

UNITED STATES PATENT OFFICE.

ELIAS M. JOHNSON, OF NEW YORK, N. Y.

PROCESS OF MANUFACTURING STEEL.

SPECIFICATION forming part of Letters Patent No. 569,461, dated October 13, 1896.

Application filed May 21, 1896. Serial No. 592,496. (No specimens.)

To all whom it may concern:

Be it known that I, ELIAS M. JOHNSON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in the Manufacture of Steel; and I do hereby declare that the following is 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, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in the manufacture of chrome-steel or steel having incorporated therewith a certain percentage of chromium.

In the manufacture of chrome-steel as heretofore generally practiced the chromium is introduced into the furnace at the time or just before tapping the metal. It is found that when so introduced the metal oxidizes, so that it is impossible to get uniform results, so that in one bath of steel there may be incorporated therewith one-half the chromium put in, while in the next bath there may be but one-third, the result being that at one time there is an excellent product and at other times a very inferior one, owing to the want of uniformity. All of these processes which incorporate the chromium and steel in the furnace are impractical, due to certain reactions which take place in the furnace, rendering it impossible to produce uniform results.

I have found by experiment that if the steel to be treated and the chromium to be added thereto or incorporated therewith be melted in separate furnaces and the chromium in a molten state be introduced into the molten steel as the latter is flowing to the receiver a uniform quality of steel is produced, which it is impossible to obtain by introducing the chromium into the converter or furnace.

My invention therefore consists in the process of introducing the chromium in a molten

state into the molten steel as it comes from the furnace and while flowing to the receiver, as hereinafter fully described and claimed.

In carrying my invention into effect I proceed as follows: The steel is treated in a converter, open hearth, or other apparatus in the ordinary manner, and as it is tapped therefrom and while flowing in a molten state into the receiver the chromium in a fluid or semifluid state is added thereto, which will be incorporated uniformly therewith. The chrome-steel thus produced may be poured into molds or cast into pigs or ingots and will be found especially useful and advantageous for manufacturing certain articles.

Owing to the highly infusible character of the chromium, to reduce it to a molten or semifluid condition it is necessary to heat it in a furnace in which a very high degree of heat can be produced and maintained. This can be accomplished by an electric furnace, but even then it is necessary to have the tap-hole in close proximity to the mass of steel.

The proportions of chromium to be added to the steel will vary according to circumstances and will also depend to a certain extent upon the purpose for which the manufactured product is to be employed. Therefore no definite proportions can be stated, as it will depend considerably upon the judgment and experience of the manufacturer.

Having thus fully described my invention, what I claim is—

The process herein described of making chrome-steel which consists in introducing into the steel as it is flowing from the converter or furnace in a molten state, chromium in a fluid or semifluid state; substantially as described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

ELIAS M. JOHNSON.

Witnesses:

PETER P. SHERRY,
ARTHUR L. SOPER.