W. A. SHAW.

CONVERTING WROUGHT IRON WIRE, RIBBON, AND PLATES INTO STEEL

No 90,313. Patented May 18, 1869.

Fig. 1.

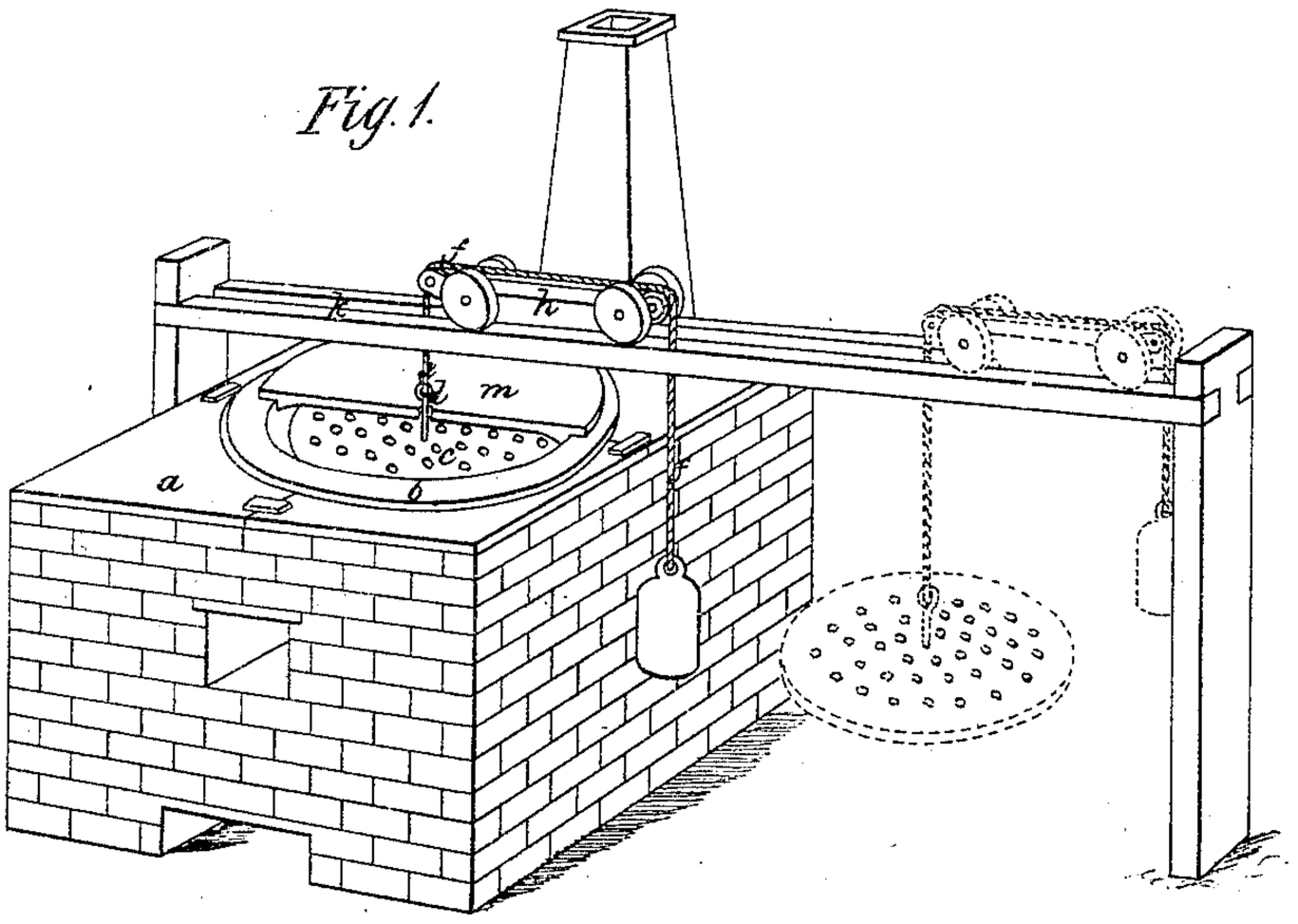
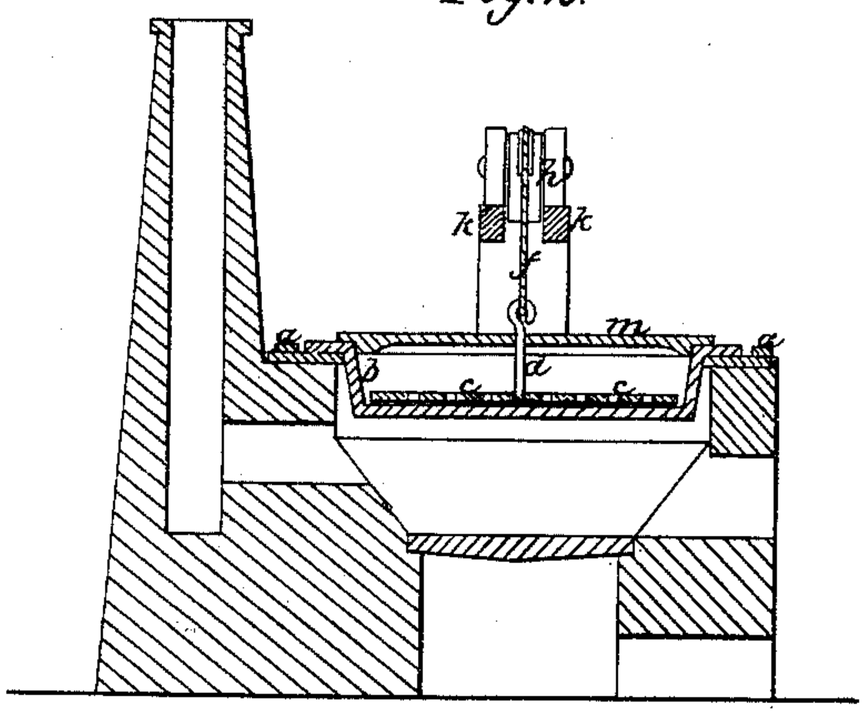


Fig. 2.



Witnesses,
Th Bailey
Wm H Habe

Inventor.
William Anthony Shaw
by P Bolton atty

United States Patent Office.

WILLIAM ANTHONY SHAW, OF NEW YORK, N. Y.

Letters Patent No. 90,313, *dated May* 18, 1869.

IMPROVED PROCESS OF CONVERTING WROUGHT-IRON, WIRE RIBBON, AND PLATES, INTO STEEL.

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

To whom it may concern:

Be it known that I, WILLIAM ANTHONY SHAW, of the city, county, and State of New York, have invented a new and improved Process of Converting Wrought-Iron Ribbon, Wire, and Plates, into Steel; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings.

The nature of my invention consists—

First, in the process of converting iron into steel by the employment of a liquid bath of cyanide of potassium and charcoal, prepared as hereinafter described, in which the iron is immersed for a time proportionate to the thickness of the metal to be converted, which effects the conversion of the iron into a better quality of steel, in less time than has hitherto been accomplished by any process of this character heretofore devised.

Second, in the process for converting the iron into steel, and distributing or equalizing the conversion, by first immersing the metal in a liquid bath of the character above specified, and afterwards subjecting the metal, when taken out from such bath, to a prolonged heating, in the manner hereinafter set forth.

In practically working out my process in the large way, I have constructed a furnace as shown in perspective, Figure 1, and in cross-section, Figure 2, having a cast-iron cover or top, *a*, with a circular opening for a pan or flat-bottom kettle, *b*, of cast-iron, which is placed immediately over the fire, and is supported by a flange around its top, as shown in the drawing. This pan is of any convenient size, say twenty-four inches diameter inside, and twelve inches deep.

Fitted into this kettle is a perforated cast-iron disk, *c*, about five-eighths of an inch thick, which is elevated out of the kettle by a rod, *d*, attached to a chain, *f*, passing over rollers of a car, *h*.

The car is supported on a railway, *k*, which permits the operator to move the disk a short distance from the furnace, and to return it again, when loaded, to the kettle.

Over the whole furnace may be placed a canopy or hood of sheet-iron, with a pipe leading into the chimney or stack of the furnace, to carry off any fumes arising from the bath.

The kettle has also a lid, *m*, which is used from time to time to partly protect the bath from the atmosphere.

Into this kettle I put cyanide of potassium, in sufficient quantity to fill the kettle half full when melted. The fire in the furnace is next elevated, and when the melted cyanide of potassium has become of cherry-red heat, I add, in small portions at a time, grains, about the size of pears, of well-burned and thoroughly-dry charcoal, until about one quart has been added. The whole is well stirred, and a full cherry-red heat maintained.

The articles to be converted are placed on the disk, the whole pushed over the bath, and gently immersed in it.

This will reduce the temperature of the bath, and it must be elevated to the temperature already named.

The time of immersion depends upon the depth of conversion required, if a plate; or if it is wire or ribbon, then upon the thickness of it. Ordinary strips of the latter material can be easily converted, by this process, in twenty minutes.

The wire, after removal from the bath, is allowed to cool; it is then thoroughly washed in fresh water, to remove any adhering cyanide of potassium, and is next dried in hot sawdust.

At this stage of the process there is an unevenness of conversion; the surface is a higher steel than the centre. The subsequent treatment distributes or equalizes this, as well as perfectly annealing the wire.

After drying, the coils are placed in an oven and covered with powdered plumbago or kaoline, prepared as described for use in the muffle of my tempering-apparatus, for which I have filed an application for Letters Patent, of even date herewith, or other powder which will protect the wire from oxidation, and not at the same time cohere to the wire, nor its particles cement together by the heat required.

Thus protected, the coils are heated to a cherry-red heat, for a time proportionate to that during which they were exposed to the bath of cyanide of potassium and charcoal. Ordinary wire and ribbon are best when thus heated for about five hours.

The next operation is to temper the articles. This may be effected in the usual manner; but for wire and ribbon, the apparatus and process described by me, in my above-mentioned application for Letters Patent, of even date herewith, are superior to any other mode.

Having now described my invention, and the manner in which the same is or may be carried into effect,

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

1. The process of converting wrought-iron ribbon, wire, plates, or like articles, into steel, by the employment of a bath of cyanide of potassium and charcoal, prepared substantially as described, in which the metal to be converted is treated as herein set forth.

2. The process of converting the wrought-iron into steel, and of distributing or equalizing the conversion by first treating the metal to be converted, in a bath of the character specified, and afterwards subjecting it, when taken from the bath, to a prolonged heating, substantially in the manner and for the purposes described.

3. An apparatus for converting wrought-iron into steel, constructed substantially as herein shown and set forth.

In testimony whereof, I have signed my name to this specification, before two subscribing witnesses.

WM. ANTHONY SHAW.

Witnesses:

D. D. PARMELEE,

COR. L. DISOSWAY.