UNITED STATES PATENT OFFICE.

JOHN DICKSON, OF NEW CASTLE, PENNSYLVANIA.

IMPROVEMENT IN MANUFACTURE OF SHEET-IRON.

Specification forming part of Letters Patent No. **34,294**, dated February 4, 1862.

To all whom it may concern:

Be it known that I, JOHN DICKSON, of New Castle, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Sheet-Iron, whereby I impart to it the beautiful enameled and non-corrosive surface peculiar to Russia sheet-iron; and I do hereby declare the following to be a full, clear, and exact description thereof.

The object of my invention is to produce an article of sheet-iron which shall possess the peculiar characteristics of Russia sheet-iron, the chief of which is a highly-polished enameled surface which will not scale off when the iron is bent and worked, and which will resist the oxidizing effect of the atmosphere and of water. Many attempts have been made, I am aware, to accomplish this purpose, but none, so far as I know, with the success which I have achieved.

To enable others skilled in the art to make use of my improved process, I will proceed to explain it in detail.

The sheets of iron are made and rolled out to the required tenuity and as smooth as possible between rollers in the usual manner. They are then prepared for the enameling process by carefully removing all oxide or scale from their surface by means of an acid bath composed of a weak dilution of sulphuric acid in water, after which the iron is washed with alkaline water or rye-water to remove all trace of acid. The sheets of iron are then covered on both sides with a thin coating of a peculiar preparation or enamel which I make for this purpose, the composition and ingredients of which are hereinafter fully described. This preparation is laid on with a soft swab as evenly as possible, and it is better, although not necessary, to apply it while the iron is warm, but not so hot as to show at all red in the dark.

If it is desired to enamel only one side of the iron sheets, the preparation is confined to that side. After the application of the enamel the sheets thus prepared are placed in an oven, where they are exposed to a gentle heat (but not to the direct action of the fire) for about six hours. The heat must not be so high as to cause the iron to show red in the dark. This process is repeated two or three times, as may be found necessary, by applying a fresh coating of enamel and drying it in the oven. After a sufficient coating of enamel has been given to the iron the next step in the process is to revive partially the lead contained in the enameling preparation to a metallic state. This I accomplish by placing the enameled sheets of iron in a suitable iron box in layers, with finely-powdered charcoal dusted over the surface of each sheet. The box is then closed, the lid being luted down, so as to make it as nearly air-tight as possible, and it is placed in an annealing-oven, where the sheets of iron are gradually raised to a dark-red heat and then as gradually cooled. The operation is then completed, the sheets of iron being covered with a beautiful coating of enamel, which is so incorporated with the texture of the iron on the surface of the sheets that they will bear to be worked and bent into any shape without producing any scaling off of the enameled surface. Sheet-iron thus prepared will resist oxidation in the same manner as the celebrated Russia iron, which it closely resembles in appearance and qualities.

Another, and perhaps a better, method of applying my enameling preparation is as follows: The sheet-iron having been rolled until it is ready for the final rolling, and before it has been heated for that operation, is cleansed of all scale in the said bath, as before described, and then washed free from acid in the usual manner. A heavy coating of my enameling preparation is then given to the sheets, which is dried upon them by a gentle heat, care being taken not to raise the sheets to a red heat before the enamel is perfectly dry. The sheets are then heated up sufficiently for rolling in the usual manner, and two or three sheets, placed in layers, are together passed through the finishing-rolls. The sheets are then placed in the iron box, as before described, in layers, with powdered charcoal between them, and annealed in the oven, as before described. The advantage of this process of applying the enamel in a thick coat over the surface of the sheet before it receives its final passage through the rolls is that the enamel is thus more thoroughly incorporated with the body of the iron.

When the iron has been annealed, after either of the above-described modes of applying my enameling preparation, a still further luster may be given to the sheets by applying a fin-

ishing-coating of enamel, which is dried on with a very gentle heat, so as not to unanneal the metal.

My enameling preparation is composed of the following ingredients in the proportions indicated. A slight variation of the proportions of the several articles entering into its composition may be made without materially affecting its operation, so that while I state the relative proportion of parts which I find most desirable in practice, I do not desire to confine my claim to the exact proportion stated.

The ingredients are plumbago in the proportion of one and a half ($1\frac{1}{2}$) pound; protoxide of lead or litharge, one (1) pound; acetate or sugar of lead, one-fourth ($\frac{1}{4}$) pound; Prussian blue, one-fourth ($\frac{1}{4}$) pound; flaxseed-oil, one gallon; muriatic acid, one-half of a fluid ounce; nitric acid, one-fourth of a fluid ounce; beeswax, one-half of a pound, dissolved in about one-half of a gallon of oil of turpentine. These ingredients are mixed as follows: The plumbago, litharge, sugar of lead, and Prussian blue are ground together very fine and then mixed with the flaxseed-oil, and this mixture is boiled over a slow fire for two or three hours. The mixture is then removed from the fire, and when partially cooled the nitric and muriatic acids are added and stirred in, and afterward the solution of beeswax in oil of turpentine is added.

It is not absolutely necessary to use both litharge and sugar of lead in this preparation. The place of the latter article may be supplied by an equal quantity of the former.

The ingredients may be mixed cold without being boiled together, as before stated; but in this case the flaxseed-oil and litharge must be boiled together before being mixed with the other articles. It is better, therefore, and but little more trouble, to prepare the enamel as at first stated.

Having thus described my improved process for giving to sheet-iron the appearance and qualities of Russia sheet-iron, what I claim as my invention, and desire to secure by Letters Patent, is—

The use of an enamel or preparation for giving a highly-glazed and durable surface to sheet-iron composed of an oxide or oxides of lead and carbon and Prussian blue pulverized and mixed with drying-oil, and a solution of beeswax in oil of turpentine, or its equivalent, with or without the addition of a small proportion of acid, and in connection therewith the reviving of the metallic lead in the enamel on the surface of the iron during the annealing process in the manner and for the purpose hereinbefore described.

In testimony whereof I, the said JOHN DICKSON, have hereunto set my hand.

JOHN DICKSON.

Witnesses:

JAMES K. FREW,

ROBT. GAILY.