UNITED STATES PATENT OFFICE.

LEGRAND B. SMITH, OF NEW YORK, N. Y.

IMPROVEMENT IN PROCESSES OF PRINTING ON AND DECORATING METAL SURFACES.

Specification forming part of Letters Patent No. **183,336**, dated October 17, 1876; application filed April 29, 1876.

To all whom it may concern:

Be it known that I, LEGRAND B. SMITH, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Printing and Decorating Metal; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to decorating and printing on tinned iron or similar combination metal, having as its object an indelible design and an imprint, which cannot be disturbed or defaced by a reagent, but, once set, will retain its color and conformation, though subjected to violent alterative action.

It is well known in the art that tin or other smooth, bright-surfaced metal will not hold an imprinted color when treated with alcohol or other test reagent, or long subjection to heat.

My invention consists, broadly, in heating a printed roughened metallic plate—more in detail appearing from the following description, in which, as auxiliary to my main idea, my invention further consists in a thin gummy coat applied to the print prior to the heat application, as a first subsidiary step, while as a second there may be used in place of the common printer's ink a compound liquid in which acid and some corresponding reacting metal enter as elements.

The plate is preferably tinned iron, of which different grades exist; for instance, pure tin is used to coat the iron forming vegetable-cans, while for some other purposes sheet-iron is coated with an admixture of lead and tin. To both of these my process equally applies, and I roughen the plate by any appropriate means, such as rollers, the well-known sand-blast, or otherwise. The plate is then passed through a printing or decorating process, consisting in stamping a type imprint directly upon the face of the roughened plate, the same in principle and effect as printing on paper, all of which foregoing is, however, fully and at large set forth in United States Letters Patent No. 172,894, granted me the 1st of February, A. D. 1876.

I have thus far described matter which is covered by said Letters Patent; but the subject-matter now in hand is to cause such a printed sheet to retain its received color or printed impress. To such an end my invention herein consists simply in the application of heat sufficient to effect a mechanical union or amalgamation of the print and the metal corrugations.

I do not restrict myself to a certain or specified degree of temperature, nor to the mode of application of same, since it is evident that the height of the temperature requisite to cause the angular particles of metal to unite with the inks and insure an effectual cohesion of the two must vary, as does the density and melting-point of the particular substance which constitutes the coating of the main or base plate, and on which coating substance the roughened corrugations are formed. Also, it is apparent that the means and methods of heating the plate may be of any agreeable nature, and the special or detailed description of same is unnecessary, any one skilled in the art being capable of readily applying the principle of my invention and employing appropriate apparatus.

In the working of this process, if a thin coating of gum, or some such substance as will cover all the metallic face surface, is put on before application of heat, it will prevent oxidation of the metal, and so produce a brighter and more finished surface. I have tried an ink in which acid (nitric) was a part element. This acid was also used in combination with copper. Its action on tin helped the effect. Other acids in combination with other metals can be used; but for practical uses the ordinary black printing-ink will stand the test.

The above processes applied to bright metal do not produce the same results, and the secret lies in the fact that the roughened surface so assists the amalgamation, by allowing the foreign substances used in producing the designs to sink, in part, below the plane of the surface of the metal, as to make it of practical value when finished, in that it can be used for various commercial purposes, among

others in the manufacture of cans in which beef and like substances are packed, which are subjected to a long boiling in water. However, I do not limit myself to the actual use of these last two mentioned measures—to wit, the gummed surface and peculiar liquid applied; but I may omit either one or both entire from my process of obtaining an indelible type imprint on metal; and I desire to be understood as unqualifiedly claiming the application of heat to a roughened metallic surface for the purpose of rendering indelible any or all prints, designs, or decorations thereon, printed or colored, or in any manner placed or transferred.

The minor features of the thin surface coat of gum and the quality of ink may be modified, omitted, or changed agreeably to any occasion or taste.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The process of indelibly printing a metallic sheet, consisting in printing directly upon a roughened metallic surface, and subjecting same to a heated temperature, substantially as and for the purpose described.

2. In the process of indelibly printing a metal surface, prepared as above described, coating same with a gummy substance, whereby its oxidation upon subjection to heat is prevented, substantially as and for the purpose described.

3. A process of indelibly printing on metal, the same consisting in printing a roughened surface with ink compounded of acid and metal, then coating with gum, and finally treating same to a moderate heat, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

LEGRAND B. SMITH.

Witnesses:

SAMUEL G. BARNARD,

HARRY SMITH.