June 26, 1951 C. B. ALLER 2,558,504

METHOD OF PRODUCING A PRINTING FORM HAVING A BIMETALLIC SURFACE

Filed Aug. 1, 1947

Fig. 1.

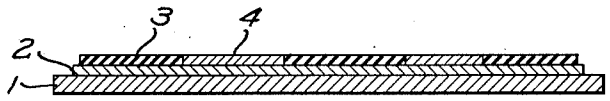


Fig. 2.

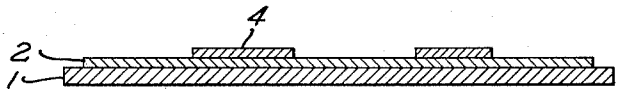


Fig. 3.

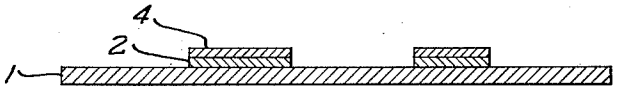


Fig. 4.

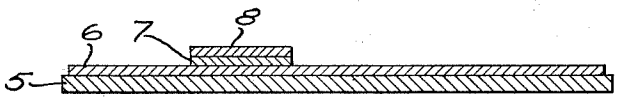


Fig. 5

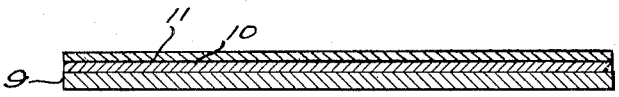


Fig. 6

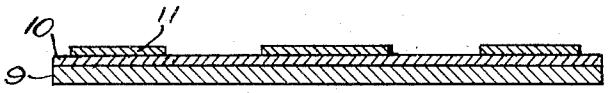
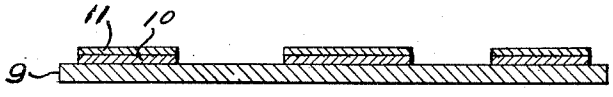


Fig. 7.



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METHOD OF PRODUCING A PRINTING FORM HAVING A BIMETALLIC SURFACE

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7 Claims. (Cl. 204—17)

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In the production of printing forms, especially for the different kinds of planographic printing, the method has often been adopted to form the image to be printed by etching away metallic parts at the same time controlling the extent of the etching in the depth or to the sides or in the depth as well as to the sides by means of a material not attacked by the etching agent. This is the method generally used in the production of printing forms, the surface of which consists of a single metal, as well as in the production of the so-called bimetallic printing forms in which the surface parts which are intended to transfer ink, are of a metal different from the metal of which the surface parts not intended to transfer the printer's ink to the paper. In the former case there is used for the limitation of the extent of the etching to the sides various non-metallic materials, e. g. "burnt enamel," which can be made through the melting of asphalt on the surface parts in question. If desired the said non-metallic material may be removed before starting the printing. In the production of the bimetallic printing forms the limitation of the extent of the etching in the depth or to the sides or in the depth as well as to the sides is often formed by a metal not attacked by the etching agent. In this case the surface of this metal forms part of the finished printing surface of the printing form, i. e. either the part of the printing surface which is to transfer the ink, or the part which is not to transfer the ink, according to the nature of the metals to be considered.

In these known methods the etching agent practically always consists of an acid, an acid salt or a salt of a metal the ions of which may behave as having more than one valency. However, also other oxidation or reduction agents may be used in etching.

According to the present invention production of printing forms by etching away metallic parts at the same time controlling the extent of the etching in the depth or to the sides or in the depth as well as to the sides by means of a material not attacked by the etching agent is carried out in such a manner that the etching is carried out with or without electric current by means of a sulphide-forming etching agent thereby restricting the action of the etching agent by the surface or edge of a coating of zinc or cadmium or their sulphides.

This method offers among other things the advantage that it is possible to produce bimetallic printing forms in which one of the metals of the printing surface is zinc or cadmium or their

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sulphides. It has hitherto been rather difficult to procure such printing forms of a quality giving a good reproduction of an image having fine details because it is difficult to find an etching agent by means of which other metals can be etched away without at the same time removing zinc or cadmium, or without attacking from the edges, parts covered with zinc or cadmium.

To all essentials the method may be executed in different ways. One way is characterized in that on the surface of a metal, for instance copper or tin, which can be attacked by the sulphide forming etching agent, there is placed an image consisting of zinc or cadmium, after which the etching is carried out with the said etching. The image may be produced by a direct precipitation of zinc or cadmium, for instance galvanically on a surface of which the surface parts on which zinc or cadmium is not desired precipitated are covered with a suitable non-conductive material, which may later be removed. The non-conductive material may for instance consist of printing colours or of printing colours into which asphalt has been melted, or of resin or of many other materials the application of which is well known from the graphic technique.

In another method according to the invention the image consisting of zinc or cadmium may also be formed by coating the entire surface of the printing form with zinc or cadmium and subsequent etching away of the parts of the surface which are desired to be removed. The metal, which can be attacked by the sulphide forming etching agent may be present in the form of a surface layer on a surface which after the etching away of the said layer is or can be made receptible to water and ink-refusing in a planographic printing method. In this case a printing form is obtained in which the ink-retaining parts consist of zinc or cadmium or their sulphides, while the water receptive and ink-refusing parts consist of other materials.

In an especially advantageous embodiment of this method the underlayer or metallic base for the metal which can be attacked by the sulphide forming etching agent consists, for example, in a surface of stainless steel, chromium or chromium alloy. The finished printing form will then present a printing surface, the water-receptive and ink-refusing surface of which consists of stainless steel, chromium or chromium alloy, whereas the ink-receptive parts consist of zinc precipitated on an underlying metal protected by the zinc.

As sulphide forming etching agent according

to the invention there may be used an aqueous solution containing alkali sulphide or alkali polysulphide. This etching means is very effective even without the employment of any electric current the metal attacked being converted into sulphide, which either falls from the surface attacked of its own accord or can be removed from the same by a slight washing or rubbing. However, the etching takes place more easily under influence of an electric current, the printing form to be etched being connected with the positive pole of a current supply, whereas the negative pole is connected with a suitable electrode. The density of current and the tension are dependent on how quickly it is desired to carry out the etching. It has been found that zinc and cadmium even in the thinnest layers and in the finest points remain uninfluenced by the treatment, whether a current is passed through or not. It is probable that these metals are actually superficially attacked (sulphidized) by the etching fluid, but the sulphide layer formed is in this case so dense and covers so well and adheres so well to the surface of the printing form or to non-transformed zinc or cadmium that the attack does not in the least result in a reduction of the parts covered by zinc or cadmium, nor is there any attack on any layer of other material which may be found below the zinc or cadmium. In this way the present invention offers considerable advantages as compared with other known methods of etching, in which it is often very difficult to prevent fine details or printing points from being attacked during the etching by materials from adjacent surface areas. In autotyping for instance this very often results in a perceptible change in the shade values which is avoided in the various embodiments of the present invention.

The invention is illustrated, but not limited, by the drawing, in which

Figs. 1, 2 and 3 show three different stages of a printing form according to one manner of carrying out the present invention,

Fig. 4 the finished product of a second manner of carrying out the invention, and

Figs. 5, 6 and 7 again three stages of a printing form produced according to a third manner of carrying out the invention.

In Fig. 1 a sheet of stainless steel is designated by 1. Its surface is polished and covered with a thin layer 2 of copper, whereafter an image is transferred on to the copper layer, for instance photographically. After dusting with asphalt powder and melting of the same in a manner known per se, the image forms a resist or protecting parts 3 adhering to the copper layer. In the openings between the parts 3 a thin layer of zinc 4 is deposited in known manner. The protecting parts 3 are now removed as shown in Fig. 2.

The sheet is then placed in a bath containing alkali sulphide or alkali polysulphide. It is connected with the positive pole of a voltage supply, and after being electrolyzed for a few minutes with a voltage and density of current which need not be adjusted accurately, but which is of about the same strength as is used for instance when electrolytically precipitating zinc, the sheet is taken out and dried, and now in most cases it will be seen that the copper has entirely disappeared without any apparent change in the zinc. If the copper has not disappeared the treatment may be repeated until this purpose has been achieved. When the copper has been etched away the sheet is ready for inking and application for offset printing, see Fig. 3.

When using a chromium plated copper sheet instead of a sheet of stainless steel in the method described above, a printing form as shown in Fig. 4 is obtained, where 5 is the copper sheet, 6 a layer of chromium, 7 is a copper layer and 8 is a layer of zinc covering the copper to protect it during the etching process.

By the method illustrated in Figs. 5, 6 and 7, a metallic base 9 of stainless steel, chromium or chromium alloy is covered in a galvanic bath with a copper or tin layer 10, after which a zinc or cadmium layer 11 is applied galvanically to the entire surface of the copper or tin layer. Parts of the zinc or cadmium layer 11 then are selectively removed to form the desired image, as shown in Fig. 6. The plate then is placed in an alkali sulphide or an alkali polysulphide bath and electrolyzed until the exposed portions of the copper or tin layer are removed, as shown in Fig. 7, to provide a printing form like that of Fig. 3.

Having thus set forth my invention, I claim:

1. The method of producing a printing form having a bimetallic surface which comprises, covering parts of a layer of a metal selected from the group consisting of copper and tin, which layer is on one surface of a metallic base which is water-receiving and ink-repellent in a planographic printing process, with a metal selected from the group consisting of zinc and cadmium, and etching away parts of the layer not covered by the metal of said last group with a sulphide-forming etching agent, while leaving the covered parts and the metallic base.

2. The method of producing a printing form as defined in claim 1 in which the metallic base has a chromium surface on which the first-mentioned selected metal is applied.

3. The method of producing a printing form as defined in claim 1 in which the metallic base has a chromium alloy surface on which the first-mentioned selected metal is applied.

4. The method of producing a printing form as defined in claim 1 in which the metallic base has a stainless steel surface on which the first-mentioned selected metal is applied.

5. The method of producing a printing form having a bimetallic surface which comprises, depositing on a metallic base, the surface of which is water-receiving and ink-repellent in a planographic printing process, a first layer of a metal selected from the group consisting of copper and tin, covering parts of the first layer with a metal selected from the group consisting of zinc and cadmium, and etching away uncovered parts of the first layer with a sulphide-forming etching agent while leaving the covered parts of said layer.

6. The method of producing a printing form having a bimetallic surface which comprises, covering a first layer of a metal selected from the group consisting of copper and tin, which layer is on one surface of a metallic base which is water-receiving and ink-repellent in a planographic printing process, with a second layer of a metal selected from the group consisting of zinc and cadmium, removing desired parts of the second layer to expose the underlying parts of the first layer while leaving the remaining parts of the first layer covered, and thereafter removing the exposed parts of the first layer with a sulphide-forming etching agent while leaving the remaining parts of the second layer.

7. The method of producing a printing form having a bimetallic surface which comprises, covering parts of a layer of a metal selected from the group consisting of copper and tin, which layer is on one surface of a metallic base which is water-receiving and ink-repellent in a planographic printing process, with a resist, depositing a metal from the group consisting of zinc and cadmium onto those parts of said layer not covered by the resist, selectively removing the resist to leave the underlying portions of said layer exposed, and then removing the thus exposed portions of said layer with a sulphide-forming etching agent while leaving the remaining parts of the second layer.

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