No. 774,958. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

TOLMIE JOHN TRESIDDER, OF SHEFFIELD, ENGLAND

MANUFACTURE OF STEEL.

SPECIFICATION forming part of Letters Patent No. 774,958, dated November 15, 1904.

Application filed July 17, 1903. Serial No. 166,012. (No specimens.)

To all whom it may concern:

Be it known that I, TOLMIE JOHN TRESIDDER, a subject of the King of Great Britain and Ireland, residing at Atlas Iron and Steel Works, Sheffield, in the county of York, England, have invented certain new and useful Improvements in the Manufacture of Steel, of which the following is a specification.

This invention has for its object to provide steel of such a character that while readily receptive of a fibrous structure under suitable treatment it can retain that fibrous structure under conditions that would ordinarily produce a crystalline structure, such, in particular, as the sudden chilling from a very high temperature necessary in the process of face-hardening after supercarburization. The said steel according to this invention has the following composition, namely: iron, carbon, manganese, nickel, and tungsten in or about the following proportions in each ten thousand parts, by weight, of the steel mixture: carbon, from twenty-eight to thirty-two parts, by weight; manganese, from twenty-five to thirty parts, by weight; nickel, from two hundred and twenty-five to two hundred and fifty parts, by weight; tungsten, from twenty-eight to thirty-two parts, by weight, the remainder being iron with such impurities as usually cannot be avoided in practice, such as silicon, sulfur, phosphorus, cobalt, arsenic, copper, and the like. Silicon may be present up to ten or fifteen parts, by weight, without detriment, while the others, if their presence cannot be avoided, should be present in as small a quantity as is possible.

The following is the preferred way of proceeding in manufacturing the steel having the above composition: The charge consisting of about one half good hœmatite or Swedish pig-iron and the other half good pure steel-scrap is melted on the Siemens hearth until the impurities have been eliminated, and the carbon, as judged by fracture of a spoon sample, is under one-fifth per cent., and then nickel, in the form of rondelles, of metallic nickel is thrown into the bath and stirred therein. When this is thoroughly incorporated, (which will usually be in about ten minutes,) red-hot ferromanganese is added in such quantity as experience shows will after allowing for the necessary loss leave the desired percentage of manganese. When the said ferromanganese has been well stirred in, the tungsten is added, preferably, in the condition of red-hot ferro-tungsten, containing about one-third tungsten and two-thirds iron. No allowance need be made for loss of tungsten. As soon as the ferrotungsten has had time to become thoroughly mixed the steel is tapped into a ladle and cast into an ingot. The ingot thus produced is of such a character that before being reheated it can be laid down and allowed to cool without its being liable to spontaneous disintegration; but, if desired, it can while still hot be at once taken to the forging-press or rolling-mills to be forged or rolled into plates without any special precautions being necessary, and if ordinary steps be taken for removing scale the surface will not require to be machined; but if it be desired to machine it machining can be done with facility.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. Steel composed of iron, carbon, manganese, nickel and tungsten, the proportion of manganese not exceeding one per cent. of the whole.

2. Steel containing iron and carbon, manganese, nickel and tungsten in about the following proportions: carbon, 0.28 to 0.32 per cent.; manganese, 0.25 to 0.30 per cent.; nickel, 2.25 to 2.50 per cent.; and tungsten, 0.28 to 0.32 per cent., the remainder being iron.

3. Steel composed of iron, carbon, manganese, nickel and tungsten, the sum of the substances other than iron being less than ten per cent. of the whole.

In testimony whereof I affix my signature in presence of two witnesses.

TOLMIE JOHN TRESIDDER.

Witnesses:

EDWARD CHARLES HAMMOND,

WILLIAM GERALD REYNOLDS.