

UNITED STATES PATENT OFFICE.

JOHN ALFRED STEPHAN AND RICHARD SOUTHERTON, OF BIRMINGHAM,
ENGLAND.

PROCESS OF TREATING IRON.

SPECIFICATION forming part of Letters Patent No. 460,405, dated September 29, 1891.

Application filed December 23, 1889. Serial No. 334,734. (Specimens.) Patented in England July 16, 1888, No. 10,266.

To all whom it may concern:

Be it known that we, JOHN ALFRED STEPHAN and RICHARD SOUTHERTON, citizens of Great Britain, residing at Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in the Manufacture of Iron; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Letters Patent for this invention have been obtained in England, No. 10,266, dated July 16, 1888.

This invention relates to the manufacture of iron; and it consists in treating the iron or steel, as hereinafter fully described and claimed, to improve its quality and increase its strength.

In carrying out our invention we take ten parts of emery and mix it with eight parts of ammonia-alum. The emery is coarsely powdered or used in its crude state, and the materials are preferably heated or calcined, either before or after mixing, to drive off moisture; but they may be used without such heating or drying. From two to ten parts of the mixture are used to each one hundred parts of iron, according to the hardness required in the iron, and four parts of mixture to one hundred parts of iron will be found to give excellent results. The mixture may be added to metallic iron or steel in a reverberatory or puddling furnace, the mixture being thrown into the molten metal and puddled with it. The mixture of ammonia-alum

and emery has a peculiar action upon the iron, with which it is mixed and incorporated under the influence of intense heat. The tensile strength of the iron is increased, ordinary best iron breaking at about twenty tons to the square inch, while iron treated as set forth will stand 38.3 tons in its soft state and when hardened 48.3 tons to the square inch, as found by actual experiment and test. The iron thus treated possesses many of the characteristics of fine tool-steel. It may be repeatedly hardened and softened, and it is also rendered more ductile.

The peculiar action of the mixture upon the metal is believed to be analogous to the action of carbonaceous material upon iron in the manufacture of steel in crucibles by the cementation process. Portions of the pure aluminous material become incorporated with the iron and increase its tensile strength, and the mixture is also believed to clean the iron and remove impurities from it.

What we claim is—

The method of treating iron, which consists in incorporating a mixture of emery and ammonia-alum with the molten metal during the puddling operation, substantially as and in the proportions set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN ALFRED STEPHAN.
RICHARD SOUTHERTON.

Witnesses:

GEORGE EDWIN KELLY,
HENRY SYDNEY WEBSTER.