated with ink.

It is an object of this invention to provide a metal planographic printing surface characterized by a plurality of randomly disposed irregularly shaped minute pits in an otherwise unilateral and substantially smooth surface. It is another object of this invention to provide a planographic printing surface having moisture-retaining pits separated by substantially smooth interconnecting or continuous areas and being substantially free from sharp pointed apices. A still further object is to provide a zinc surface particularly adapted to planographic printing when dampened with glycerin-containing fountain solutions, i. e., when dampened with fountain solutions having a viscosity higher than that of water alone or that of the usual acidulated fountain solutions. Another object of this invention is to provide a method of planographic printing whereby substantially smooth and ungrained areas, in the non-printing portions of the plate, may be protected against ink contamination by means of fountain solutions having a viscosity substantially higher than that of water and without recourse to adsorbable lyophilic colloids. Other objects and advantages will become

apparent as the description of the invention proceeds.

I have discovered that the surface of rolled zinc, and particularly substantially pure zinc, foil is, by reason of the minute tears or pits fortuitously produced therein by the repeated rollings necessary to reduce the metal to foil, ideally suited to planographic printing.

As the art of rolling metal foils forms no part of this invention and as the fortuitous occurrence of minute surface pits or tears in rolled metal foil and particularly in substantially pure zinc foil, is well recognized in that art, no further discussion of the rolling operation is deemed necessary to an understanding of my discovery.

As an aid to visualization of the type of surface pits which I have discovered to be particularly useful for planographic printing, reference is had to the drawing in which:—

Fig. 1 is a somewhat schematic plan view of a small area of a rolled zinc foil, suitable for the purposes of this invention, as seen by angularly incident light at a magnification of circa x300 diameters; and

Fig. 2 is a cross section, taken along the lines 1-1 in Fig. 1 and as seen at a magnification of circa x300 diameters.

It will be noticed, from an examination of the drawing, that the pits or depressions A, are, in effect, isolated valleys in a continuous and otherwise substantially smooth surface B. In an abrasively grained surface on the other hand, such of the original surface as survives the attrition of the graining operation, is invariably isolated from its kind by surrounding and interconnecting valleys and appears, in section and in whatever direction the section may be taken, as a truncated cone. In the printing surface of this invention, however, a substantial portion of the total surface is substantially smooth unilateral and at the same general level as is clearly shown at B, in Fig. 2. The function of the depressions or pits is the same as that of the valleys of the grain of the ordinary planographic printing plate; that is, they serve as traps for the dampening fluid to prevent its entire displacement by the inking rolls; they provide a "tooth" whereby a direct image may be delineated in crayon or ink; and when used as photosensitive printing plates they assist in the retention of the chromate-albumen or other sensitizing solution.

The present invention rests on my discovery that the valleys in the plate surface need not be intercommunicating, as they have always been in prior practice, and that a real advantage ac-

crues from their mutual isolation or rather from the presence of the smooth intervening surfaces which effect their isolation. I have discovered that, under otherwise like conditions, the pitted
5 rolled foil of this invention produces more clean copies with less fountain solution than does a conventionally grained plate.

Very little is understood about the actual mechanism of planographic toning; and I do
10 not pretend to know in what manner the smooth areas of my plate function to reduce the toning tendency, and I must, therefore, content myself with the statement of my observation that in some unknown manner they do cause less
15 tone than would under like conditions be produced by a conventional grain of intercommunicating valleys and sharp apices.

As a theory useful in visualizing a possible explanation, it may be supposed that, when plates
20 provided with the conventional grain are employed, the pressure of the ink rolls is exerted against, and that these rolls are supported entirely by, the sharp grain apices which tend to cut through the film of moisture to the ink;
25 whereas with plates embodying this invention having the smooth flat topped plateaus between the pits in the surface, the ink rolls have a larger area of support, the film of moisture thereover is subjected to a much lower disruptive force
30 per unit area, and hence persists unruptured to prevent ink contamination and consequent toning.

The ratio of pitted-to-smooth area may be varied over fairly wide limits without sacrifice
35 of the advantages accruing from the smooth areas of my plate. In general I prefer a surface having its pitted area about equal to its smooth area; although I may satisfactorily use a surface having as much as 70% or as little as 20% of its
40 area as pits.

While gum arabic-containing solutions may be used, I do not recommend them; but prefer to use fountain solutions which render the metal surface lyophilic by chemical reaction rather
45 than by the adsorption of a lyophilic colloid as gum arabic and particularly prefer such fountain solutions as, in the presence of glycerin, passivate the metal surface as well.

50 Rolled zinc foil, of the herein described surface characteristics, may be used for planographic printing with or without backing, depending on the thickness thereof. At thicknesses below five thousandths of an inch, I pre-

fer to provide a non-metallic backing, which may be paper impregnated with a flexible waterproofing agent capable of adhesion to the metal. As various backings may be used, and as the assembly of backing and foil may be obtained by various methods which form no part of this invention, no further description thereof is deemed
5 necessary. In general I find a thickness of 0.005 of an inch suitable for use without backing, and thicknesses between 0.005 and 0.0015
10 of an inch suitable for use with a backing. If an image is to be delineated on the plate by direct typewriting, I recommend a foil of between 0.001 and 0.0015 of an inch backed with a fairly dense paper. At less thickness the type tends
15 to cut through the foil facing, and at greater thickness the resiliency or recoverable deformability of the paper is not usually sufficient to prevent undesirable embossing.

I claim:

20 1. A planographic printing plate comprising a rolled zinc foil having minute tears or pits fortuitously formed in one surface thereof by the action of the rollers, such surface constituting the printing face of the plate and consisting of
25 mutually isolated pits separated from each other by smooth intervening surfaces at the same general level.

2. A planographic printing plate comprising a rolled zinc foil having minute tears or pits fortuitously formed in one surface thereof by the action of the rollers, such surface constituting the printing face of the plate and consisting of mutually isolated pits separated from each other by smooth intervening surfaces at the same general level, the pitted area forming from 20% to
35 70% of the printing face.

3. A planographic printing plate comprising a rolled zinc foil having minute tears or pits fortuitously formed in one surface thereof by the action of the rollers, such surface constituting the printing face of the plate and consisting of mutually isolated pits separated from each other by smooth intervening surfaces at the same general level, said smooth surfaces serving as a support for the printing rolls, and said pits serving as individual pockets to receive and hold
45 much of the film formed by the printing inks and dampening fluids out of contact with the printing rollers whereby the disruptive force exerted by the rolls upon the film is reduced to a minimum.
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