# UNITED STATES PATENT OFFICE.

W. DEWEES WOOD, OF PITTSBURG, PENNSYLVANIA.

## MANUFACTURE OF SHEET-IRON.

SPECIFICATION forming part of Letters Patent No. 300,184, dated June 10, 1884.

Application filed January 18, 1884. (No specimens.)

*To all whom it may concern:*

Be it known that I, W. DEWEES WOOD, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Manufacture of Sheet-Iron; and I do hereby declare the following to be a full, clear, concise, and exact description thereof.

My present invention relates to the manufacture of a kind of sheet-iron having a surface dark in color, but bright and glossy, and not liable to oxidation under the influence of the atmosphere or other usual surroundings or conditions of use. Sheet-iron possessing these characteristics to a greater or less degree is already known in the art under the name of "Russia," "imitation Russia," "planished," &c., and processes for the manufacture of the same are described in sundry patents already granted to me, and the process to which the present invention is most nearly allied is that described in Letters Patent No. 291,260, granted to me January 1, 1884. In this patent I provided, among other things, for preparing the broken-down sheets for subsequent working by coating the same with a wash of red oxide of iron, carbon, and water, or other suitable liquid, whereby to promote through such artificial means the formation or building up or accumulation of an oxide surface on the sheet.

My present invention relates more particularly to this step or part of the process described in said patent, and consists, in general terms, in adding to the mixture above spoken of, as a wash, from twenty-five to fifty per cent. (more or less) of vinegar or other like material. The object of adding the vinegar is to aid still further in or facilitate or hasten the artificial formation of an oxide surface on the sheet, and this action is believed to be chiefly due to the acetic acid, which is one of the constituent elements of good vinegar; hence I do not limit myself to the use of vinegar, as such, but I specify it because I have found it suitable for the purpose, as well as cheap and easy to use; but instead of vinegar any suitable acidulous or acidulating material may be employed, such as is adapted to operate under the conditions named with substantially a like effect.

In working my present invention I preferably use refined cast-iron, and by known methods get a bloom of a comparatively high degree of purity. This I work down by ordinary forging or rolling operations to sheet form of about No. 20 wire-gage, more or less, taking care throughout the operation to keep the material clear of free scale; but at the same time I secure the formation on each face of each sheet of a fixed, as distinguished from a free or raised, black-oxide coating, and on such coating I promote, so far as may be, the formation of a red-oxide surface; and to this end I give to each sheet while undergoing the rolling operation a free exposure on both sides to the atmosphere, changing or opening up the sheets frequently, if rolled in doubles or packs, and also use water on the rolls with considerable freedom, so that it shall run down on the sheets while passing through; or I apply the water directly to the hot sheets by a brush or otherwise, but not in such amount as to cool them through or to interfere seriously with their regular and uniform reduction by rolling. If any free scale is raised, it is to be carefully brushed off or otherwise removed. This method of treatment will give a fixed black-oxide coating on each surface of each sheet, and will form more or less red oxide on the top or surface of the black oxide. The sheets thus broken down, and with the black and red oxide coatings thereon, as thus described, are allowed to cool, and I then apply to each surface of each sheet a coat or wash consisting of charcoal-dust and red oxide of iron mixed up in a comparatively thin solution with water and vinegar, the proportion of the latter to the former being about as already stated. The water need not necessarily be pure, and, in fact, other ingredients may be added when desirable; also, other solutions composed of or containing acetic acid or chemically equivalent acidulous or acidulating material, and not deleterious to the metal or process, may be substituted for the vinegar—as, for example, a weak solution of muriatic acid or sulphuric acid or salt and water—and such ingredients I include under the term "chemical equivalents." The mixture

is to be prepared or mixed up comparatively thin, so as to readily be applied with a broom or other suitable implement, and by the use of which the wash is to be thoroughly rubbed in or the rubbing action is to be kept up until the red oxide formed on the sheet and the ingredients of the wash are well commingled, and are also distributed with a good degree of uniformity over the surface of the sheet, on which they remain as a thin film or coating; and this addition of the vinegar or its chemical equivalent, as described, is directed especially to the building up or accumulation by chemical action of coating of oxide on each face of each sheet in excess of that which would ordinarily be secured by the use of such wash if the vinegar were omitted. The carbon, preferably in the form of pulverized charcoal or graphite, is used chiefly to and in the chemical operations subsequently taking place. In the preparation of this wash a finely pulverized or ground red oxide may be used; or, if not put in at first, the washings and rubbing of successive sheets and the repeated dipping of the brush or broom or other implement into the liquid will soon so impregnate or charge the wash with the red oxide taken from the sheets that it will answer the purpose in view. The sheets thus treated are then allowed to lie a short time in order that the acidulous element so introduced may do its work, and the longer they lie the greater will be the oxidizing effect; but ordinarily the desired effect will be produced inside of twenty-four hours, and as a general rule ten or twelve hours will be sufficient; but the time should not be so great as to permit the oxidizing action to be other than a surface action. In this way enough red oxide may be formed on the sheets for the purposes in view.

The present invention, in so far as relates to its destructive elements of novelty, ends at this point, and without repeating at length reference may be made to the Patent No. 291,260 for a description in detail and at length of the further processes or steps by means of which the sheets thus prepared are worked into the desired product, such steps being, in general terms, matching the sheets up in packs, heating and rolling, (keeping them free of free scale,) packing in carbon, treatment in a retort under high temperature till the fixed oxide previously made or accumulated on the surfaces of the sheets has by the action of the carbon become revived or converted into metallic iron, or brought so near to the condition of metallic iron that it is just ready to come or on the point of coming to that condition at which it may be termed "nascent" iron. Then the sheets are separately cleared of refuse material, reoxidized and chilled, followed by further working, all as described in said Patent No. 291,260; but, in so far as relates to steps or parts of the process other than "reviving," I do not limit myself to the operations referred to, since the carbonization of the revived surfaces may be effected simultaneously with the work of reviving by the use of suitable oleaginous or resinous matter along with the charcoal, substantially as set forth in the specification of an application, Serial No. 113,641, filed December 5, 1883, or such other steps or parts of the entire process may otherwise be varied at pleasure.

I claim herein as my invention—

As a mixture or wash for use in the manufacture of planished sheet-iron, the mixture of red oxide, carbon, water, and acidulating material, substantially as set forth.

In testimony whereof I have hereunto set my hand.

W. DEWEES WOOD.

Witnesses:
R. H. WHITTLESEY,
C. M. CLARKE.