May 2, 1950 J. E. MORSE 2,506,164

METHOD FOR THE PRODUCTION OF METALLIC PRINTING MEMBERS

Filed Oct. 15, 1947

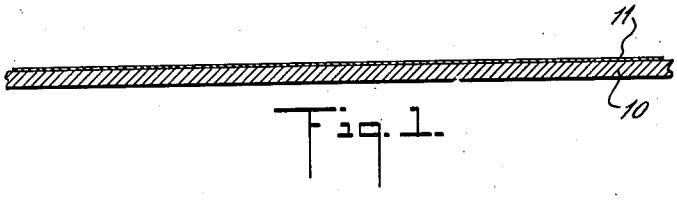


Fig. 1.

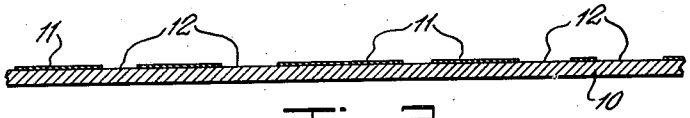


Fig. 2.

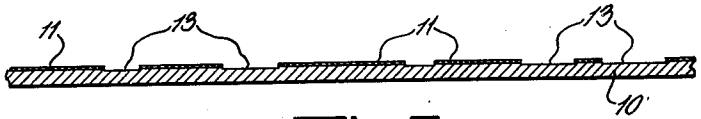


Fig. 3.

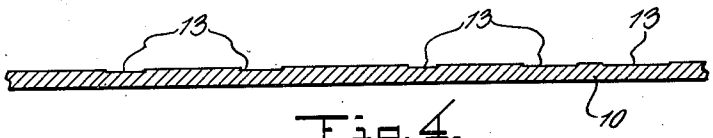


Fig. 4.

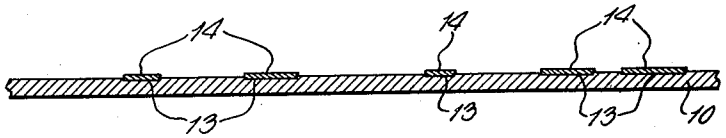


Fig. 5.

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METHOD FOR THE PRODUCTION OF METALLIC PRINTING MEMBERS

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7 Claims. (Cl. 204—17)

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This invention relates to the production of metallic printing members such as plates or cylinders.

According to this invention a convenient, economical and accurate method is afforded for depositing in areas of predetermined outline on a printing member presenting an aluminum surface electrolytically deposited metal selected from the group consisting of copper and nickel.

The method of this invention is excellently adapted for the production of printing plates for planographic or lithographic printing. In planographic or lithographic printing a printing plate is employed having a substantially flat surface presenting portions which have different selective attraction for printing ink and for water. The portion having selective attraction for printing ink consists of areas of predetermined outline such as letters, designs, halftone prints, or the like. By first applying water to the plate, the surface areas having preferential affinity for water become moistened, and, upon subsequently applying printing ink, the ink does not adhere to the surface areas having preferential affinity for water while it does adhere as a coating upon the printing areas of predetermined outline having a preferential affinity for the ink. Upon application of the inked printing member to the surface of a paper sheet, for example, printing conforming to the printing areas of predetermined outline is transferred to the paper.

In the preparation of printing plates for planographic or lithographic printing, plates composed of aluminum have been extensively used due to the fact that aluminum, especially after having been subjected to mechanical or chemical graining, has a very pronounced preferential attraction for water as compared with printing ink. This affinity for water is further improved by etching the plate with a lithographic etch such as gum arabic solution and phosphoric acid, which leaves a deposit or film more capable of retaining water on the plate. In order to provide areas having preferential attraction for printing ink, lacquer coatings, coatings of egg albumin sensitized with dichromate and hardened by light that are covered with a greasy ink, or greasy ink images drawn or transferred directly on the plate have been employed, but such means for providing areas having preferential attraction for printing ink have the disadvantage of wearing away quite rapidly so that only relatively short runs are possible using a given printing plate. Moreover, in order to retain the water reception areas effective for this purpose during operation

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of the printing press it is necessary to add etch to the damping solution in the fountain. This etch, if strong enough, will attack the greasy image or the lacquer base providing the ink receptive areas causing the image to wear or fade away. If, on the other hand, the etch is not of sufficient strength it will not prevent spreading of the image into the non-printing areas.

It has also been proposed to coat a printing plate such as an aluminum printing plate with an over-all coating of electrolytically deposited copper or other metal which has a preferential attraction for printing ink as compared with water. After the over-all copper coating has been applied, the desired image is superimposed on the coating in the form of a suitable masking that is resistant to the action of nitric acid and the non-printing areas of the copper coating are dissolved away by the action of nitric acid leaving the aluminum surface of the printing plate exposed in the non-printing areas. In this manner more durable printing plates can be produced as compared with printing plates wherein the printing areas are provided by lacquer coating, but the method of producing the plate is very wasteful of copper for both sides of the aluminum printing plate are coated over-all with copper and later the greatest part of the copper coating is removed by the action of the nitric acid. This method also has the disadvantage of not being reliable in the production of accurate printing areas for there is the danger, especially in the case of delicate half-tone work, that the delicate layer of lacquer or enamel which protects the printing areas during the dissolving of the copper with nitric acid will be undermined. Moreover, the use of nitric acid to dissolve away the copper from the non-printing areas is attended with the development of fumes which are injurious to health and which are very objectionable especially in view of the fact that when the nitric acid is used in the amount necessary to dissolve away the copper from the non-printing areas of a printing plate, very severe fuming occurs.

It is a purpose of this invention to overcome difficulties of the character aforesaid and afford a printing member such as a plate or cylinder which is capable of use in connection with extremely long printing runs. In fact according to the method of this invention the production of a printing plate suitable for planographic or lithographic printing can be controlled so that the plate will be suitable for printing runs of any desired length. Moreover, in the practice of this invention the image areas produced on the

printing plate consist of metal which is not affected by the etch in the damping solution and permit the maintenance of the etch in the damping solution at sufficient strength to prevent the image from spreading without any danger of the image fading or wearing away.

According to this invention a printing member such as a plate or cylinder which presents an aluminum surface is first covered with a suitable masking material except for areas of predetermined outline which are left exposed. The areas of predetermined outline, as stated above, may be in the form of letters, a design, a halftone print or the like, depending on the subject-matter to be printed. A suitable etching solution is next applied to the surface which etches the exposed areas of predetermined outline. The masking material is then removed from all of the surface, leaving both the unetched aluminum surface and the etched areas exposed. The printing member is then placed in an electroplating bath adapted to deposit a metal selected from the group consisting of copper and nickel and is subjected to electroplating. I have discovered that upon receiving the electroplating treatment, the metal from the electroplating bath becomes selectively adherent only to the etched areas of the aluminum surface, leaving the unetched portion of the aluminum surface exposed and, as a result of the electroplating treatment, the metal becomes deposited as an integral coating firmly adherent on the etched areas of the aluminum plate, the thickness of the coating being dependent upon the duration of the electroplating treatment.

As a result of the foregoing process steps, plates suitable for planographic or lithographic printing can be prepared, for the metals copper and nickel exhibit affinity for printing ink as compared with water and provide printing areas while the uncoated aluminum exhibits selective affinity for water as compared with printing ink and provides the non-printing areas. Since the thickness of the metal deposited in the printing areas can be controlled as desired, the thickness of the metal constituting the printing areas can be adapted for printing runs of any desired duration. Thus, if the printing run is to be a relatively short one, a thin coating of electrolytically deposited copper or nickel will suffice. However, it is one of the principal advantages of the method of this invention that the metal can readily be deposited so as to provide printing plates or the like that have extremely long lift. In fact, the method of this invention not only may be employed in the production of plates, cylinders or the like, suitable for planographic printing, but, also, by building up the thickness of the deposited metal, may be employed to provide printing plates or other printing members appropriate for use in type printing. Alternatively, by deep etching followed by electroplating to deposit copper or nickel in the etched areas below the level of the surface of the unetched areas, a printing member suitable for intaglio printing can be produced.

In order to afford a better understanding of the practice of this invention it will now be described in connection with a specific example of the practice thereof in the production of an aluminum plate suitable for the planographic or lithographic printing of a photographic image. The image to be reproduced may be originally produced in the usual way by first preparing a photographic negative and then producing a halftone positive through a halftone screen. An aluminum plate of the type that is conventionally employed on a printing cylinder is first treated to produce a grained surface. A pure grade of aluminum is desirable, that of 2S purity being preferable. The graining is preferably accomplished by a chemical graining treatment, that treatment disclosed in my application Serial No. 757,718, filed June 28, 1947, for Graining plates being especially suitable. The purpose of the graining of the aluminum is to provide a surface which in the finished plate will be highly receptive to water as compared with printing ink. The graining of aluminum plate is not essential, however, to the process of this invention. Alternatively the aluminum plate may merely be cleansed as by treating it with alkali followed by nitric acid so as to remove surface contaminations and provide a uniform surface. Mechanical graining ordinarily is not employed inasmuch as the mechanical graining is likely to contaminate the aluminum surface, which is undesirable unless the plate is thereafter chemically treated to remove the contamination.

The surface of the aluminum plate to be used for printing is coated with a layer of dichromated gum arabic sensitive to light. A suitable formula for this purpose, which is extensively used, is as follows:

Water	c. c.	1000
Ammonium hydroxide (28%)	c. c.	90
Ammonium bichromate	gms.	90
Gum arabic (sufficient to provide 14.5° Bé.)	gms.	280

The foregoing formula is typical of what is commonly known as a "deep etch" sensitizer coating, due to the fact that it stands up under the action of etching solutions. After the sensitizer coating has been applied, the coating is exposed to light through the positive so as to produce light exposed areas and areas unexposed to light which correspond to the image on the positive, and the coating is treated with a solution which is adapted to dissolve away the image areas of the coating that have not been exposed to light, leaving the light exposed areas intact. For this purpose, there may be used a developer solution of alkaline earth salt, such as calcium chloride, and an organic acid such as lactic acid, e. g., a solution consisting of 1000 c. c. of 37° Bé. calcium chloride and 40 c. c. of lactic acid is suitable for the purpose. The calcium chloride acts as a carrier which prevents solution of the light exposed areas of the coating while the lactic acid dissolves away the image areas that were unexposed to light.

The plate prepared, as above described, is covered with the deep etch sensitizer coating in the non-printing areas while the printing areas, as determined by the positive used, are left exposed. The next step consists in treating the surface of the plate with an etching solution, a suitable formula for the purpose being as follows:

Calcium chloride solution 40° Bé.	c. c.	1000
Cuprous chloride	gms.	25
Hydrochloric acid (C. P. sp. gr. 1.19)	c. c.	5

The etching solution is applied for about two minutes and attacks the exposed printing areas of the aluminum plate. Its function is primarily that of removing aluminum oxide film and rendering the etched surface receptive to the subsequent electroplating step. An etching bath

such as that of the foregoing formula is preferred inasmuch as the etched surface of the aluminum acquires during the etching a very slight stain of metal (copper in the case of the foregoing formula) which serves to preserve the etched surface from formation of aluminum oxide film and to afford a trace of metal which is more receptive to electroplating with either copper or nickel than aluminum is.

The etched plate with the masking coating still intact, preferably is next washed with alcohol in order to remove the etching solution before the masking coating is removed so as to avoid the possibility of the etching solution flowing outside the predetermined outlines of the printing areas when the masking coating is removed. The removal of the masking gum arabic coating can then be readily accomplished merely by washing with water. If desired, the washing with water may be followed by citric acid in order to remove all traces of the gum arabic, the plate being scrubbed to assist in the removal of the gum arabic, which, if present, would result in deposition of copper thereon during the electroplating step and would contaminate the electroplating bath.

The plate, prepared as above described, is now ready for copper electroplating. A suitable formula for the electroplating bath consists of—

Copper sulphate	gms	240
Sulphuric acid (sp. gr. 1.84)	c.c	35
Water	c. c	1000
Gelatin	gm	.02

The electroplating is accomplished using a current density of about one ampere per square decimeter. The copper deposited from the electroplating bath adheres only to the etched image areas of the aluminum plate and forms a coating the thickness of which depends upon the duration of the electroplating step. A slight scum of copper sometimes develops over the non-printing areas of the aluminum plate, but any such scum can readily be removed by rubbing it off, by reverse plating, or by etching it off with nitric acid. The resulting plate presents a bimetallic surface, namely, the areas of predetermined outline corresponding to the image on the positive are coated with copper while the balance of the plate where the aluminum is uncoated remains exposed. If desired, the electrolytically deposited copper can be buffed so as to increase its selective affinity for printing ink in comparison with water.

Printing plates produced, as above described, provide extremely true reproduction of the original positive down to the finest tones and the finest mesh halftone screens can be used. The process of this invention has been successfully employed in the production of colored reproductions employing a plurality of halftone positives of the image, each positive having been produced for the printing of those image portions corresponding to a given color. Extremely accurate colored reproductions have been produced in this way employing separate plates for each of as many different colors as may be required in making the colored reproduction.

The sequence of steps employed according to the above described example of the practice of this invention is indicated diagrammatically in the accompanying drawing wherein each of Figs. 1 to 5 is a cross section of a printing plate as it occurs at different points in the process.

In Fig. 1 an aluminum plate 10 is shown with

a coating 11 of light sensitive dichromated gum arabic applied thereto, the thicknesses being exaggerated for clarity in this figure as well as in the other figures. Fig. 2 illustrates the condition of coated plate after the layer 11 has been exposed to light through the positive and after the areas unexposed to light corresponding to the image areas on the positive have been removed, leaving the exposed areas 12 of predetermined outline. Fig. 3 illustrates the condition of the plate after the plate has been etched in the exposed areas, leaving the etched image areas 13, while the balance of the plate is still protected by the coating 11. Fig. 4 illustrates the condition of the plate after the masking coating 11 has been removed, leaving the surface of the aluminum plate entirely bare. However, the surface of the aluminum plate is characterized by the etched areas 13 having the outline determined by the image to be reproduced, the balance of the surface being unetched. Fig. 5 illustrates the condition of the plate after the electroplating step. It is to be noted that a coating 14 has been integrally applied only to those areas which had previously been etched. The copper, as thus deposited, exactly reproduces the image areas corresponding with the image areas of the original positive and no copper becomes deposited elsewhere on the aluminum plate.

In the figures shown in the drawing the depth of the etching and the thickness of the coating 14 of copper have been exaggerated for the purpose of clarity in the drawing. Thus the coating 14 of copper, even when applied so as to be capable of extremely prolonged printing runs, can be such that the plate surface is virtually flat and suitable for planographic or lithographic printing. The deposited copper has excellent affinity for printing ink while being repellent to water, and the balance of the surface presented by the aluminum, when moistened, does not permit the printing ink to adhere thereto. While the plate can be produced so as to be suitable for planographic or lithographic printing, it is also possible, as mentioned above, to deposit the coating 14 of copper to such thickness that the printing plate can be used for type printing or to etch the areas 13 to such depth that the coating 14 of copper will be below the level of the unetched areas, thus producing a printing member which can be used for intaglio printing.

The printing plates used for planographic or lithographic printing are ordinarily in the form of relatively thin aluminum plates or sheet-like bodies that can be secured to the surface of a printing cylinder. However, it is apparent that printing plates suitable for use in a platen printing press can be produced according to this invention. Moreover, the process of this invention also is applicable directly to the surface of a printing cylinder. If desired, in the practice of this invention, each side of an aluminum printing plate can be provided with a different image or other printing surface.

While the practice of this invention has been illustrated in connection with the preparation of a printing plate from a photographic positive utilizing a light sensitive coating, it is apparent that this invention can be practiced in other ways and that all that is required is that a suitable masking coating be applied over the surface of a printing plate presenting an aluminum surface, the coating being resistant to a solution adapted to etch the aluminum and the masking coating having openings therethrough through

which the etching solution can act on areas of the surface presented by the printing plate which have predetermined outline. For example, the openings in the masking coating could, if desired, be produced mechanically. If the openings are produced mechanically, it is of course the case that the masking coating need not be light sensitive and may for example be a suitable lacquer or enamel.

For etching the areas of aluminum surface any of a variety of known etching solutions may be employed. Thus, in the case of the etching solution of the foregoing example, the proportions can be considerably varied, and for 1000 c. c. of the 40° Bé. calcium chloride solution the amount of cuprous chloride can be varied between about 2 grams and about 100 grams while the hydrochloric acid can be varied between about 2 c. c. and about 20 c. c. Other etching solutions which may be employed are (1) 1000 c. c. of calcium chloride solution 40° Bé., 2 to 100 grams of zinc chloride, 2 to 100 grams of cuprous chloride and 2 to 20 c. c. of hydrochloric acid; (2) 1000 c. c. of calcium chloride solution 40° Bé., 10 to 100 grams of ferric chloride and 0 to 20 c. c. of hydrochloric acid; (3) 1000 c. c. of calcium chloride solution 40° Bé., 2 to 100 grams of cuprous chloride, 2 to 100 grams of ferric chloride and 2 to 20 c. c. of hydrochloric acid; and (4) 1000 c. c. of calcium chloride solution 40° Bé., 60 c. c. of lactic acid, 58 grams of ferrous chloride. In etching solutions such as those mentioned the calcium chloride acts as a carrier to prevent the solution of the light exposed gum arabic coating. Other water soluble salts of alkaline earths may also be used for this purpose. If some masking coating other than the one having a gum arabic base is used, e. g., lacquer or enamel as above mentioned, which is not dissolved by aqueous solutions, then the calcium chloride or the equivalent is not required to be present.

As mentioned above, it is preferably to employ as the active etching agent, or to incorporate with another etching agent such as hydrochloric acid, a salt of a metal which during the etching is deposited to appreciable extent as a stain on the etched areas of the aluminum surface so as to protect the etched surface from reoxidation and so as to leave a deposit which promotes the adherence of an electrolytically deposited coating of copper or nickel. In the formulae above mentioned salts of iron, copper and zinc have been mentioned. However, salts of other metals may also be used such as tin (e. g., stannous chloride), cadmium (e. g., cadmium chloride), cobalt (e. g., cobalt chloride), chromium (e. g., chromium chloride) or nickel (e. g., nickel chloride). More generally salts may be employed wherein the cation is a metal that is below aluminum in the electromotive force series for metals and wherein the anion is the anion of a strong mineral acid such as hydrochloric acid. The metal thus deposited has a greater affinity for electrolytic deposition of copper or nickel than does aluminum. The salts of these metals can be used as the sole etching agent although preferably some hydrochloric acid or other strong acid is also present to speed up the etching action. Copper nitrate in the presence of hydrochloric acid is an excellent etching agent and leaves a stain deposit of copper that is very receptive to electroplating.

While it is preferable to employ an etching bath that leaves a stain deposit on the area of aluminum surface that has been etched, this is not essential. Thus the exposed areas can, if desired, be etched only with hydrochloric acid. But in such case the electroplating should be performed promptly after the etching before the etched areas become excessively coated with a film of aluminum oxide. Moreover, in any case, the resulting electroplating does not provide as good or as firm a deposit as when the metal salt is contained in the etching bath.

For the electroplating bath any cupric salt dissolved in an acidic medium which does not attack aluminum can be employed. As in other copper plating operations, it is ordinarily preferable to employ copper sulphate in a sulphuric acid aqueous medium. For 1000 c. c. of water it is usually desirable to employ from about 100 to about 300 grams of copper sulphate and from about 10 to about 60 c. c. of sulphuric acid. The proportion of acid influences to some degree the character of the copper coating that is deposited, the coating tending to be somewhat softer if the proportion of acid is cut down and tending to be somewhat more porous if the proportion of acid is increased. A coating of preferred characteristics is afforded when the proportions are as above indicated. The presence of a small amount of an addition agent in the electroplating bath is preferable in affording a smoother and brighter coating but is not essential. In addition to gelatine, other addition agents such as glue, dextrine, etc., can be employed.

During the electroplating a current density of 1 ampere per square decimeter affords optimum results when the electroplating is performed without agitation at a temperature of about 72° F. However, the current density can be varied considerably, e. g., between about 0.25 and about 10 amperes per square decimeter.

In the practice of this invention the metal that is deposited on the aluminum plate by electroplating is copper. However, nickel may be employed as well as mixtures of copper and nickel. Copper is preferred to nickel inasmuch as copper has a somewhat greater affinity for printing ank than does nickel. If nickel is employed any conventional electroplating bath for electrolytic deposition of nickel may be employed. For example, the electroplating bath may consist of 120 grams of nickel sulphate, 22 grams of ammonium chloride and 30 grams of boric acid dissolved in 1000 c. c. of water. In the electrolytic deposition of nickel the same current densities can be employed that are employed in accomplishing electroplating with copper.

It is apparent from the foregoing description of this invention that a method is afforded whereby printing surfaces of metal selected from the group consisting of copper and nickel are produced on a printing member presenting an aluminum surface by selective deposition of the metal determined by differentially conditioning the aluminum surface prior to electroplating. As a result of repeated demonstrations with various types of images to be reproduced, including the finest half-tone screen images, the method had been found to be extremely accurate, readily carried out, economical, and capable of producing printing plates that are notable for their very great durability in service. While this invention has been described in connection with specific examples of the practice thereof, this has been done merely for illustrative purposes and the scope of this invention is to be governed by the language of the following claims.

I claim:

1. In the production of a metallic printing

member presenting an aluminum surface partially covered in areas of predetermined outline with an integrally deposited coating of metal selected from the group consisting of copper and nickel, the steps comprising covering said surface with a masking coating containing openings having said predetermined outline within which areas of said aluminum surface having said predetermined outline are exposed, etching said aluminum surface of said exposed areas of predetermined outline not covered by said masking coating with an aqueous etching solution which comprises an anion of a strong mineral acid to thereby remove aluminum oxide from said areas and to render said areas receptive to electroplating with said metal selected from the group consisting of copper and nickel, removing said masking coating leaving both the etched areas and unetched portions of said aluminum surface exposed, and while said etched areas and said unetched portions of said aluminum surface are exposed subjecting said aluminum surface to electroplating for deposition of said metal selected from the group consisting of copper and nickel from an acidic aqueous solution of a salt selected from the group consisting of cupric salts and nickel salts, whereby said metal is selectively deposited as an integral firmly adherent coating only on said etched areas of predetermined outline.

2. A method of producing a metallic printing member presenting an aluminum surface normally unreceptive to electroplating with a metal selected from the group consisting of copper and nickel, etching selected areas of predetermined outline of said aluminum surface by means of an aqueous etching solution which comprises an anion of a halogen acid to thereby remove aluminum oxide from said areas to render said areas receptive to electroplating with said metal selected from the group consisting of copper and nickel, and, while the etched and unetched areas of said aluminum surface are unprotected, electrolytically depositing said metal selectively only on said etched areas of predetermined outline as an integral firmly adherent coating by electroplating from an acidic aqueous solution of a salt selected from the group consisting of cupric salts and nickel salts.

3. In the production of a metallic printing member presenting an aluminum surface partially covered in areas of predetermined outline with an integrally deposited coating of metal selected from the group consisting of copper and nickel, the steps comprising covering said surface with a masking coating containing openings having said predetermined outline within which areas of said aluminum surface having said predetermined outline are exposed, etching said aluminum surface of said exposed areas of predetermined outline with an etching solution comprising a salt the cation of which is a metal below aluminum in the electromotive force series and the anion of which is an anion of a strong mineral acid to thereby remove aluminum oxide from said areas and to deposit said metal of said salt on said areas as a stain that protects said areas against oxidation and renders said areas more receptive than aluminum for electrolytic deposition on said areas of said metal selected from the group consisting of copper and nickel, removing said masking coating leaving both said etched areas and the unetched portions of said aluminum surface exposed, and while said etched areas and said unetched portions of said aluminum surface are exposed electrolytically depositing said metal selected from the group consisting of copper and nickel as an integral firmly adherent coating only on said etched areas of predetermined outline by electroplating from an acidic electroplating bath containing a salt selected from the group consisting of cupric salts and nickel salts in contact with said aluminum surface.

4. A method of producing a metallic printing member presenting an aluminum surface which comprises coating said aluminum surface with a light sensitive masking coating, producing an image thereon comprising light affected areas and areas unaffected by light, said last-named areas defining said image, removing the areas not affected by light from said coating, leaving openings in said coating defining said image wherein areas of said aluminum surface are exposed, etching said aluminum surface in said exposed areas while the portions of said aluminum surface surrounding said areas are protected by said coating utilizing an acidic etching solution containing a salt the cation of which is a metal below aluminum in the electromotive force series and the anion of which is an anion of a halogen acid and a salt of an alkaline earth for preventing dissolution of said masking coating, washing away the etching solution while said coating covering said unetched portions of said aluminum surface remains intact, removing said coating leaving both said etched areas and said unetched portions of said aluminum surface exposed, and by electroplating from an acidic electroplating bath in contact with the said etched areas and unetched portions of said aluminum surface containing a cupric salt depositing an integral firmly adherent coating of copper only on said etched areas, thereby providing a copper presenting printing surface corresponding to said image surrounded by aluminum surface uncoated with copper.

5. In the production of a metallic printing member presenting an aluminum surface partially covered in areas of predetermined outline with an integral deposit of metal selected from the group consisting of copper and nickel, the steps comprising covering said surface except for said areas with a masking coating leaving said areas exposed, etching the aluminum in said exposed areas with an aqueous etching solution which comprises an anion of a strong mineral acid to thereby remove aluminum oxide from said areas and to render said areas receptive to electroplating with said metal selected from the group consisting of copper and nickel, removing said masking coating leaving both the etched and unetched portions of said aluminum surface exposed, and then while both the etched and unetched portions of said aluminum surface are exposed depositing said metal selected from the group consisting of copper and nickel on said etched areas by electroplating from an acidic aqueous solution of a salt selected from the group consisting of cupric salts and nickel salts as an integral coating having the outline of said etched areas.

6. In the production of a metallic printing member presenting an aluminum surface partially covered in areas of predetermined outline with an integral deposit of copper, the steps comprising covering said surface except for said areas with a masking coating leaving said areas exposed, etching the aluminum in said exposed areas with an aqueous solution of a chloride to remove aluminum oxide from said areas, removing said masking coating leaving both said etched and unetched portions of said aluminum surface

exposed, and then while both the etched and unetched portions of said aluminum surface are exposed subjecting said aluminum surface to electroplating from an acidic electroplating bath containing a dissolved cupric salt, whereby copper is electrolytically deposited as a firmly adherent coating only on said etched areas of predetermined outline.

7. In the production of a metallic printing member according to claim 6, the steps according to claim 6 wherein said etching solution comprises a dissolved salt of a metal below aluminum in the electromotive force series.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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Certificate of Correction

Patent No. 2,506,164 May 2, 1950

JOHN E. MORSE

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 54, for the word "lift" read *life*; column 8, line 44, for "ank" read *ink*; column 9, line 38, after "areas", first occurrence, insert *and*; column 12, line 9, list of references cited, for "Aug. 25, 1915" read *Aug. 24, 1915*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of July, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.