

May 10, 1932.

J. C. McFARLAND

1,857,929

DECORATING AND ETCHING METALS

Filed June 22, 1928

2 Sheets-Sheet 1

Fig. 1.

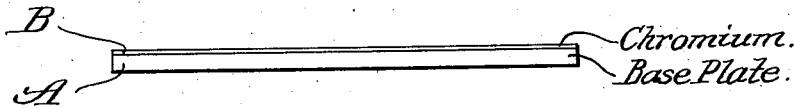


Fig. 2.

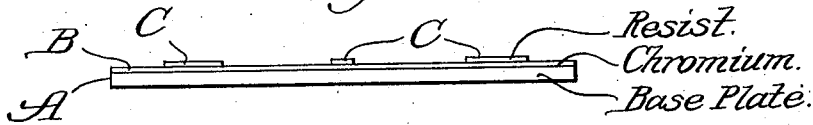


Fig. 3.

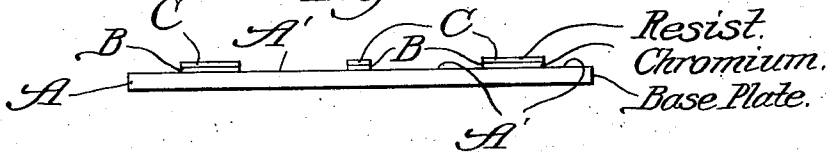
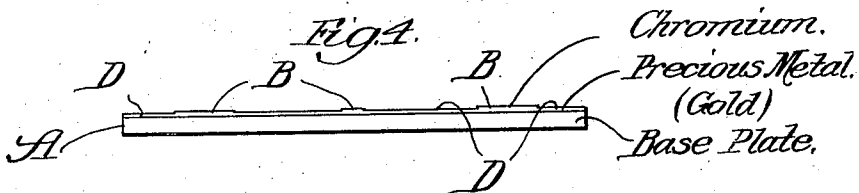


Fig. 4.



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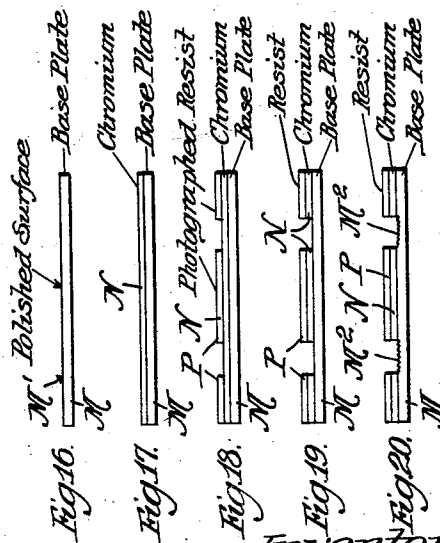
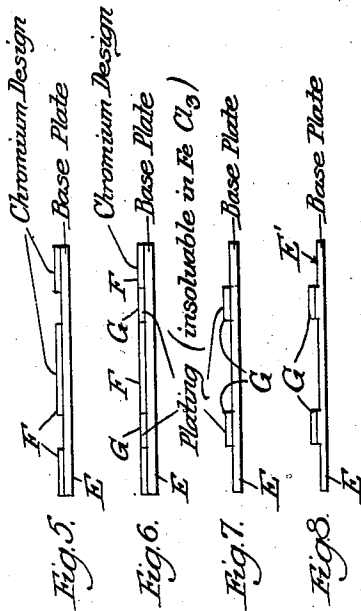
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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DECORATING AND ETCHING METALS

Application filed June 22, 1928. Serial No. 287,535.

The present invention pertains particularly to a process of decorating metals, and etching such metals, if desired.

The primary object is to provide a process well suited to the production of decorated base metal plates, or other base metal objects, followed by etching, if desired. The process is well adapted, for example, to the purpose of decorating the movement block of a watch.

In the process, use is made of the principle that chromium plating can be readily accomplished, whilst, on the other hand, a plating of chromium will not itself readily receive another plating, such as a precious metal plating.

Chromium is extremely hard, resistant, and will not tarnish. Accordingly, chromium plating may itself be employed advantageously in a decorative design, which may comprise a chromium plate design and a complementary metal plate design of contrasting color, such as gold, green gold, copper, or the like.

The process may be applied, for example, to the decoration of the movement block of a watch, the movement block being composed of any suitable base metal, or base metal alloy, such as a composition commonly known as 12% nickel. Such a composition may be composed of Ni, 12%; Cu, 70%; Zn, 18%.

The process is capable of variations. The accompanying drawings illustrate preferred methods. It is to be understood, however, that variations in the steps may be employed.

In the drawings—

Fig. 1 shows diagrammatically a base plate and a chromium plating applied thereto; Fig. 2 illustrates a further step in which a suitable resist is applied to the chromium plating; Fig. 3 illustrates a further step in which the exposed chromium has been removed, exposing the base metal at certain areas; and Fig. 4 illustrates a further step in which a plating of some other metal, such as gold or copper, has been applied to the exposed areas of the base plate. Figs. 5-8 illustrate the steps which may be employed when it is desirable to etch the base plate after the operation of plating with a metal insoluble in FeCl_3 . Figs. 9-15 show diagram-

matically the steps to produce a design by contrasting finishes. Figs. 16-20 illustrate steps using a photographic resist in applying a chromium design to a base plate and giving the latter a finish contrasting with that of the chromium.

For clearness, the various coatings are shown of exaggerated thickness, but it is to be understood that this is merely for purpose of illustration.

It is to be understood, also, that where the process is applied to the decoration of a watch movement block, the base plate is provided with suitable recesses, perforations, bearings, etc. to enable the various parts of the watch movement to be applied, housed, etc.

In the illustration given in Figs. 1-4, A designates a base plate; B, chromium plating; C, a resist design; A', the exposed surface of the base plate; and D, a metal plating applied to the exposed areas of the base plate, so that the chromium plating design and the other metal plating give the desired decorative design, as a whole.

In the practice of the process illustrated in Figs. 1-4, the face of the plate is first given the desired topographical contour and is polished, or pumiced, if desired; a plating of chromium is then applied to the entire surface; a suitable resist design is then applied to the chromium plating; the back of the plate, or object, is coated with a suitable resist, such as paint; the exposed chromium plating (areas between the areas of the resist design) is then removed, as by use of a suitable reagent, such as dilute hydrochloric acid, or dilute sulphuric acid; the resist preferably is removed at this stage; and the exposed areas of the base plate are then plated with another metal, such as gold, gold alloy, silver, platinum, or copper.

The other metal will not plate upon the chromium-covered areas, but will plate upon the exposed surfaces of the base plate. Thus, the chromium serves as a resist during the operation of plating with gold, for example. Usually, the other metal used for plating will have a color contrasting with the color of the chromium plating.

The method described results in a deco-

rated metal plate, or metal body, the decorative surfaces comprising areas of chromium plating and complementary areas of other metal plating.

Should it be desired to etch the base metal after the operation of plating with precious metal, the areas covered by the chromium plating may be bared by removing the chromium plating. This may be accomplished by means of dilute hydrochloric acid, or dilute sulphuric acid, for example. These acids will not attack the precious metal plating. The precious metal may now be used as a resist against an etching operation. For example, ferric chloride may be employed to etch the base metal. The etched surfaces may be decorated in any desired manner. Such a process is shown in Figs. 5-8, where E designates the base plate, F the chromium plating, G the plating insoluble in FeCl_3 , and E' the etched surface of the plate E.

Where etching is to be performed, the precious metal employed for plating may be silver. The chromium plating may be removed and the silver may be used as a resist while the base metal is being etched. Thus one may obtain an etched blank. The silver may be removed, if desired, and the surface of the etched blank may be decorated in any approved way.

A modification of the process of decorating by applying platings, as described above, may be stated, as follows:

Plate the surface with chromium; apply a suitable resist in the form of a suitable design; remove the exposed chromium with a suitable solvent, such as dilute hydrochloric acid; remove the resist, thus exposing the underlying chromium plating; etch, by means of a suitable solution, such as FeCl_3 , the exposed areas of the base plate, the chromium plating serving as a resist; and plate the etched area with a metal, such as gold, green gold, or copper, which forms a contrast in color with the chromium plating. The chromium plating will not receive the new plating, but the etched areas of the base plate will receive the new plating.

Gold, silver, platinum, and their alloys, may thus be plated upon the base plate, but will not be received upon the chromium. The precious metals mentioned may be termed platable metals which are insoluble in ferric chloride. The same is true of chromium.

The method last described may be used advantageously upon surfaces exposed to wear, for example, on the exterior of a watch case, vanity case, or the like. The plating upon the etched surfaces may thus be below the general surface, so that the gold plating, or the like, will not readily wear off. In the case of a movement block, the etching is not so necessary.

A further modification of the process of

decorating a metal surface by means of platings of contrasting colors may be stated as follows:

Apply a resist design to the base plate; plate the remainder of the base plate with chromium (the resist will not receive the chromium plating); remove the resist, leaving exposed areas of the base plate; plate the exposed areas of the base plate with another metal having a color contrasting with the color of the chromium plating.

The modification just stated is more fully described and is specifically claimed in my co-pending application Serial No. 287,536, filed of even date herewith.

The resist design may be applied in any suitable manner. As an illustration, after the base plate has been plated with chromium, the chromium plating may have applied thereto a sensitive coating; an image may be produced photographically in said coating, the portions of the coating most exposed to light being hardened to produce the image; and the unreacted portions of the coating may be removed by means of a suitable developing agent. Such a process is described, for example, in Beebe and Murray Patent 1,574,357, granted February 23, 1926. Figs. 16-20 illustrate such a process, M designating a base plate with a polished surface M', N the chromium plating, P a resist applied photographically, and M² a dull finish which may be applied to portions of the base plate if desired.

If desired, a suitable transfer method may be employed, in lieu of the method just described, to apply the resist.

In performing the plating operations, suitable current density per unit of area will be employed to obtain the desired results, as is understood in the art.

The improved method is applicable to producing decorative designs on various base metals and alloys, such as brasses, bronzes, German silvers, etc.

Also, the method is applicable, with suitable variations, to the production of a decorative design on precious metals.

A further variation of the first described process which is applicable, for example, to decorating a watch case, or watch case back, may be stated, as follows:

Produce a dull or polished finish on the surface of the back; apply a chromium plating to said surface; apply to the chromium plating a light-sensitive coating, expose and develop, thus leaving a resist pattern or design of the reacted coating on the back and exposing the chromium plating at other areas; remove the exposed chromium plating, as by means of dilute hydrochloric acid; remove the resist; polish or dull the surface of the back, in which operation the newly exposed chromium plating will not be affected; and, finally, remove the remaining chro-

mium plating. This results in a decorative design on the surface of the original material which comprises a design in one finish and a complemental design in another finish.

5 The contrast in color may be effected by treatment of a plating after it has been applied. This process is illustrated in Fig. 9-15, H designating the base plate having a desired finish H', K the chromium plating, L the resist, and H² the contrasting finish applied to portions of the base plate.

10 The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

15 What I regard as new, and desire to secure by Letters Patent, is:

20 1. A method of treating a metal surface having a dull finish, which comprises: producing a chromium plating design on a portion of said surface and exposing the remaining areas; polishing the exposed areas of the original surface; and removing the chromium plating design.

25 2. A method of treating a metal surface, which comprises: giving a desired finish to said surface; producing a chromium plating design on a portion of the surface thus finished; producing a contrasting finish on the exposed areas of the original surface; and removing the chromium plating design, whereby the original surface is left with a decorative design comprising designs having contrasting finishes.

30 3. A method of treating a metal surface which comprises: giving a desired finish to said surface; applying a chromium plating to the entire surface thus finished; applying to the chromium plating a resist design; removing the exposed chromium plating; removing the resist from the remaining chromium and producing a contrasting finish on the exposed areas of the original surface; and removing the chromium plating design, whereby the original surface is left with a decorative design comprising designs having contrasting finishes.

40 4. A method of treating metal surface, which comprises: giving a desired finish to said surface; producing a chromium plating design on a portion of the surface thus finished; and producing a contrasting finish on the exposed area of the original surface while the chromium serves as a resist.

50 5. A method of treating metal surface, which comprises: giving a desired finish to said surface; plating the surface with chromium, applying a light sensitive coating to the chromium surface, photographing a design therein, and developing the film; dissolving the chromium throughout the areas left unprotected by the image; and producing a contrasting finish throughout the ex-

posed area of the original surface while the chromium serves as a resist.

6. A method of treating a metal surface which comprises: polishing the surface; chromium plating the polished surface; applying a light sensitive coating to the chromium surface; photographing a design thereon and developing the film; dissolving the chromium throughout the areas left unprotected by the image; and producing a dull finish on the surface from which the chromium has been removed while the remaining chromium serves as a resist.

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