UNITED STATES PATENT OFFICE.

JOHN H. RICKETSON, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN COMPOSITION CASTING METAL FOR MAKING ROLLS, &c.

Specification forming part of Letters Patent No. **186,955**, dated February 6, 1877; application filed December 7, 1876.

To all whom it may concern:

Be it known that I, JOHN H. RICKETSON, of Allegheny city, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Composition Casting Metal for Making Rolls, &c.; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the manufacture of cast-metal rolls, pinions, and like articles; and consists in forming articles of the class specified from cast-iron, wrought-iron, and spiegeleisen, or ferro-manganese, compounded in the manner hereinafter specified, the relative proportions of the several elements being varied within certain limits, according to the quality of the article to be produced.

Heretofore in the manufacture of rolls, pinions, and like articles, the ordinary cast-iron roll and pinion has been found lacking in durability, owing to the softness of the metal and its inability to resist heavy strains. To overcome these objections cast-steel rolls and mixed cast-iron and steel rolls and pinions have been resorted to, but the first is produced at great expense, owing to the subsequent labor necessary to finish the roll or pinion, and last named is an uncertain product, the face of a roll being frequently softer at some points than at others.

The object, therefore, of the present invention is to produce a roll, pinion, or similar casting of homogeneous or uniform metal of great tensile strength and uniform hardness.

I will now proceed to specifically describe my invention so that others may apply the same.

The metals employed for the mixture are cast-iron, such as old rolls or other old cast metal; pig metal, preferably Nos. 1, 2, and 3, up to forge metal; wrought-iron in scrap or otherwise, preferably in small pieces, as facilitating the process; and a small per cent. of ferro-manganese or spiegeleisen. I first melt the cast-iron in a reverberatory or similar suitable furnace until a bath of metal of a white heat is obtained. I then add to the bath of molten cast-iron a quantity of wrought-iron varying from five to fifteen per cent. of the cast-iron bath, according to the required hardness and strength of the roll or pinion. The wrought-iron is added in divided quantities, such as will readily melt, and from time to time with intervals of about ten minutes. When the whole amount of wrought-iron has been melted in the cast-iron the bath is tested in the usual way, and, if found too soft, a small amount of "white iron" is added, or, if it is too hard, a small quantity of No. 1 pig metal is added. After a short interval, during which the heat of the bath is kept up, from one-half to one and a half per cent. of spiegeleisen or ferro-manganese is added, and in from ten to twenty minutes thereafter the furnace is tapped and the casting of the roll, pinions, or other article is made.

For a ten-thousand-pound casting I have found the following proportions answer well: Old rolls or old cast metal, five thousand pounds; No. 2 or No. 3 pig metal, four thousand pounds; wrought-iron, nine hundred and fifty pounds; spiegeleisen or ferro-manganese, (added in divided quantities,) fifty pounds—total, ten thousand pounds. Or, old rolls or old cast metal, six thousand pounds; No. 2 or No. 3 pig metal, three thousand pounds; wrought-iron, nine hundred pounds; spiegeleisen or ferro-manganese, (added in divided quantities,) one hundred pounds—total, ten thousand pounds—the intervals between the adding of the wrought-iron, the spiegeleisen, and the tapping being preserved, as before specified, and the spiegeleisen being what is known to the trade as ten per cent. spiegeleisen.

Under ordinary circumstances it is not desirable to use more than twelve per cent. of wrought-iron in the admixture, for the reason that, in casting rolls, pinions, and like articles, where a larger per cent. has been added, a "shrinkage draw" in the journals renders the casting useless. But if more wrought-iron is to be added I overcome this difficulty by forming the admixture of cast-iron, wrought-iron, (twelve per cent.,) and spiegeleisen as above specified—casting it into ingots, and then remelting the ingots, and subsequently adding the additional quantity of wrought-iron, by which means the shrinkage draw may to a great extent be overcome.

It will be noted that in the process and admixture of metals described the spiegeleisen is not added in such quantities as to recar-

burize or steelify the mass to any extent, but only in sufficient proportions to render the mass homogeneous, and cause it to retain its liquidity and produce uniform castings.

The article thus produced is remarkable for its tensile strength and uniformity of structure, and is sufficiently hard and smooth of face for many purposes, such as bar-rolls, rail-rolls, pinions, &c.

I am aware of the patent of E. and P. Martin, No. 72,061, December 10, 1867, and do not herein claim such subject-matter; but

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

1. The described composition metal for casting rolls, &c., consisting of cast and wrought iron and spiegeleisen or ferro-manganese, all substantially in the proportions herein specified.

2. The described process of preparing a compound metal for casting rolls, &c., which consists in alloying cast and wrought iron and spiegeleisen or ferro-manganese on a Siemens furnace hearth, substantially in the manner and the proportions herein specified.

In testimony whereof I, the said JOHN H. RICKETSON, have hereunto set my hand.

JOHN H. RICKETSON.

Witnesses:

F. W. RITTER, Jr.,

JAMES I. KAY.