

UNITED STATES PATENT OFFICE.

LEWIS CROOKE, OF NEW YORK, N. Y.

IMPROVEMENT IN TIN-PLATED SHOT.

Specification forming part of Letters Patent No. **204,298**, dated May 28, 1878; application filed March 9, 1878.

To all whom it may concern:

Be it known that I, LEWIS CROOKE, of the city, county, and State of New York, have made an invention of a new manufacture of burnished tin-plated projectiles, and an improvement in the art of manufacturing projectiles; and that the following is a full, clear, and exact description and specification of my said invention.

Shot and balls for fire-arms to be used by hand are made of lead or some of its alloys, and are generally blacked and polished by means of black-lead or graphite. Such shot are objectionable for several reasons. In the first place, the process of blacking and polishing the shot by means of graphite produces a dust which is highly injurious to the workmen employed to do the manual labor. The shot also are disagreeable to handle, and produce the rapid fouling of shot-guns. They are affected by contact with the flesh or juices of the game shot with them, so that salts of lead are speedily produced, which are injurious to those who eat the game.

The subject of the present patent is a new manufacture of shot and balls which is free from the above-stated objections, and also an improvement in the art of manufacturing shot and balls.

The new manufacture consists of burnished tin-plated shot and balls, or, in other words, of shot and balls which are both tin-plated and burnished, so as to present a bright metallic surface that does not soil the hands or the gun, and does not produce poisonous compounds.

The improvement in the art consists of the treatment of projectiles composed in part or wholly of lead with a solution of a salt of tin, and with agitation, either separately or conjointly, the effect of the first-named treatment being the plating of the shot with tin, and the effect of the second-named treatment being the burnishing of the plated shot.

In order that the invention may be fully understood, I will proceed to describe the best mode which I have thus far devised of producing the said new manufacture.

When tin-plated shot are to be made the lead shot are taken in the damp condition in which they exist when removed from the cis-

tern of the shot-tower, before they have had time to become oxidized, and are treated, either simultaneously or consecutively, with an acid solution of a salt of tin, and with agitation sufficient to burnish them. The said solution of tin, which I have used with the best success, is made of the following ingredients and in the following proportions, the quantity made at any one time being varied as found expedient: One pound of crystallized protochloride of tin is dissolved in eight gallons of water, and three-quarters of a pound of commercial nitric acid is added to the solution.

The shot to be treated are charged into a tumbling-barrel, or other mechanical agitator lined with glass or other material having a smooth vitrified surface, and a sufficient quantity of the compound acid solution is added to fill the interstices between the shot and just cover them. The tumbling-barrel is then closed, and is agitated briskly until metallic tin is deposited from the solution upon the shot in the form of a plating or thin coat thereof. The rapid agitation of the shot in the glass-surfaced barrel causes the consolidation of the deposited tin-plating, and also its burnishing, so that when the work is done the shot produced have bodies of lead, or an alloy thereof, coated with a highly-burnished plating of tin.

The kind of tumbling-barrel which I prefer to use is one having trunnions transverse of its length, whereby a brisk agitation can be readily effected. The time required for the agitation is generally about five minutes, but may be prolonged, if deemed expedient.

If deemed expedient, the process may be varied by first treating the shot or balls with the tin solution, hot or cold, in any ordinary wooden tumbling-barrel, or by first treating them with the tin solution by simply steeping them without agitation in a quantity of the tin solution sufficient to cover them, and, after the shot have been plated with tin, by charging them with water into a glass-lined tumbling-barrel, in which they are agitated until their surfaces become burnished.

Shot which have previously been polished by the use of graphite may be used for my new manufacture, provided they be first cleansed of the graphite and lead oxide and

of any grease which may adhere to them. Shot, also, which have laid in stock after being taken from the cistern of the shot-tower may be used; but in such case, as their surfaces are generally oxidized, it is expedient to cleanse them by agitation with a weak solution of nitric acid before subjecting them to the tin solution.

If burnished tin-plated lead balls are to be produced, they may be made by the use of the same solution and agitation as above described for shot.

In operating with the acid tin solution above described by me, care should be taken that the solution is not milky in appearance, nor does not become so when applied to the shot or balls. If the solution be milky when made, it is an evidence that more nitric acid should be added to it, and if it becomes milky when in contact with the shot it is an evidence that more of the solution should be used, as well as more nitric acid. The solution most expedient for any particular lot of shot may readily be found by commencing the treatment with the compound solution described, and then varying its composition as circumstances or the peculiar nature of the lead shot show to be expedient.

The invention of my new manufacture is not restricted to the means above described of producing the same, because the shot may be plated with tin otherwise, and may then have their tin-plated surfaces burnished by agitation in a glass tumbling-barrel, or one faced or lined with glass or its equivalent. On the other hand, the process or improvement in the art above described by me is not restricted to the peculiar acid solution of tin above described, as other solutions of tin may be used with success. Thus, for example, a solution of tin for plating may be prepared by dissolving one pound of protochloride of tin and two pounds of chloride of sodium in eight gallons of water, to which half a pound of hydrochloric acid (commercial) has been added; and, if deemed best, the action of the solution may be aided by heat, applied by introducing steam into the tumbling-barrel by means of a pipe inserted through one of the trunnions thereof.

Another solution which produces good results is obtained by dissolving one pound of crystallized protochloride of tin in one quart of water containing two ounces of hydrochloric acid, (commercial,) and by then adding to the solution so produced four gallons of a solution of bitartrate of potash acidulated with four and a half ounces of nitric acid, (commercial.) The solution of the bitartrate may contain about half a pound of the bitartrate for the four gallons of water.

Other tin-plating solutions may be used, either hot or cold, as found expedient.

Lead shot previously cleansed of lead oxide may be electroplated with tin by treating them simultaneously with a proper solution of tin and a current of electricity obtained from a galvanic battery, or by other means. A proper solution for this purpose may be made by dissolving in two gallons of water half a pound of pyrophosphate of soda, and by adding to the solution one pound of crystallized protochloride of tin. This solution may be weakened by the addition of water, if deemed expedient.

This same solution may be used in connection with metallic zinc, without a battery. In this case the shot to be treated are charged into an ordinary tumbling-barrel, with a sufficient quantity of solution to cover them, and with a quantity of granulated zinc, which need not exceed one-tenth of the weight of the shot. The shot are then agitated in the tumbling barrel until the plating is effected—say, for a period of ten minutes. Or, in place of charging zinc into the tumbling-barrel, the latter may be formed of zinc, or may be lined with that material.

After the shot have been tin-plated by the above treatment they may be burnished by agitating them in an ordinary tumbling-barrel with sawdust, or, better, by agitating them in a glass-lined tumbling-barrel with water.

My new manufacture is not restricted to projectiles having bodies of pure lead, as either lead or its alloys may be employed for such bodies. On the other hand, the invention set forth and claimed in this patent does not include the manufacture of projectiles of lead coated with tin which is not burnished or polished; nor does it include the process of plating lead articles with tin without agitating them.

I claim as my invention—

1. Burnished tin-plated projectiles having a body of lead coated with burnished metallic tin, substantially as before set forth, the same being a new article of manufacture.

2. The improvement in the art of manufacturing projectiles, consisting, substantially as before set forth, of the treatment of projectiles with a solution of tin, and with agitation—whereby said projectiles are not only tin-plated, but have bright metallic surfaces imparted to them.

Witness my hand this 7th day of March, A. D. 1878.

LEWIS CROOKE.

Witnesses:

C. T. BRUEN,
JOHN M. HARRINGTON.