UNITED STATES PATENT OFFICE.

FRANZ ANTON LOHAGE, OF UNNA, PRUSSIA, ASSIGNOR TO EDMUND LEOPOLD BENZON, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN THE MANUFACTURE OF STEEL.

Specification forming part of Letters Patent No. **22,687**, dated January 18, 1859.

To all whom it may concern:

Be it known that I, FRANZ ANTON LOHAGE, of Unna, in the Kingdom of Prussia, a subject of the King of Prussia, have invented Improvements in the Manufacture of Steel; and I do hereby declare that the following is a full and exact description of my said invention.

These improvements consist in a peculiar manner of working in the puddling-furnace.

I employ the puddling-furnace in the same way as for making wrought-iron. I introduce a charge of about two hundred and eighty pounds of pig-iron and raise the temperature to redness. As soon as the metal begins to fuse and trickle down in a fluid state the damper is to be partially closed in order to temper the heat. From twelve to sixteen shovelfuls of iron-cinder discharged from the rolls or squeezing-machine are added, and the whole is to be uniformly melted down. The mass is then puddled with the addition of a little black oxide of manganese, common salt, and dry clay, previously ground together; or any other material adapted to bring the metal into a perfect state of boiling and rising may be used. After this mixture has acted for some minutes the damper is to be fully opened. The mass soon swells up and small grains begin to form in it and break through the melted cinder on the surface. As soon as these grains appear the damper is to be three-quarters or wholly shut, according to the quality of the fuel employed, and the process closely inspected while the mass is being puddled to and fro beneath the covering layer of cinders. During the whole of this process the heat should not be raised above the welding-heat of shear-steel. The blue jets of flame gradually disappear while the formation of grains continues, which grains very soon begin to fuse together, so that the mass becomes waxy. If these precautions are not observed, the decarbonization of the metal would be carried too far, and the mass would pass more or less into iron, and no uniform steel product could be obtained. As a precautionary measure against such an event, I find it convenient to place in the furnace, near the fire-bridge, and upon an elevated bed prepared for the purpose, about forty pounds of pig-iron. This iron will soon begin to fuse and trickle down, and if the decarbonization has been carried too far it may be raked into the mass to bring it back to the proper state. As soon as the mass is finished so far the fire is stirred to keep the necessary heat for the succeeding operation, the damper is to be entirely shut, and part of the mass is collected into a ball, the remainder always being kept covered with cinder-slacks. This ball is brought under the hammer, and then worked into bars. The same process is continued until the whole is worked into bars.

When I employ refined Welsh or pig iron of that description I throw in on the bottom of the furnace ten pounds of best plastic clay in a dry granulated state before the beginning of the process.

I would observe that the commencement of the above process—that is, the fusing and boiling the pig-iron—is similar to the operations usually carried on in the puddling-furnace in the manufacture of wrought-iron. I do not therefore intend to claim such part of the process; but

What I desire to claim as new and of my invention in the above-described process is—

Regulating the heat and stopping the decarbonization of the fused mass of metal in the finishing process in the puddling or reverberatory furnace, as set forth, before it becomes converted into malleable or wrought iron, and whereby I obtain steel, in the manner herein specified.

In witness whereof I, the said FRANZ ANTON LOHAGE, have hereunto set my hand and seal the 2d day of October, in the year of our Lord one thousand eight hundred and fifty-eight.

FRANZ ANTON LOHAGE. [L. S.]

Witnesses:

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