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PLANOGRAPHIC PRINTING PLATE

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1 Claim. (Cl. 101—401.1)

This invention relates to an improvement in planographic printing plates and the method of using the same; and it comprises a planographic printing plate having a metal printing face provided with a thin adherent surface-film of electrolytically produced anodic oxide of the metal, said anodic oxide being characterized by a retention capacity, for both greasy and watery materials, and in particular aqueous solutions having a viscosity substantially higher than that of water alone, of a higher order than has the ordinary atmospherically produced oxide of the metal, whereby neither said greasy materials nor said watery materials when adsorbed by said anodic oxide are physically capable of displacing the other therefrom: and it further comprises the method of dampening the non-printing areas of a planographic printing plate having as a printing surface a continuous layer of anodic oxide, with water containing a preferably hydroscopic viscosity augmenting agent, whereby greater protection for these areas under printing conditions is obtained than is afforded by a like dampening solution, under like conditions, on an ordinary printing plate.

Planographic printing from metal depends upon the immiscibility of oil and water and the fact that while grease ordinarily tends to displace water from metal, the latter may be so modified chemically, after the printing image has been delineated thereon with grease receptive materials, that the so modified surface (the non-printing area) is more readily or preferentially wet by water than by grease, whereby grease is no longer readily capable of displacing water therefrom. When, as is common practice, the printing image is delineated in greasy materials, as lithographic crayon for instance, much skill and nicety of adjustment is required to maintain such a balance of the physical forces involved that neither the image spreads into the non-printing areas nor the dampening solution encroaches on the image causing the latter to "work sharp" or actually "walk off" the plate.

One object of this invention is to provide a metal planographic printing plate and particularly one having an aluminum printing face which is capable of substantially indefinite retention of a greasy image against the action of a dampening solution under printing conditions. Another object of this invention is to provide such a plate as described further capable of effectively retaining a dampening solution, on the non-printing areas thereof and under printing conditions, against the encroachment of ink thereon and without the necessity for chemical modification of the said non-printing areas to render them preferentially water receptive. Still another object of this invention is to provide a planographic printing plate having an aluminum printing face surfaced with a thin adherent filmiform layer of anodic aluminum oxide characterized by a retention capacity for both a greasy image and an aqueous dampening solution, of a higher order than has the ordinary spontaneous oxide of the metal. Other objects and advantages will appear as the description of the invention proceeds.

As the art of electrolytically producing a dense film of anodic oxide on aluminum is well developed and as the electrolytes suitable for the purpose and the requirements of current pressure and density for the production of hard, continuous and firmly adherent surface films of anodic aluminum oxide are well known and are no part of this invention, further description thereof here is deemed unnecessary.

Metal planographic plates are customarily "grained" or provided with minute pits by abrasive attrition of the metal. The primary purpose of these pits is to help in the retention of the dampening fluid, on the non-printing areas, against the rolling action of the inking mechanism thereover. While a "grained" plate has, so far as I know, always been used for planographic printing, it is well recognized that, in certain instances, as in very fine half-tone printing, they are in the nature of a necessary evil and every effort is made to obtain, for such purposes, a "grain" so fine as to produce a merely mat surface.

It is an advantage of the plates of this invention that the dampening fluid is so well retained by the anodic oxide surface that abrasive graining may be dispensed with altogether where a photographic image is to be printed. When, however, a greasy image is to be delineated directly on the plate, as by lithographic crayon for instance, a certain "tooth" is generally but not always required to take the image-forming greasy material. To those skilled in the art, it will be obvious that the amount of "tooth", if any is required at all, will depend upon the plasticity of the image-forming greasy material. To provide a "tooth" for the purpose immediately above mentioned is the secondary function of the conventional grain. Because of the dual function of the surface pits or "grain", planographic printing plates heretofore have always been grained, as stated.

Plates of the present invention may be prepared without graining when the nature of the image to be delineated thereupon permits, and this is of advantage, as stated. When a grain is required, as by reason of the necessity of a "tooth" to take a crayon of low plasticity for instance, plates of the present invention may be abrasively or otherwise grained in any of the customary manners and then electrolytically treated to yield a surface layer of anodic oxide.

The reason why grease and dampening solutions are so firmly retained by plates surfaced with anodic aluminum oxide is not understood; but it is believed that the film of anodic oxide is microporous. This belief is mentioned, as a matter of conjecture only, because it is useful as a theory in visualizing the possible relation of the phenomenon of adsorption and capillarity. Normal aluminum oxide retains grease by adsorption only, and the presence of micro-capillaries in the anodic oxide would greatly increase the capacity of the latter to retain adsorbed fluids or greasy plastic solids.

Whether or not micro-capillaries exist in anodic aluminum oxide, it is a matter of practical observation that after the anodized plate leaves the electrolytic bath, it should be well rinsed and dried and protected from accidental contact with greasy or aqueous contaminants until the image has been delineated thereupon and the non-printing areas thereof have been treated with an appropriate dampening fluid. The above precaution is stressed because if the anodic oxide of the printing surface becomes contaminated and particularly if it is contaminated with grease, its rehabilitation is, if not impossible, at least a difficult matter. It has been observed, for instance, that where an accidental or other grease spot on thick anodic oxide had been treated with appropriate solvents until all traces of the grease have seemingly been removed and the plate accepts the dampening solution as well on this treated area as it does on the uncontaminated non-printing areas, upon printing several hundred copies from the plate a ghostly image of the treated spot appears and gradually grows in strength as printing proceeds.

For this reason, as well as those of economy and expediency, it is preferred to prepare the plates of this invention with thin rather than thick films. Any film of anodic oxide, however thin, which is actually and completely continuous, is thick enough for the purposes of this invention. The economy incident to the use of thin films will be apparent to those skilled in the art of producing anodic aluminum oxide, for they will recognize that the inevitable increase in current consumption required to produce thick films thereof is proportional not merely to the thickness of the film but to some higher power thereof.

For the purposes of this invention, any aluminum planographic printing plate, be it sheet aluminum or aluminum foil, whether to be backed with paper or otherwise, or any other substantially plano aluminum surface however derived, as by metal spraying, cathode spattering or otherwise, may be provided with a thin surface adherent filmiform layer of anodic oxide of aluminum and thus conform to the requirements hereof.

I have found that particularly advantageous results accrue from the use of the plates of this invention when the dampening fluid has a viscosity substantially higher than that of water. A suitably high viscosity may be obtained by adding one part of so-called C. P. Glycerin to nine parts of distilled water. I may, for purposes well understood in the art, use gum arabic instead of, or in conjunction with, glycerin, and may also make use of acidifying agents and/or buffers to obtain and maintain the dampening solution at that hydrogen ion concentration which causes least swelling of the bichromate albumen image present when printing from a photographically determined image, as is known.

I have discovered in connection with the use of the plates of this invention that the inclusion in the dampening fluid of a benign hygroscopic viscosity augmenting agent, such as glycerin, affords greater proportional protection to the non-printing areas of the plate under printing conditions than obtains when similar proportions of such an agent are used in connection with ordinary plates. Why this is so, is not understood; but it is of advantage.

While for the sake of simplicity, I have confined my illustrative example to aluminum, it is to be understood that aluminum alloys and other metals yielding anodic oxides, characterized by a retention capacity for both greasy and watery materials of a higher order than that of the ordinary atmospherically produced oxide of the metal whereby neither the greasy materials nor the watery materials when adsorbed by the anodic oxide are physically capable of displacing the other therefrom, are suitable for my purpose and are considered as within the purview of my invention.

By the expression "physically capable" I mean that without the aid of chemical agents and under the conditions which obtain during inking and printing operations, an aqueous dampening solution is not capable of the physical displacement of ink, and more specifically the fatty acid components thereof, from anodic oxide surfaces originally wet with such greasy material, and conversely and under the same conditions, lithographic printing inks are not capable of the physical displacement of aqueous dampening solutions from such surfaces originally wet by such solutions as tested by the substantial maintenance of the originally dampened areas free from ink under practical printing conditions.

Having thus described the nature of the said invention and in what manner it is best carried into practical effect, what I claim is:—

A planographic printing plate having an aluminum printing face on which a greasy image is applied, said face being provided with a thin adherent film of electrolytically produced anodic oxide of aluminum, said film being characterized by a retention capacity for both greasy and watery materials such that neither the greasy materials nor the watery materials when adsorbed by said anodic oxide are physically capable of displacing the other therefrom.

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