Patented May 11, 1948

2,441,300

# UNITED STATES PATENT OFFICE

2,441,300

## INK FOR ETCHING METAL

Donald L. Vande Bunte, Detroit, Mich., assignor to Packard Motor Car Company, Detroit, Mich., a corporation of Michigan

No Drawing. Application August 21, 1944, Serial No. 550,493

1 Claim. (Cl. 41—42)

1

This invention relates to improvements in etching fluid and more particularly to ink used for etching alloys and metals.

Metal and alloy pieces have been etched with ink solutions to denote various things, such as identity, inspection and quality. Ink is applied to metal or alloy pieces by a rubber stamp or a scriber and forms a reaction product that is bonded to the metal or alloy to provide a mark of contrasting color. Inks previously employed to etch metals or alloys have provided a reaction product that lacked permanency of bond to metal or alloy pieces and the desired color contrast.

An object of this invention is to provide an ink that will form a reaction product on metals or alloys having a readily discernible contrasting color and a permanent bonded connection.

Another object of this invention is to provide an ink that will react on ferrous metals and alloys to form a permanent marking of contrasting color.

Another object of the invention is to provide an ink that will react on non-ferrous alloys, such as bronze, brass, aluminum and tin to form a permanent marking of contrasting color.

Still another object of the invention is to provide an ink that will react on ferrous metals to form a permanent bonded marking of a contrasting color.

In carrying out the invention, an ink solution that will satisfactorily mark ferrous metals consists of molybdic acid, hydrochloride acid and nitric acid. The chemical reaction of this solution on ferrous metals will form a product that is much darker than such metals and permanently bonded thereto so that it can withstand handling and other treatments without deterioration. One formula for this solution may be:

| | | |
|---|---|---|
| Molybdic acid, powder | grams | 437 |
| Hydrochloric acid, concentrated | milliliters | 2,450 |
| Nitric acid, concentrated | do | 530 |

By adding copper sulphate to the solution of molybdic acid, hydrochloric acid and nitric acid, an ink suitable for eaching alloys is provided. As an example, 100 grams of copper sulphate may be added to provide a solution that will satisfactorily etch alloys. This solution will of course also etch ferrous metal.

In order to provide an ink that will etch non-ferrous alloys, such as copper, bronze, brass or tin, antimony trichloride is added to either one of the ink solutions previously mentioned. For this purpose, 585 grams of antimony trichloride

2

can be added to the selected solution. When antimony trichloride is added to molybdic acid, hydrochloric acid and nitric acid, the solution will satisfactorily etch ferrous metals and non-ferrous alloys such as copper, brass, bronze and tin, and when added to molybdic acid, hydrochloric acid, nitric acid and copper sulphate, the solution will satisfactorily etch both ferrous metals and non-ferrous alloys such as copper, brass, bronze and tin.

By adding mercuric chloride to the solution of molybdic acid, hydrochloric acid, nitric acid and antimony trichloride, a solution may be provided that will satisfactorily etch aluminum as well as the ferrous metals and non-ferrous alloys previously mentioned. Twenty-three grams of mercuric chloride may be added for this formula. The reaction product from the application of this solution on copper, bronze and brass will have a darker color than when mercuric chloride is eliminated from the solution.

Water may be added to the solutions heretofore described to reduce objectionable fumes, to add bulk and to eliminate any danger of burning persons handling or applying them. As an example, 360 milliliters of water may be added to the above mentioned formulas for the purposes specified. However, it will be understood that water is optional and does not influence the reaction of the solutions on the alloys or metals.

To the ink solutions previously specified, either with or without water, sulphuric acid may be added for the purpose of controlling the time the solutions will remain liquid after application to metal. The timing of the liquid state of the applied solutions regulates the depth to which the chemical reaction takes place below the alloy or metal surface to which the solution is applied, and this obviously may be varied for different uses. As an example, 80 milliliters of sulphuric acid may be added to the previously mentioned formulas to satisfactorily increase the duration of the liquid state of the solution after application to a piece of metal.

It will be understood that the formulas herein set forth are merely examples and that the quantity of the chemicals in the solutions may be varied to some extent.

Molybdic acid in the solutions has the effect of darkening the reaction product so that the color contrast with the alloy or metal to which it is bonded is pronounced. Also the use of molybdic acid in the solutions increases the permanency of the bond of the reaction product with ferrous metals.

It will be understood that various forms of the invention other than those described above may be used without departing from the spirit or scope of the invention.

This is a continuation in part of any copending application Serial Number 430,073, filed February 9, 1942, now Patent Number 2,377,593, issued June 5, 1945.

What is claimed is:

An ink for etching metal consisting of molybdic acid, hydrochloric acid, nitric acid and water.

DONALD L. VANDE BUNTE.




REFERENCES CITED

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

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 2,080,348 | Truitt | May 11, 1937 |
| 2,377,593 | Vande Bunte | June 5, 1945 |