UNITED STATES PATENT OFFICE.

HANNIBAL GOODWIN, OF NEWARK, NEW JERSEY.

PROCESS OF PREPARING PLATES OR SURFACES FOR ORNAMENTATION.

SPECIFICATION forming part of Letters Patent No. 444,951, dated January 20, 1891.

Application filed December 4, 1885. Serial No. 184,752. (No model.)

To all whom it may concern:

Be it known that I, HANNIBAL GOODWIN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Process of Preparing Plates or Surfaces for Purposes of Ornament or Utility; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to secure at a reduced cost as compared with certain hand processes more artistic and effective ornamentation, and, as compared with more closely allied processes—such, for example, as that of Charles Nègre, of Paris, France, set forth in English Patent No. 1,835 of 1857, which is hereby disclaimed—to secure more sharp and cleanly-cut outlines, and particularly more permanent and heavy or thick deposits of metal, whereby the ornamentation or design on the plate will be more durable.

More specific objects are to provide more effective reserves to resist the etching, coloring, or galvanic agents or fluids, whereby the thicker deposits may be obtained, and to enable a greater variety of deposits to be made on a given plate or surface, and to more perfectly control the depositions, so that on a given plate the lines of ornamentation will not only be more true to the original design, but a greater variety of metals may be disposed on the plate at just such points as that their colors will produce the best effects of ornamentation.

Heretofore, in order to secure a deposit of metal forming a picture or design on a metallic ground of another color, Nègre, above referred to, applied to said metallic ground a film of matter, such as bitumen, gelatine, albumen, or gums made sensitive to light, and at the same time capable in a degree of protecting said metallic ground from the action of acid or a galvanic current. This film he subjected to the action of light passing through a suitable negative, and thus hardened or impressed certain parts of the film corresponding with the translucent parts of the negative, so that they were insoluble in certain solvents, which latter, being applied to the plate, dissolved the unimpressed portions of the film, leaving the ground-plate partly bare. Upon these bare portions he then deposited metal, which, in connection with the ground metal, produced a design or ornament in differing colors. After removing the remainder of the resisting film he in some cases continued his process by coloring the ground by oxidizing or otherwise chemically treating the ground metal.

This inventor also contemplates, when acting on zinc, steel, &c., obtaining an engraving in relief by causing an acid to act upon metal laid bare by employing a reversed negative to photographically impress a sensitive film and dissolving the umimpressed parts, as above described. After thus obtaining the partly-bare plate and etching the same with acid, so that the covered parts are in relief, he covers the heliographic varnish of the relief parts, after wetting the same with gum-water, with ink by means of a roller, to resist the galvanic current. He then immerses the plate as a cathode and fills up the depressions with metal, which with the ground metal produces a design resembling damaskene work. It may be observed that in both these alternative processes he imposes on the ground-plate but one electro-deposit, while by my improvement, hereinafter described, a variety of electro-deposits may be imposed on a ground-plate, which may thus possess but little or no inherent beauty or brilliancy of color or other ornamental advantage. Finally, by my improvements I am enabled to obtain, after forming the design in a film sensitive to light but possessing but little power to resist the galvanic action, a substitute film having a far more perfect resisting nature or capacity than the said sensitive film.

In carrying the improved process into effect I first provide a plate, preferably one in which the color is suitable to remain as one of the colors constituting the final picture, or one to or on which a color has been deposited prior to its receiving the design, which color may be applied by means of electro-deposition, or by mechanical or chemical gilding, bronzing, or plating; or, again, I may em-

ploy a plate to which color is to be given subsequent to applying the design. The material of the design to be imposed on or applied to the said plate is either asphaltum or some fatty matter, as fatty ink. The design when of asphaltum is applied or imposed by photographic printing or by a tracing-brush. When in fatty ink, the design is applied to the plate either by photographic printing, by any well-known method of transfer, or by a tracing-brush. When the design is in asphaltum or in fatty ink, it is obtained in this wise: I flow the plate with some suitable matter, as albumen, which has been rendered sensitive to light by any of the well-known processes, or with asphaltum, which is or has been made sensitive to light, thus producing on said plate a film, over which, when said film is brought to a suitable condition by evaporating the solvent, is placed a photographic positive or negative, a print, a pen-and-ink sketch on translucent paper, a textile fabric, such as lace or any other design adapted to be brought into intimate relation to the sensitive film and to allow the transmission of light. The said film and its overlying pattern or design is then exposed to light, which latter hardens or renders more insoluble those parts of the film which correspond with the translucent parts of the overlying design. After sufficient exposure I first roll on the albumen-covered plate a coating of varnish or ink to re-enforce the hardened or light impressed surface and then proceed to develop the reproduced design or impression by suitable solvents—such as water for the albumen and benzine for asphalt—from just those parts of the plate to which light has not passed, the asphaltum in one case and the ink and underlying albumen in the other. The plate having thus received the design, either by printing, transfer, or by tracing, now presents a surface parts of which are covered by asphaltum alone, by fatty ink alone, or by fatty matter, and its underlying light-hardened albumen, and acts as a basis for all the subsequent operations. With the plate in this condition I next take one of several following steps, which either tend toward a complete or final ornamentation or complete the process of ornamentation.

First. To the bare parts of the plate I may add, apply, or impose a film of matter, preferably metallic, of one uniform color, or to said bare parts I may add a variety of colors in sections, or in what is known as "parcel coloring" by means of "stopping off" or covering portions of said bare portions.

Second. To the covered parts alone I may add one uniform color, or to said covered parts I may apply several colors in sections.

Third. To both the covered and bare parts of the plate I can apply colors which are uniform or in variety in one or the other, or both.

Fourth. I may give the effect of light and shadow to the picture by etching away to a proper depth the bare parts alone and then applying to the surfaces thus eaten away a single color or colors in variety, or by etching away the covered parts alone and giving them a similar treatment. In connection with the bare or colored cavities I may add in either case a single or varied coloring to the surfaces remaining in relief.

Fifth. I may increase the brilliancy of a part or of all the colors forming the finished picture, as well as modify the colors themselves, by burning in suitably-colored transparent and easily-fusible silicate or glass enamel.

Referring back to the first of the above series, to add or apply color to the bare parts alone my method is, where the material of the design consists of fatty ink, and especially where it is to serve as an insulator or resist of the galvanic current, first to re-enforce said resist by dusting on some non-conductor, such as ebonite.

Though most of the steps of the process thus far recited are not in themselves new, the use of a non-conducting dust, in connection with a fatty ink and an underlying film, to secure an impervious and sufficient resist in etching or depositing is, I believe, new, and the use of ebonite in the form of a dust as a resist I also believe to be new. The re-enforced fatty or asphaltum parts acting as a resist, I proceed to give color to the bare parts of the plate by one or more of the following means: A, electro-deposition of a metal of a color in suitable contrast to the color previously given to the plate; B, electro-deposition of a metal in different colors, such as different colors of gold; C, electro-deposition of different metals differing from each other in color; D, electro-deposition of metal in "matte color" or in a dead or unburnished color, which may be changed wholly or in part by means of a burnisher or by chemical reaction; E, gilding, plating by means of chemical or mechanical adhesives; F, bronzing, powdering, or oxidizing by any ordinary means; G, covering with an adhesive covering or coating of resinous matter which is not soluble in the solvent of ink or asphalt, and with which has been incorporated a suitable color; H, coloring "in parsee" by either of the three last means specified, either by varying the color of each or by using them interchangeably; I, etching out to a suitable depth the bare parts and then treating the surface by any one or more of the above means.

Another method of adding color to the bare parts, better adapted for some purposes of ornamentation or use, especially where the color given requires the deposit to be of greater thickness and stability, is the following:

Instead of using the re-enforced asphaltum or fatty parts as a resist, I remove them after they have given form to the design and substitute a far more effective insulating substance. To accomplish this I flow over the cleansed or etched-out plate a solution of lac

or some equivalent matter which is not soluble in the solvent of asphalt or fatty ink. After this is sufficiently set I remove the asphalt or the inky parts of the design, together with the albumen underlying the latter, by means of proper solvents, such as turpentine for the ink and asphalt and sulphuric acid for the albumen, leaving the parts that were bare now covered with a film of lac. Having thus made bare the parts that were covered with ink or asphalt, and having properly cleansed the bare parts, I flow the plate with a solution of some other substance—such as copal—which is not soluble in the solvent of lac and which is a very effective galvanic insulator; or preferably, in order to cause the copal to adhere more strongly or perfectly to the metal, I first make a light electro-deposit of some metal upon the cleaned-out parts to secure a somewhat porous surface, and then flow the copal over the plate. At this point I may remark, parenthetically, that Nègre, above mentioned, provides a plate which after receiving a first electro-deposit is etched, the bare electro-deposit serving as a resist. It will be noted that in my process above described I protect the electro-deposit before subjecting the plate to the etching or galvanic fluid with an effective resist, and thus secure after etching a much more clean and sharp outline, an advantage greatly to be desired both in printing and ornamentation. When this last coating, which may be re-enforced by the application of some non-conducting dust—such as ebonite above mentioned—is sufficiently set, I apply to the plate alcohol or its equivalent, which while penetrating the film or coating of copal without dissolving it does dissolve the underlying lac, which, together with its covering of copal, is readily removed from the surface, leaving the parts that were bare before the lac was applied bare again and leaving the parts that were first covered with ink or asphalt now covered with copal or with a deposited film of metal and copal, which is a more effective galvanic insulator than ink or asphalt. I wish just here to emphasize the fact that the plate in the condition just described is peculiarly adapted for use in etching and to be employed in commercial printing, or when of zinc the plate is adapted to be employed for zincography or surface printing, after the manner of lithography. After properly cleansing the parts made bare by the removal of lac and its copal covering I proceed to give them the desired color by some one of the means before enumerated. Color having thus by either of the before-mentioned methods been added to the bare part, I remove the resist, and the added color, in combination with the natural color of the plate or in combination with the color given to the plate previous to its receiving the design, now forms a finished design or picture. I may now, however, add brilliancy to parts or to the whole of the finished picture or ornament and further modify the color of the parts or the whole either by burning in colored transparent and easily-fusible silicate or glass enamels or by covering the same parts with a colored transparent resinous or gummy substance of enduring quality.

Referring back to the second of the series first enumerated, to add color to the covered parts of the plate, I employ one or more of the following means most suited to the purpose of the artist: *a*. I give to the asphaltum previous to its photographic impression a decided and more or less transparent color, which is in suitable contrast to the color of the plate, and when the unimpressed parts are washed away there results, by means of this color added to the covered parts, a picture upon the metal in different colors. *b*. To the ink rolled upon the sensitized and exposed albumen surface I add a special color in suitable contrast to the color previously given to the plate, and then washing away the covering from the parts not impressed by the light there results a picture upon the metal in different colors, which when properly lacquered will be quite effective and of considerable permanency where not subject to much friction or wear. *c*. To the fatty varnish or ink covering of the plate I apply metallic leaf or bronze powders or vitreous powders to be burned in, all of a color in suitable contrast to the plate or to the color given to the plate previous to its receiving the design, or to the color applied to parts of the plate first made or left bare after the imprint or application of the design. *d*. When the plate employed is of silver or has been silvered, or is of gold or has a gilded surface, I first give to the bare parts a temporary film of some metal, as copper, that is easily oxidizable by heat or other means and which when oxidized has no affinity for mercury. This temporary film of copper being given to the bare parts, I dissolve out the asphalt or the ink, or the ink with its underlying albumen. I now oxidize the copper film and so cause it to resist mercury. I next apply to the surface mercury, which unites only with the silver or gold that has been laid bare by the removal of asphalt or ink. I next apply to the mercurialized parts either a metallic leaf, powder, or amalgam, of a color in suitable contrast to the color of those parts of the plate that are beneath the temporary film of copper, and I then fix the metal so applied by mechanical means or by volatilizing the mercury by means of heat, and then bringing up the color by any well-known means; and finally, I remove the oxidized film of copper by a solution of nitrate of silver or any other well-known means, and so reveal the silver or gold surface which was temporarily covered; or, except in case the plate has a thick surface of gold, instead of thus applying color to the surface from which ink or asphalt has been removed, I etch away to a suitable depth the mercurialized surface by means of nitric acid, and then, having removed the copper film and also having suitably protected the

surfaces in relief, I give color to the hollowed-out parts by one or more of the before-named means.

In adding color to the covered parts of the plate to answer some requirements not amply met by any of the foregoing means, especially where a thicker and more durable electro-deposition is required, I proceed as follows: I flow over the plate a solution of lac or other equivalent substance which is not soluble in the solvent of asphalt or ink, and when set I remove by means of naphtha the asphalt or the transferred or traced ink, or the ink with its underlying albumen, as the case may be; but in the last case, where ink covers albumen, I preferably first remove the ink and leave the albumen and flow over the plate a solution of some electrically non-conducting substance, as rosin, and when this has duly set I immerse the plate in dilute sulphuric acid, which penetrating through the rosin soon loosens the albumen and allows both it and its covering of rosin to be easily removed. Thus, having the parts that where bare now insulated by lac fortified with rosin and the parts that were covered with asphalt or ink now bare, I proceed, after duly cleansing the latter, to give them color by some one or more of the most suitable means heretofore embodied in a lettered series, or by other suitable means. Having thus added to the covered parts alone of the plates a color in suitable contrast to the color of the plate previous to its receiving the design, and having removed the film or films which were caused to cover the bare parts of the plate, there results a picture of permanency and effectiveness. I may further proceed to modify the color of parts or the whole of the picture, and to add brilliancy to parts or the whole, either by burning in colored and transparent easily-fusible enamels or glazes, or by covering the same parts with a colored transparent resinous or gummy substance of enduring quality.

Again, referring back to the first numbered series, where the plate to be operated upon is one that requires after it has received the design the application of color to both the covered and bare parts, as is generally the case with plates of zinc, copper, and other more common metals, which have not received a foreign and more enduring color before receiving the design, I proceed thus: I first employ the asphalt or inked parts properly re-enforced as a resist and then add single or varied color to the bare parts by electro-deposition, or by any one or more of the most suitable of the means already recited, or the bare parts may be first etched down and then receive the color, as specified. I next flow over the plate a solution of lac, as before described, and then remove the asphaltum or the ink, or the ink with its underlying albumen, as the case may be; but preferably, where ink covers albumen, I remove the ink and leave the albumen, and then flow the plate with a solution of a non-conducting substance, as rosin dissolved in turpentine, and I then immerse the plate in dilute sulphuric acid, when after a few minutes the acid will have so penetrated through the film of rosin and loosened the albumen that by means of a brush these parts wholly leave the surface, while the parts covered with the lac and rosin will remain unaffected. After suitably cleansing the surfaces thus made bare by the removal of the asphalt or other matter constituting the design I proceed to add single or varied color to said surfaces by electro-deposition or by any one or more of the most suitable of the means before described for the purpose. The said surfaces, instead of receiving the color, may be etched out to a proper depth, and then the hollows so made may receive the color by the same means.

A second, and for some purposes a far preferable, method of giving color to both the covered and the bare parts is the following: I first flow over the plate a solution of lac, then remove the asphalt or ink, or ink with its underlying albumen, as the case may be; but preferably in the latter case, where ink covers albumen, I remove the ink and leave the albumen, and then flow the plate with rosin, and then dissolve out the underlying albumen in the manner before described. After suitably cleansing the surfaces thus made bare by the removal of the albumen and ink or asphalt I proceed to give single or varied color to said surfaces by means of electro-deposition or by any one or more of the most suitable means before indicated in this specification. The said surfaces, instead of receiving color, may be etched out to a proper depth and then covering the surfaces of the cavities by the same means.

Having given color to the covered parts of the plate, I next proceed to protect said color from taking other color which is next to go on to those parts of the surface which were bare after the plate received the design, but which are now covered with lac. To this end I flow the plate with a solution of some such substance as copal, which is insoluble in the solvent of lac. This film I preferably re-enforce while yet "tacky" with some non-conducting dust. I next apply a solvent, such as alcohol, which penetrates the copal without dissolving it, but dissolves the underlying lac, which, together with its covering, is readily removed, leaving the copal covering the color before added intact. I here again emphasize the fact of the fitness of the plate in its present state to be etched for commercial printing.

Having thus effectually protected the first color added, I next proceed to give single or varied color to the surfaces made bare by the removal of the lac, and this I do, after having properly cleansed said surfaces, by means of the electro-deposition of a metal or metals of a color in suitable contrast to the color just applied, or by one or more of the most suit-

able of the means already indicated above. The said surfaces, instead of receiving said color, may be etched down to a proper depth, and the cavities so formed may receive color by any of the means before mentioned. The resist being finally removed, the picture appears complete in more or less varied color.

I may further modify the color of parts or the whole of this picture, and at the same time add brilliancy to the same by burning in colored and transparent enamels or by covering with colored and transparent resinous substances.

My method of ornamenting the plate by means of lights and shadows in conjunction with the application of color is as follows: I either use the covered parts of the plate as a resist, and then etch out the bare parts to a sufficient depth, and then to the hollows give suitable shade of one or more colors by means already indicated, and then roll over the surfaces in relief a thin mordant, and then apply to the same such metal leaf or colored powder as will assist in converting the relief into an effective high light, or applying the resist to the bare parts of the plate by some one of the means already indicated, and removing the asphalt or ink constituting the design, and then etching out the surfaces thus made bare, and then treating the resulting hollows and reliefs as in the last case specified. After the color or colors are applied the remaining resisting or insulating films are or may be dissolved away, leaving the plate finished or to be finished by subsequent mechanical operations.

As before stated in another connection, I am fully aware that Nègre's invention provides for a ground or bed plate covered in part with an electro-deposit and in part with a color secured by oxidizing, or otherwise chemically affecting and thus coloring said ground-plate; but in his case the first uncovered electro-deposit acts as a resist while the ground metal is being colored. The inventor is thus greatly limited in the selection of a first deposit that will not be weakened in its hold on the plate during the second coloring process or be changed or affected by the chemicals employed in said second process. In my improvement the first color is protected by an effective resist before treating the uncolored ground, so that a greater variety of first colors or deposits may be employed.

Again, while I am aware that a plate has been provided with a covering in a plurality of colors, in my invention I cover the plate with a variety of electro-deposits, whereby effects of ornamentation are obtained that cannot be obtained by metals applied in any other way. I therefore wish to claim hereinafter such part of the process broadly as well as specifically.

I am aware that in English Patent No. 2,675 of 1862 is described a process of electro-depositing different metals on a given plate, a design being secured by stenciling wax or an equivalent substance on the plate or by applying wax to the whole surface of the plate and chasing through the same with a tool and then depositing metal on the parts of the plate laid bare or allowed to remain bare, and to secure on the said plate another deposit in a contrasting color another design has been traced in the wax (or, at least, the inventor referred to in said patent provides for such tracing) and another deposit has been made on the bare parts secured by such second tracing. In my improvement I dispose the two contrasting deposits side by side on the plate, so that the edge of one deposit joins that of the contrasting deposit, one of the colored deposits corresponding with the light impressed film in its position on the plate and the other of said deposits corresponding in position with the unimpressed parts of the film. By such a procedure I secure results of ornamentation widely different from such as can be secured by tracing and depositing alternately to obtain the variety of colors.

Having thus described the invention, what I claim as new is—

1. The process herein described of preparing plates or surfaces for purposes of ornament or utility, which consists in applying to or imposing on said plate a film of sensitized albumen or its equivalent, then photographically impressing said film, inking the same to re-enforce the impressed film, and developing the reproduced design by dissolving out the unimpressed portions of the film and the overlying re-enforce, then further re-enforcing the remaining portions of the film by applying an insulating or resisting dust, such as ebonite, then etching or cleaning out the bare surfaces, then flowing the plate with a resist or insulating-film insoluble in the solvent of the ink, then applying a solvent of said ink and removing the latter with its overlying film, leaving the film of light hardened albumen where first impressed, then flowing the plate with or applying thereto another resist or insulating film or covering insoluble in the solvent of the said underlying albumen film, then applying a solvent of said albumen film and removing the latter with its overlying film, then giving to this last-mentioned double resist still greater insulating capacity, then cleansing or etching out the surfaces made bare by the removal of albumen and imposing or depositing thereon a metallic covering that is to form one of the final colors of the finished picture or design, then flowing the plate with a resist or insulating-film insoluble in the solvent of the first-applied resist or resists, then applying a solvent or solvents of said underlying first resist or resists and removing the latter, together with its overlying film, leaving the plate partly covered with the remainder of the resist last applied and an underlying deposit or application of metal and partly bare, then depositing on or applying to said bare parts a

metallic film in suitable contrast to that underlying the said remainder of the resist, and then removing the remainder of the resist, leaving the two deposited or applied metals bare, substantially as set forth.

2. The process herein described of preparing plates or surfaces for purposes of ornament or utility, which consists in first flowing upon or otherwise applying to the surface of the plate a film of matter sensitive to the light, impressing or imprinting and developing a design or picture in said film by removing the unimpressed parts of the film, then re-enforcing the remaining portion or portions of said film or giving it or them greater insulating capacity, then cleansing or etching out the bare portions of the plate and imposing, applying, or depositing a coloring-matter, such as a metallic film, then flowing the plate with a resist or insulator insoluble in the solvent of the underlying re-enforced film, then applying a solvent of said underlying film and removing the latter, together with its overlying film, leaving the plate partly covered with the remainder of the resist last applied and an underlying coloring and partly bare, and then coloring said bare parts or applying, imposing, or depositing on said bare parts a suitable coloring-matter in contrast to the coloring first applied or secured, and then removing the remainder of the resisting or insulating film, substantially as set forth.

3. The process of imposing two electro-deposits on a given plate and forming a design in different metals on said plate, which consists in applying to said plate a film of photographically-sensitive matter, impressing the design or image to be reproduced on said sensitive matter and developing the same, and then substituting for the light impressed portion of the film an electro-deposit of one metal and for the unimpressed portion an electro-deposit of another different metal, substantially as set forth.

4. The process herein described of preparing plates or surfaces for purposes of ornament or utility, which consists, essentially, in flowing upon or applying to the said surface or plate a film of sensitive matter, impressing or imprinting the design or pattern upon said film and developing the design by removing portions of said film, leaving the plate partly bare, then etching or cleansing out the bare portions and depositing or imposing a metallic covering on the bare surfaces, then flowing the plate with or applying to said plate a resist or insulating film or covering insoluble in the solvent of the underlying film, then applying a solvent of said underlying film and removing the latter, together with its overlying film, then depositing or applying to the bare parts a metallic film or covering in suitable contrast to that underlying the said remainder of the resist, and then removing the said remainder of the resist, leaving the deposited or applied metals bare, substantially as set forth.

5. In the process of preparing plates or surfaces for purposes of utility or ornament, the process which consists in applying to or imposing on said plates a film of sensitive matter, then photographically impressing said film and inking the same and then developing a picture on the plate or surface by laying part of said plate bare, then flowing the plate with a resist or insulating-film insoluble in a solvent of the ink covering the underlying film of sensitive matter remaining on the plate after the development of the picture, then applying a solvent of said ink and removing the latter, with its overlying film, leaving the film of light hardened matter where first impressed, then flowing the plate with or applying thereto another resist or insulating film or covering insoluble in the solvent of the said underlying film of sensitive matter, then applying a solvent of said sensitive film and removing it with its overlying film, substantially as set forth.

6. In the process of preparing plates or surfaces for purposes of utility or ornament, the process which consists in applying to or imposing on said plates a film of sensitive matter, then photographically impressing said film and inking the same and then developing a picture on the plate or surface by laying bare parts of said plate, then cleansing or etching out the bare surface, then flowing the plate with a resist or insulating-film insoluble in the solvent of the ink covering the underlying film of sensitive matter remaining on the plate after the development of the picture, then applying matter where first impressed, then flowing the plate with or applying thereto another resist or insulating film or covering insoluble in the solvent of the said underlying film of sensitive matter, then applying a solvent of said sensitive film and removing it with its overlying film, then giving to this last-named double resist still greater insulating capacity, then cleansing or etching out the surfaces made bare by the removal of the film of light hardened sensitive matter, then imposing or depositing a metallic covering that is to form one of the colors of the finished picture or design, then flowing the plate with a resist or insulating-film insoluble in the solvent of the first-applied resist or resists, then applying the solvent or solvents of said underlying first resist or resists, and removing the latter with its overlying film, substantially as set forth.

7. In the process of preparing plates or surfaces for purposes of ornament or utility, the process which consists in applying to or imposing on said plate a film of sensitive albumen, then photographically impressing, inking, and developing a picture on said plate or surface, parts of said plate or surface being then bare and parts covered with a film, then re-enforcing said film by applying an insulating-dust, such as ebonite, then cleansing or etching out the bare surfaces, then flowing the plate with a resist or insulating-

film insoluble in the solvent of the ink, then applying a solvent of said ink and removing the latter with its overlying film, leaving the film of light hardened albumen where first impressed, then flowing the plate with or applying thereto another resist or insulating film or covering insoluble in the solvent of the said underlying albumen film and removing the latter with its overlying film, substantially as set forth.

8. In the process of preparing plates, the process which consists in applying to a plate a sensitive film and photographically impressing it, inking the impressed film, and then washing away the unimpressed portions, together with the overlying ink, leaving the plate with an inked and light hardened film and partly bare, depositing a metallic film upon the bare parts, then covering the whole surface with a resist which is insoluble in the solvent of ink, removing the ink and the underlying light hardened film, thus leaving the plate at this stage in a suitable condition to be etched down, substantially as set forth.

9. In the process of preparing plates herein described, the process which consists, essentially, in applying to the plate a picture in fatty ink, fatty varnish, or asphalt, depositing a film of metal upon the parts of said plate remaining bare, covering the whole surface with a resist which is insoluble in the solvent of the ink, varnish, or asphalt, removing by said solvent the said ink, varnish, or asphalt, and leaving the plate at this stage in a suitable condition to be etched down, all substantially as herein set forth.

10. The process herein described, which consists in imposing a photographically-sensitive film on a plate and developing a picture therein by removing portions of said film and thus laying parts of said plate bare, and then applying ebonite in the form of a dust or powder to said film to re-enforce the same, substantially as set forth.

11. In the process of preparing plates for purposes of utility or ornament, the process of protecting or re-enforcing a resisting film with ebonite in the form of powder or dust, substantially as set forth.

12. In the process of preparing plates for purposes of ornament or utility, the process of flowing the plate with a film sensitive to light, impressing said film and removing the unimpressed parts forming a picture or design, and substituting for said sensitive and developed film a film having greater capacity for resisting the action of a galvanic current, said film preserving the same developed design, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of December, 1885.

HANNIBAL GOODWIN.

Witnesses:

CHARLES H. PELL,

FREDK. F. CAMPBELL.