UNITED STATES PATENT OFFICE.

ASAHEL J. SEVERANCE, OF NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN D. BROWN, OF SAME PLACE, AND WINFIELD M. CLARK, OF ALBANY, NEW YORK.

PROCESS OF MANUFACTURING IRON OR STEEL.

SPECIFICATION forming part of Letters Patent No. 429,744, dated June 10, 1890.

Application filed October 11, 1889. Serial No. 326,718. (No specimens.)

To all whom it may concern:

Be it known that I, ASAHEL J. SEVERANCE, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in the Process of Manufacturing Iron or Steel, of which the following is a specification.

This invention is an improvement in the manufacture of iron or steel, by the use or practice of which I have found that I may produce at comparatively slight cost a very superior and high-grade metal.

Numerous compounds have been invented for welding, toughening, and refining steel, to which the term "welding compounds" is commonly applied, which compounds have usually been applied to the metal in its finished state or during the final steps of working, forging, or tempering the same. I have found, however, that greatly-improved results may be secured by adding to the metal while in a molten state in either an open-hearth furnace or converter or crucible after the metal has been reduced to a molten state and the lid removed a compound of this general character, and consisting, essentially, of borax, sal-ammoniac, and certain fluxing agents, as hereinafter described. In the treatment of iron or steel by these compounds I combine with the metal while in a molten state a small quantity of the compound named, the proportion being varied according to the quality of the metal and the character of the results to be obtained, as will be readily ascertained by experiment.

The compound may be associated or combined with the molten metal in any well-known way, as by introducing it into the converter or by causing it to combine with the molten mass by means similar to those employed in the now well-known treatment of steel by silica.

The compound which I use for this purpose is one consisting, by weight, of borax, thirty-three parts; pumice-stone, eight parts; salt, one part; sal-ammoniac, three parts; dolomite, one part, and spathic iron ore, one part. This is the compound in its preferred form; but I do not limit myself either to the specific compound described or to the proportions given. It is essential, however, to the attainment of the desired result that the compound contain borax, sal-ammoniac, and a strong fluxing agent—such as carbonate of iron and pumice-stone; but for purposes of this invention I may use certain equivalents for the ingredients named. For example, in the compound above described I may dispense with the salt and increase correspondingly the proportion of sal-ammoniac, or I may dispense with the spathic iron ore or carbonate of iron and use a correspondingly greater proportion of dolomite. Further, I may substitute for the dolomite or the spathic iron ore, or both, Venetian red, and in place of the pumice-stone I may use silica sand, or its well-known equivalents, or I may use with good results certain of the welding compounds now known—as, for example, that containing as essential elements borax and sal-ammoniac with carbonate of iron and plaster-of-paris; but, as above stated, the essential feature of the invention is attained by the use of a compound containing borax, sal-ammoniac, and a fluxing agent or material, by which I mean such substances as dolomite, carbonate of iron, or their equivalents, either with or without pumice-stone or silica or plaster-of-paris.

The compound is prepared for use by drying, pulverizing, and thoroughly mixing the several ingredients, as is commonly done in manufacturing such articles.

I have found that by the above-described treatment or process I can produce at approximately the cost of ordinary iron or steel a remarkably fine, tough, and high-grade metal equal to nearly any in the market for the manufacture of all articles of iron and steel.

What I claim is—

The process of manufacturing iron or steel, which consists in associating with the metal while in a molten state a compound of borax, sal-ammoniac, spathic iron ore, and pumice-stone, or their described equivalents, as herein described.

ASAHEL J. SEVERANCE.

Witnesses:
WINFD. M. CLARK,
JOHN D. BROWN.