# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN PROCESSES FOR TREATING AND RESTORING THE METAL OF OLD CAR-WHEELS.

Specification forming part of Letters Patent No. **194,113**, dated August 14, 1877; application filrd May 23, 1877.

*To all whom it may concern:*

Be it known that I, GEORGE W. SWETT, of the city of Troy, county of Rensselaer and State of New York, have invented a new and Improved Process for Melting, Treating, and Refining the Metal of which old Car-Wheels that have been used is composed, of which the following is a specification:

The nature of my invention consists of a process for treating and melting the metal of which old car-wheels that have been used is composed, and its improvement, so that it may be again employed for the same purpose, with the bad conditions and peculiar deterioration which use has imposed upon it removed.

It is a well-known fact that the metal employed to form car-wheels is necessarily required to be of the best quality of chilled iron. It is also well understood that this metal, under the peculiar conditions of use to which it is subjected from continued concussion and strain, loses its molecular tenacity and becomes weak. When this metal, so conditioned from use, is remelted in a cupola-furnace in the ordinary way, it carries the effect of this deterioration with it to such an extent that it must be mixed with a large proportion of new iron, and even then there are contingent difficulties surrounding its use for new wheels.

On examination of the iron composing a wheel that has been used until this deteriorated condition has been produced, it will be found, under the microscope, to show in all its chilled lines of crystallization, and between its radial arrangement of molecules, fissures containing oxide of iron. When the iron thus conditioned is melted in a cupola-furnace in the ordinary way, and run into pigs or recast into wheels, it will be found to contain carburet of iron, appearing in patches through its structure—which is produced from the oxide before named—and the presence of this material renders the iron weak and unreliable to use where great strength is required.

My means of remedying this difficulty, so that the metal composing old wheels may be restored to a good condition of chilled iron, consists of a process of remelting it in a reverberatory furnace, and treating the same by a series of connected operations, and is as follows:

The old wheels are charged in the reverberatory furnace, placed upon the bed with their treads toward the bridge-wall, with sufficient space left between them for the passage of the gases and heat.

The metal thus placed upon the bed of the furnace is melted with a carbonizing flame, and the action of this flame is continued until the iron has reached a highly-carbonized condition, and the liquidity which the metal under such surroundings will assume. The carbonizing or smoky flame is produced in the reverberatory furnace in the usual manner. After the iron has reached this condition of carbonization, and the liquidity due to it, the action of the flame is changed to a decarbonizing one by increasing the blast. While decarbonization is taking place deoxidation is being produced of the intercellular oxide of iron before named, by the well-known affinity which carbon has for oxygen under these conditions. This latter application of a decarbonizing flame is continued until the molten iron has reached a highly-decarbonized point. During this latter operation not only the oxides disappear, as before stated, but silicon, if present in the metal, will pass into the slag. To this decarbonized iron I now add "spiegel" or "franklinite" to the extent of from five to six per cent. in weight of the mass under treatment, and so soon as this has impregnated the metal upon the bed the influence of the decarbonizing flame is stopped and the metal is ready to run into pigs or be recast into new wheels.

Instead of franklinite or spiegel a soft grade of pig-iron containing a large percentage of carbon and such as would be known in the trade as No. 1 or No. 2 iron may be added in the proportion of from ten to fifteen per cent. in weight to the weight of the mass under treatment. When this latter has been melted and diffused through the metal on the bed the same may be run off into pigs or cast into new wheels.

During the process of decarbonization sprue tests should be made to determine its condition, and in no case should the subsequent addition of spiegel or franklinite be made until the iron has reached a high point of decarbonization, for this condition is required to

remove the oxides and silicon. When decarbonization is nearly completed it will be indicated by the disappearance of the carbonic-oxide flame from the surface of the molten iron, but sprue tests should be made to determine the matter with positiveness.

I am well aware that iron has been decarbonized by passing a current of air through it when melted, and in a converting-vessel, and spiegel subsequently added.

I am also aware of the fact that none of the several operations I employ are new, considered by themselves, and that my invention only exists in the manner that I employ them in connected sequence to remove a deterioration from metal which peculiar conditions of use have imposed upon it.

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

The process herein described of rendering the metal of which old car-wheels are composed capable of use again for the same purpose, and which consists in subjecting the metal in a reverberatory furnace to the action of a carbonizing flame until a highly-heated state of fluidity is obtained, and then to the action of a decarbonizing flame to the extent described, and subsequently carbonizing the metal by adding spiegel or franklinite or No. 1 or No. 2 iron, as described.

GEO. W. SWETT.

Witnesses:
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