

# UNITED STATES PATENT OFFICE.

JOHN HOLLIDAY AND JOHN LAMBERT, OF BROOKLYN, ASSIGNORS TO  
WILLIAM SLACK, OF STAPLETON, NEW YORK.

## IMPROVEMENT IN UTILIZING TIN-SCRAP AND MANUFACTURE OF STANNATES.

Specification forming part of Letters Patent No. **208,735**, dated October 8, 1878; application filed  
December 24, 1877.

### *To all whom it may concern:*

Be it known that we, JOHN HOLLIDAY and JOHN LAMBERT, of the city of Brooklyn, in the State of New York, have invented an Improved Process for the Utilization of Waste Tin Scraps or Timmers' Clippings in the Manufacture of Stannate of Soda, Metallic Tin, and Metallic Iron, and Salts of Iron, of which the following is a specification:

The tin scraps or metallic tin are treated in a solution of caustic soda, nitrite of soda, arsenite of soda, and nitrate of soda.

The best proportions are as follows: two hundred parts commercial caustic soda, seventy parts nitrite of soda, one hundred and thirty parts arsenite of soda, and fifty parts nitrate of soda.

The above chemicals are dissolved in sufficient water to have when dissolved a solution gaging from 15° to 18° Baumé.

It is preferable to have over the tank used for this operation a cover connecting with a high chimney, to take away the gases evolved in the operation, such as arseniureted hydrogen and ammonia. This bath, which we will call a "reaction-bath," is kept at about 180° Fahrenheit, and tin scraps or metallic tin introduced into the same.

When the bath is new a charge of tin scraps or metallic tin requires about two hours to finish. Every fresh charge of tin scraps requires more time until the bath is worked out. When taken out of the reaction-bath the tin scraps are washed with water once or twice. The water from the first washing is used to replace the evaporation from the reaction-bath. When worked out the reaction-bath contains in solution stannate of soda and caustic soda, which can be saturated by adding some stannic acid obtained by precipitation of the washing-liquors with sulphuric acid, and thus the solution becomes stannate of soda. When the solution of stannate of soda has thus been saturated it is evaporated to dry the salt.

Instead of evaporating the stannate-of-soda liquors, the stannic acid can be precipitated directly from them by adding some sulphuric or muriatic acid. The stannic acid thus obtained can be transformed into block-tin by the ordinary processes.

Tin can also be removed from the tin scraps by using only a bath containing, with caustic soda, either arsenite of soda or nitrite of soda.

The proportions, with caustic soda and arsen-

ite of soda alone, having given the best results are: caustic soda, ninety parts; arsenite of soda, one hundred and thirty parts. With caustic soda and nitrite of soda alone: caustic soda, ninety parts; nitrite of soda, seventy parts.

In the above reactions with caustic soda and arsenite of soda, arseniureted hydrogen is evolved, and with caustic soda and nitrite of soda ammonia is evolved. This latter could be condensed in a proper apparatus for the production of ammonia or salts of ammonia.

When arsenic is present, and it is desired to remove the same entirely, the operation is continued until the same is driven off as arseniureted hydrogen.

The iron scraps freed from tin can be worked into iron.

We wish it to be understood that the proportions of materials may be slightly varied as long as the same result is attained.

Heretofore, when tin has been removed from scrap-iron by caustic soda and nitrate of soda, peroxide of manganese or similar material, such as litharge, has been present to furnish, by its decomposition, the oxygen required in oxidizing the tin.

By our process the manganese or similar material is dispensed with, and the stannates are pure and free from foreign matter, because the nitrite, nitrate, or arsenite oxidizes the tin directly, and the nitrogen or arsenic set free reacts on the water, decomposing the same by combining with the hydrogen. The oxygen liberated promotes the oxidation of the tin, and the stannate is produced free from foreign matter.

We claim as our invention—

The reaction-bath for the manufacture of stannic salts, composed of a solution of caustic soda or potash in connection, alone, with one or more of those agents which, acting with the tin and the oxygen of the water, produce stannic salts, such as alkaline arsenites, nitrates, or nitrites, substantially as set forth.

Signed by us this 18th day of December, A. D. 1877.

JOHN HOLLIDAY.  
J. LAMBERT.

Witnesses:

GEO. T. PINCKNEY,  
CHAS. H. SMITH.