(No Model.)

I. E. CRAIG.

MANUFACTURE OF SHEET IRON.

No. 321,693. Patented July 7, 1885.

Fig. 1.

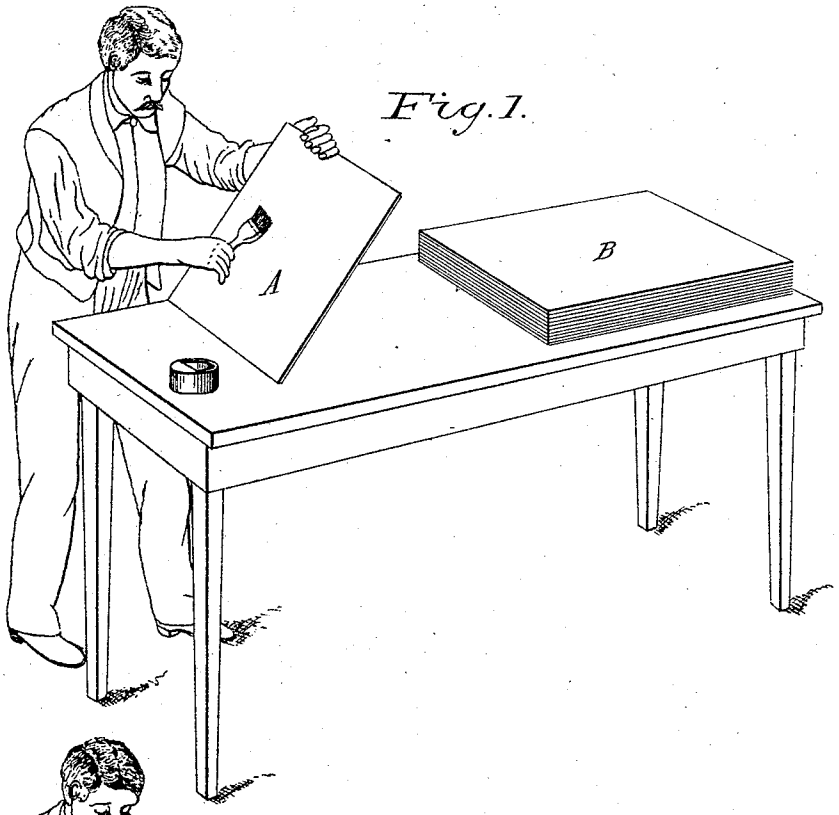
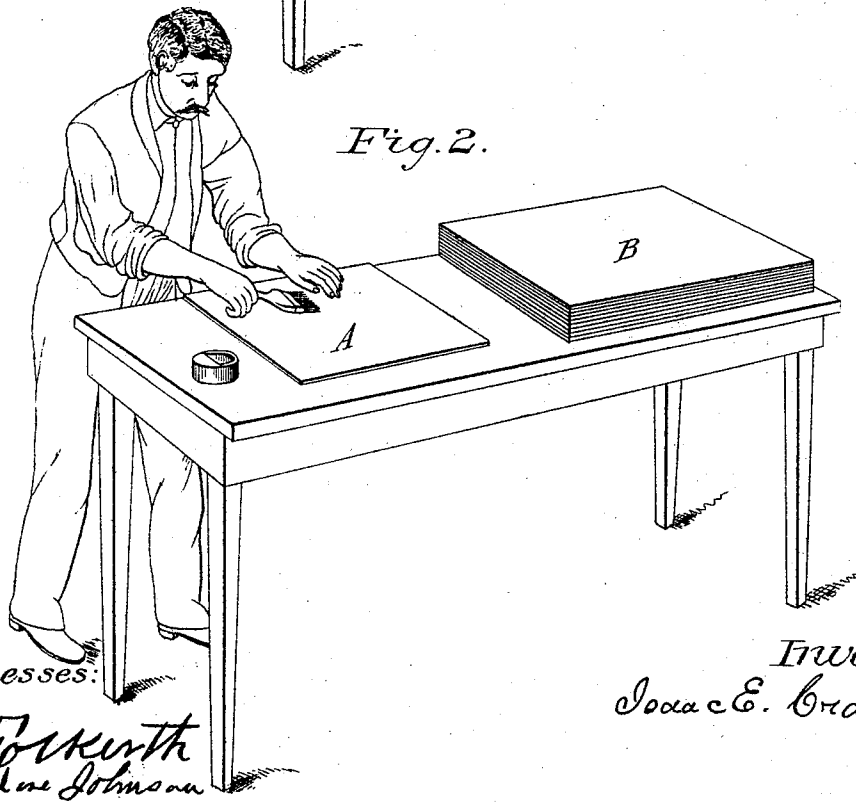


Fig. 2.



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MANUFACTURE OF SHEET-IRON.

SPECIFICATION forming part of Letters Patent No. 321,693, dated July 7, 1885.

Application filed July 10, 1884. (No model.)

To all whom it may concern:

Be it known that I, ISAAC E. CRAIG, a citizen of the United States, residing at Camden, in the county of Preble and State of Ohio, have invented a certain new and useful Improvement in the Manufacture of Sheet-Iron, whereby I am enabled to manufacture a superior quality of polished sheet-iron to that heretofore made.

I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

As uniformly practiced polished sheet-iron is manufactured from sheets or slabs having at some stage near which the process or operation of polishing is begun little or no oxide on their surfaces, and when oxide of any considerable thickness has formed, as is usually the case in the earlier steps of heating and rolling, they are cleansed of their oxide either by dissolving away the oxide in baths of suitable acids or by restoring the oxide to metallic condition by heating for a considerable time in packs with layers of charcoal between them.

This invention is useful where either method of cleaning is resorted to, or where the sheets without being cleaned have but a thin coating of oxide.

I have discovered that when oxide of lead or a salt of lead or oxide of tin or a salt of tin is applied in small quantities to the surface of sheet or slab iron and exposed to a red heat, if graphite be also present in contact with the oxide or salt or in contact with the metallic lead or tin resulting from the decomposition of the oxide or salt, that the lead or tin in the state of metal unites by chemical action or mechanical mixture with the graphite, and forms on the surface of the sheets or slabs a coating which possesses some of the properties of both the metals and the graphite, but, unlike graphite, is fusible, and will not rub off, and, unlike the metal, has some capacity for a durable luster, and that in the subsequent working of the sheets at a heat while being polished the metals and graphite become mingled and incorporated with the new oxide on the surface of the sheets in such a way as to give to the surface a close texture, ability to resist corrosion, and a handsome appearance. The presence of this mixture on the surface of the sheets prevents the development in finishing of red or brown spots or patches, which are a source of much loss in the manufacture of polished sheets.

It is already known that an improvement is made in the quality of the surface of polished sheet-iron by applying, during its manufacture, to the sheets or slabs a small quantity of oxide of lead or oxide of tin, so that on being reduced their metals may unite with the surface and produce, as they are found to do, a desirable tenacity and flexibility of oxide on the finished sheets. It is also known that an improvement results from the presence on the sheets during the latter steps of their manufacture of a small quantity of graphite, and that graphite so used gives adaptability to polish, uniformity of color, and chemical inertness to the surfaces so produced. But the qualities resulting from these two methods of treatment have not heretofore been obtained on the same sheets; and I find in practice that where lead or lead and tin are revived on the sheets from the oxide or salts, in the after working of the sheets without the presence of graphite a part of the lead on a majority of the sheets reoxidizes and fuses into the well-known red, glassy, and brittle form of fused litharge, and of the remainder of the soft metals not so reoxidized a part is gathered into grains or specks on the surfaces in finishing. I also find that where graphite is used, although favoring in the highest degree the acquisition of luster, without the presence of lead or tin, the surface produced lacks flexibility and attachment to the body of the iron on being bent. And I further find that graphite, unlike other forms of carbon, does not act as a reagent to reduce the metallic oxides, as its lowest temperature of combustion is much above the highest heat used in making sheet-iron, but that it remains, forming chemical union or mechanical mixture with the revived metals and the surface of the iron, and that the oxides are reduced by the hydrogen occluded within the iron, or by the hydrocarbons in the heated atmosphere of the furnace; and that this reduction is accomplished

as well when the coating of oxides and graphite is a mixture of these solids with water as when oil or other carbonaceous matter is used. I also find that the several defects as above described attending the separate use of the materials named disappear when the materials named are jointly used.

The object of this invention is to produce all these beneficial effects on the same sheets by the application of the materials above named; and to this end my invention consists in the following treatment of the sheets or sheet-slabs which have but a thin coating of oxide or have been cleansed of their coating by any of the means known to the art.

In the annexed sheet of drawings, Figures 1 and 2 show the method of applying the mixture.

I prepare a mixture of oxide of lead or salts of lead and graphite or the oxide or salt of tin and graphite, or of all three, using by preference, and as I think best for use on slabs, four pounds of oxide of lead, litharge rather than red lead, one-quarter pound of oxide of tin, known as "putty powder" or "polishing-powder," and one pound of graphite, ground together in one gallon of any suitable fluid, by preference linseed-oil, and apply this by a wide brush or other convenient means to the surfaces of each sheet or slab to be operated on. In those cases where in the process of manufacture the iron is cleaned in sheet-slabs and the oxide is removed by acids they should have this paint applied to them in the manner shown at A in Fig. 1 of accompanying drawings before being again heated; so, also, where the oxide is thin and not removed the paint should be applied to the iron when in the slab, and if deoxidized by heating the slabs with interlayers of charcoal or other deoxidizing agent the paint should be applied when they are being piled up in the form shown at B for this operation, and before the application of the charcoal powder, and is not in danger of being removed when the charcoal is afterward swept away, as it is then firmly attached to the surface. These slabs should not be more than about three times as thick as the sheets are intended to be when finished. The slabs may then be worked down to sheets in the ordinary manner of rolling at moderate red heat, will roll without sticking one to another, and will acquire some luster in being so reduced. They should then be heated and polished in packs in the usual manner under steam-hammers. When the sheets are cleaned at about the gage at which they are to be finished, the mixture of graphite, oxide, and oil should be made with but one-third so much oxides and graphite to a given quantity of oil as that stated as the correct proportions for use on slabs and applied in the manner shown at A in Fig. 2 before being piled up as shown at B. They should, if cleansed with acids, or if desired to treat at this stage without cleansing from a thin oxide, be heated to high redness with the paint on in the annealing or other convenient furnace in packages, and when withdrawn opened so as to expose each sheet to the air while red hot to color and reoxidize the iron; and if at this thickness they are deoxidized with charcoal and heat the paint should be first applied, and, when deoxidized, should be swept of their charcoal while still red hot, so as to give access of air on their surfaces while at a high temperature. In either case, after having been painted, heated, and reoxidized as described, they are ready to be reheated and polished in packs under the hammer in the usual manner. In each of these operations I find it most economical and desirable to apply the oxides and the graphite at one and the same time and already mixed together; but I do not confine myself to that method alone, as I find that they may be applied separately, and even with one or more heats of the iron intervening, if there is a heat and application of mechanical force in rolling or hammering after the last is applied, and their intermixture and union with the surface in a great degree still take place. Iron so made combines the excellent qualities already described.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

An improvement in the manufacture of sheet-iron, consisting in coating the surface during the process of manufacture with a composition of matter before the final heat and working, consisting of graphite and the oxide or a salt of either or both tin and lead.

ISAAC E. CRAIG.

Witnesses:
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