

# UNITED STATES PATENT OFFICE.

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## MAKING ROLLED METALLIC FOIL.

SPECIFICATION forming part of Letters Patent No. 294,725, dated March 4, 1884.

Application filed October 29, 1883. (Specimens.)

*To all whom it may concern:*

Be it known that we, HENRY S. CROOKE and LEWIS CROOKE, citizens of the United States, residing in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in the Art of Making Rolled Metallic Foil, fully described and represented in the following specification.

This invention relates to the manufacture of the ordinary classes of metallic foil, and particularly to this manufacture when carried on by the process of rolling. This process or method of manufacturing metallic foil as ordinarily conducted is now so well known to those familiar with the art as to render a detailed description thereof unnecessary to a proper understanding of the present invention. It may not, however, be out of place to state that its principal feature consists in passing the plate or plates of metal or alloy of which the foil is to be composed one or more times between one or more pairs of smooth-surfaced rolls of steel or chilled iron, which are so adjusted as to unite the several plates of metal or alloy, (if more than one plate is used,) and at the same time reduce it or them to the required thickness for the foil. In producing very thin grades of foil by this process, it has been found impossible in practice to so adjust the reducing-rolls that the sheet or web of foil produced would not contain a large number of wrinkles, some of which extended longitudinally of the web, while others extended from its margins inward. In order to present the foil in the best merchantable condition, it is of course desirable that these wrinkles produced by the rolling process should be removed, so as to leave the sheet or web in a smooth and unwrinkled condition. If the web was passed between another pair of smooth rolls, the wrinkles, instead of being removed, were simply flattened down and left in the form of folds, or the web was cut through or broken in the wrinkled places.

Another serious objection to this foil for many uses arose from the fact that its surfaces were left in a bright or burnished condition. This not only gave it an undesirable appearance, but caused the sheets, after they had been piled one upon another and subjected to

the necessary pressure to hold them in position while being cut to the proper dimensions, to adhere to each other so firmly that great difficulty was experienced in separating them when required for use, and in some cases they were even found to adhere to each other so firmly that a large per cent. of the sheets were destroyed in attempting to effect their separation.

It is the object of the present invention to remove these objectionable features; and to that end the invention consists in a method of treating the foil by which the wrinkles left by the reducing-rolls are entirely removed, while at the same time a dead or dull appearance is given to the surfaces of the foil, and all tendency of the sheets to adhere to each other is destroyed, so that they can be as readily separated as sheets of ordinary paper, all of which will now be fully explained and particularly pointed out.

In operating according to the present invention, the plate or plates of metal or alloy is or are passed between smooth-surfaced rolls in the usual manner, so as to be reduced to the proper thickness for the foil. The long sheet or web of foil thus produced will, as before stated, contain many wrinkles, running in different directions, which must be removed before the foil will be in a fit condition for the market. We have discovered that these wrinkles can be entirely removed and the foil left in a perfectly smooth and flat condition by submitting the web to an embossing operation, such as or similar to that described in United States Letters Patent No. 229,677. In this operation the full or slack portions of the web which form the wrinkles are entirely taken up by the large number of small protuberances which constitute the embossing, so that the tension upon all parts is the same, and the web is left in a perfectly smooth and flat condition.

The embossing just referred to can be best accomplished by a mechanism such as or similar to that shown and described in the Letters Patent referred to; but any other mechanism which will accomplish the same result may be used, if preferred. If the embossing-rolls are made sufficiently unyielding, the foil need not be reduced to its ultimate thinness prior to the embossing operation, as the final reduc-



tion and the embossing may be accomplished together. After being embossed as just described, the surfaces of the foil will present a roughened or frosted appearance, which, although highly ornamental, is very undesirable when the foil is to be used for many purposes. The web, therefore, after being embossed to remove the wrinkles, is passed between a pair of smooth-surfaced rolls, which are so adjusted as to crush down the protuberances which constitute the embossing, and give to the surfaces of the foil the smooth and at the same time the dead or dull appearance which it is desired they shall have. It is found, also, in practice that after the foil has been thus treated the tendency of the sheets to adhere to each other will be nearly or quite destroyed, so that even after they have been piled one upon another and subjected to sufficient pressure to hold them in position while being cut to the proper dimensions, they can be separated from each other as readily as sheets of ordinary paper.

What we claim is—

1. The improvement in the art of making metallic foil, which consists in the following operations, performed in the order named, viz: first, rolling the metal or alloy to or nearly to the required thickness for the foil; second, embossing the foil; and, third, rerolling, substantially as described.

2. The improvement in the art of making metallic foil, which consists in the following operations, performed in the order named, viz: first, embossing the foil to remove the wrinkles and impart a roughened appearance to its surfaces, and, second, rerolling the same to crush down the protuberances constituting the embossing, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

HENRY S. CROOKE.  
LEWIS CROOKE.

Witnesses:

H. P. WEST,  
CHAS. C. EMOTT.