

UNITED STATES PATENT OFFICE.

CHARLES SANDERSON, OF SHEFFIELD, ENGLAND.

IMPROVED MODE OF MAKING BARS, SHAFTS, AND OTHER ARTICLES COMPOSED OF IRON AND STEEL.

Specification forming part of Letters Patent No. 50,084, dated September 19, 1865.

To all whom it may concern:

Be it known that I, CHARLES SANDERSON, of Sheffield, in the county of York, England, have invented a new and Improved Mode of Manufacturing Railway-Bars, Shafts, Girders, Ship-Plates, Boiler and Bridge Plates, and of uniting large masses of wrought-iron for various purposes; and I do hereby declare that the following is a full and exact description thereof.

The nature of my invention consists in uniting a mass or masses of wrought-iron with molten steel or with molten homogeneous iron or steel, (made by and known as the "Bessemer" or "pneumatic" process,) whereby a complete and solid union is effected and a mass compounded of wrought-iron and cast-steel or of wrought-iron and homogeneous iron or steel, as aforesaid, is obtained.

I will now proceed to describe the application of my invention to the manufacture of railway-bars.

I take a bloom of ordinary puddled or piled iron of any desired size—say, for example, six inches square and twenty-four inches long—and heat this bloom to a red heat in a suitable furnace. I then place it in the center of a cast-iron or other mold, leaving a space between the bloom and the mold, into which space I pour molten steel or molten homogeneous iron or steel made as aforesaid. By this means a mass is obtained having a wrought-iron core and surrounded by cast-steel or homogeneous iron or steel, made as aforesaid. The compound metal is then hammered and rolled in the usual way, and will thus produce a soft wrought-iron railway-bar having a surface of cast-steel or homogeneous iron or steel.

If it is desired to make a railway-bar having only one side faced with cast-steel or homogeneous iron or steel, I place the wrought-iron bloom in a suitable position in the mold, so that the molten steel or molten homogeneous iron or steel, made as aforesaid, may be poured only on one side of the bloom. The mass is then hammered and rolled in the usual way.

The proportion of cast-steel or homogeneous iron or steel to wrought-iron and the form of their juncture, can, of course, be varied by suitably shaping the mold or the mass of wrought-iron, and also by altering the position of the wrought-iron in the mold. In all cases the com-

bination of the wrought-iron and cast-steel or of the wrought-iron and homogeneous iron or steel, as aforesaid, is effected by means of molten steel or of molten homogeneous iron or steel poured against the wrought-iron, and not by welding.

I will now proceed to describe the application of my invention to the manufacture of shafts and other purposes where masses of wrought-iron have usually to be built up by welding pieces together.

In the case of round shafts, I take a bloom of wrought-iron, heated to a red heat, and having placed it in a suitable mold, I pour molten steel or molten homogeneous iron or steel, made as aforesaid, in the space left between the wrought-iron bloom and the mold, as in making railway-bars; or I pour molten steel or molten homogeneous iron or steel, as aforesaid, between concentric rings of wrought-iron, previously forged and heated to a red heat, leaving more or less space between the rings, in order to have a greater or less thickness of steel or of homogeneous iron or steel, as may be desired. Such compound shaft may then be hammered and rolled in the usual way.

In a similar manner large masses of wrought-iron for ship and other plates may be built up by placing plates or masses of wrought-iron, heated as above described, in a cast-iron or other mold, at a suitable distance, uniting them by pouring between them molten steel or molten homogeneous iron or steel, made as aforesaid, and not by welding, as heretofore.

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

The manufacture of railway-bars, shafts, girders, ship-plates, boiler and bridge plates, and other articles from masses of wrought-iron and cast-steel or of wrought-iron and homogeneous iron or steel, (made by and known as the "Bessemer" or "pneumatic" process,) and the uniting of large masses of the above metals, in which the combination is effected in the manner herein described.

The above specification of my invention signed by me this 27th day of July, 1865.

CHARLES SANDERSON.

Witnesses:

JOHN S. KELTON,

WILLIAM BAKER.