United States Patent Office.

HENRY BROOKE. OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 90,075, *dated May* 18, 1869.

IMPROVED PROCESS OF HARDENING STEEL.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HENRY BROOKE, of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Hardening Steel; and I do hereby declare that the following is a full, clear, and exact description thereof.

The nature of my invention consists in a process of making and hardening what is known as semi-steel, or homogeneous castings, and is adapted to the following articles of manufacture, viz, rollers of all descriptions, shear-blades, circular and other cutters, machine-knives, cannon-shot, plow-mould-boards, and engravers' plates.

To enable others skilled in the art to use my invention, I will describe the process, first, as adapted to linear articles, such as plow-mould-boards or engravers' plates.

Ordinary bar-iron is cut to any suitable length, and deposited, with the ordinary fluxes, in an ordinary melting-pot, or crucible, and is subjected to the heat arising from any ordinary melting, or air-furnace.

When the metal acquires a fluid state, an ordinary iron mould is provided, of the size and shape requisite for the required casting. A plate of ordinary iron, and of the shape of the back of the required casting, is placed in the mould, in such a manner, that when the molten metal is poured into the mould, it will flow up against said metal plate, to which it will adhere.

When the casting becomes cold, it is taken from the mould, and its outer surfaces made true and free from imperfections, by the aid of any suitable machinery. It is then taken and deposited in an ordinary carbonizing, or converting-furnace, where it is subjected to the heat thereof.

Having remained in the furnace sufficient time, said period of time being regulated by the degree of hardness the casting is calculated to have, it is taken out, and the iron plate removed from the same, and all its surfaces will be carbonized, and will have the degree of hardness cast-steel possesses, save the surface which was against the iron plate, which, not being subjected to the carbonizing-process, in consequence of the iron plate intervening, possesses the nature and tensile strength of ordinary wrought-iron.

In casting and hardening cylindrical articles, such as rollers, the method employed of melting bar-iron is the same as before described. Moulds are furnished, of octagonal or hexagonal shape, and the fluid metal poured therein.

When solidified, the casting is taken to an ordinary steam-hammer, by whose aid it is made as nearly cylindrical as possible. It is then taken to the ordinary carbonizing, or converting-furnace, and carbonized to whatever degree of hardness is required, leaving the inner portion of the same wrought-iron, whilst the outer surface has become steel.

The advantages arising from the use of my invention are, that semi-steel, or homogeneous castings, when hardened, possess greater virtues than cast-steel does, since steel is very liable to fracture by any sudden jar, or disarrangement of machinery, especially when it is very hard.

Rollers, when constructed wholly of steel, are made of greater diameter, in consequence of this fact, than if they were made of wrought-iron; but, as the outer surfaces of wrought-iron rollers are not of sufficient hardness to withstand the pressure of the metals passing through them, they are inadmissible.

Rollers made by my process, as herein described, possess two natures and qualities, viz, that of wrought-iron in the main body, and steel at their peripheries, being, as it were, steel rollers with wrought-iron cores.

Such rollers can be made of smaller diameter, not only saving metal, but also drawing out the required metal more uniformly than rollers of larger diameters.

As shear-blades have been heretofore constructed, they have been made of wrought-iron, with a steel piece welded thereto, requiring considerable skilled labor to perform the same, and the blades are also liable to accident, as the weld is oftentimes defective.

By the use of my described process, such articles are made solid, but are hard at the required point.

Cannon-shot, when constructed in like manner, will withstand a heavier concussion. The point, being carbonized, will penetrate, whilst the base, being homogeneous, will not suffer molecular deterioration.

Having thus described the nature and use of my invention,

What I claim as new, and desire to secure by Letters Patent, is—

The process of making and hardening homogeneous castings, substantially as herein described, when applied to the articles enumerated herein.

In testimony that I claim the foregoing as my own, I affix my signature, in presence of two witnesses.

HENRY BROOKE.

Witnesses:

PERCEVAL BECKETT,

R. M. CARGO.