

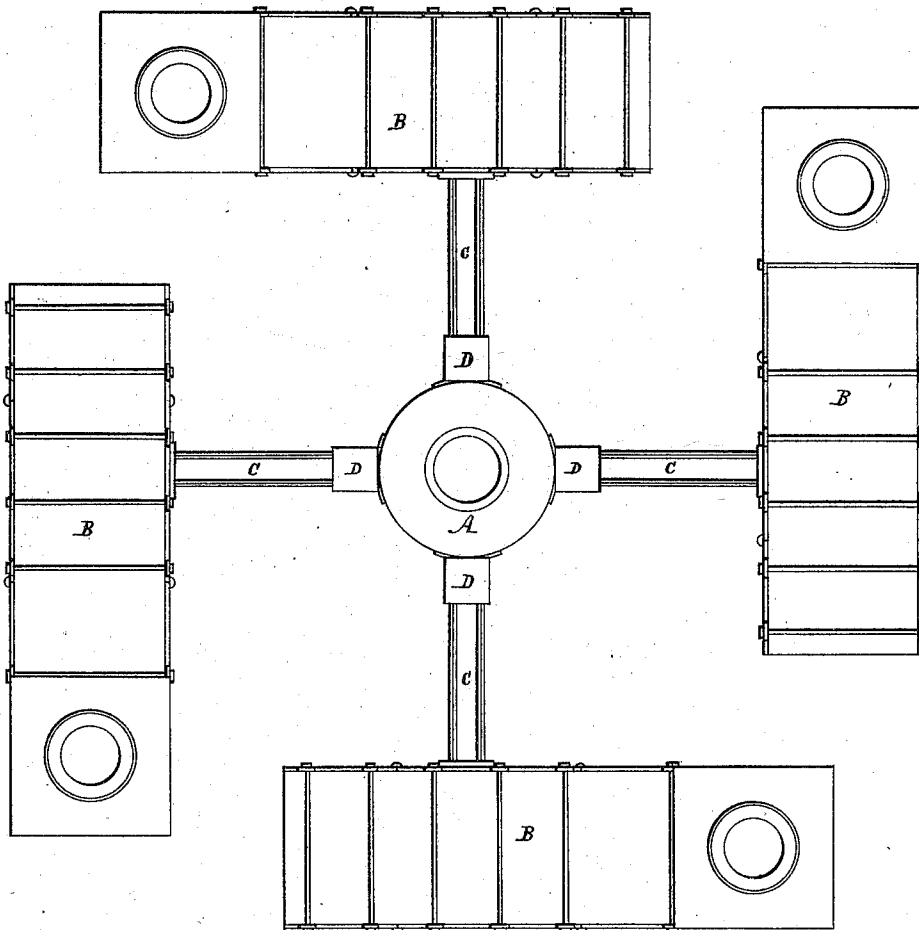
J. J. JOHNSTON.

Improvement in the Manufacture of Iron.

No. 126,709.

Patented May 14, 1872.

Fig. 1.



Witnesses.

Wm. W. S. Dyre.

Wm. H. Blodgett

Inventor.

James Johnston

J. J. JOHNSTON.

Improvement in the Manufacture of Iron.

No. 126,709.

Patented May 14, 1872.

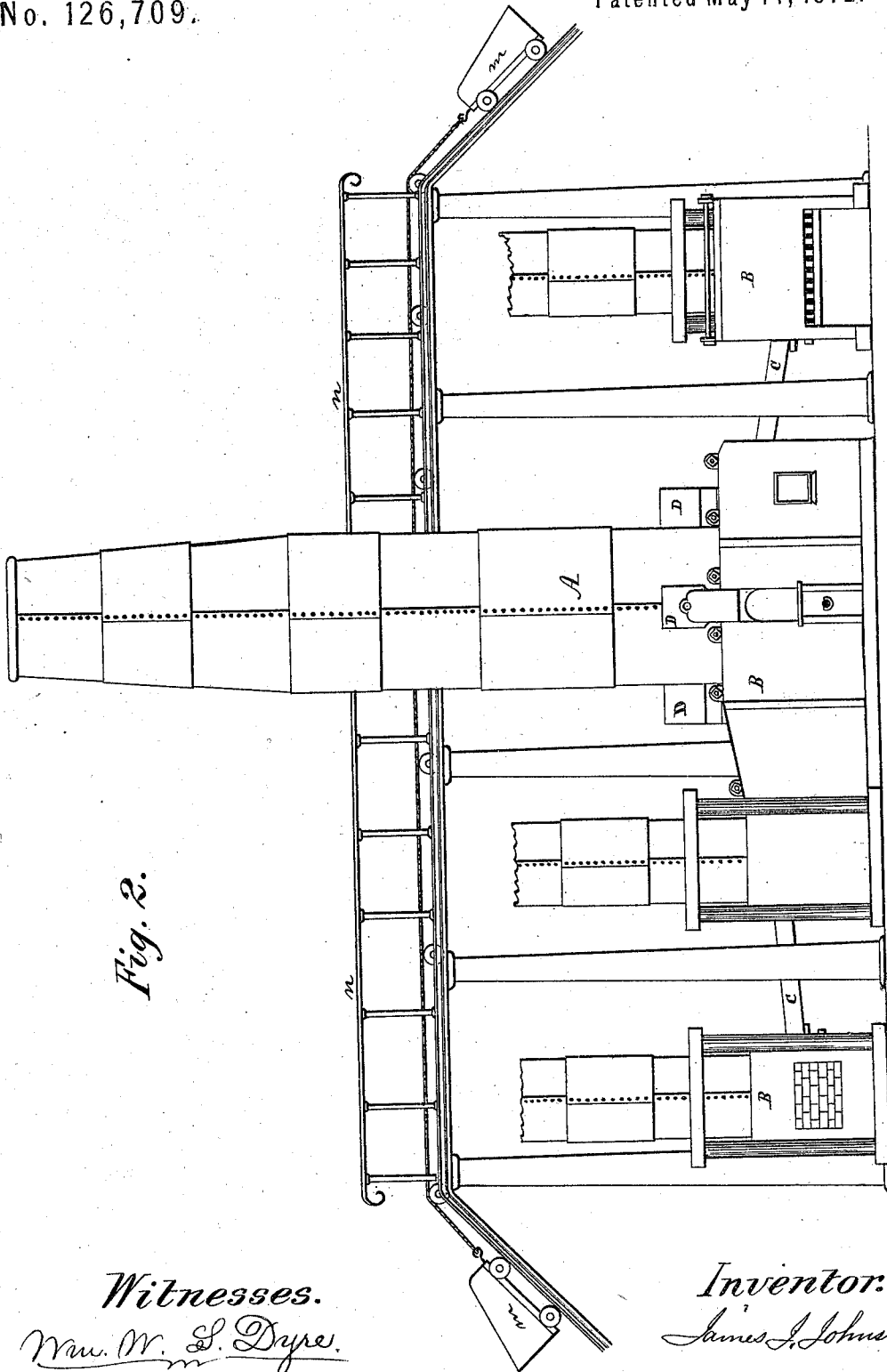


Fig. 2.

Witnesses.

Wm. W. S. Dyre.

Wm. B. Hodgett.

Inventor.

James J. Johnston

J. J. JOHNSTON.

Improvement in the Manufacture of Iron.

No. 126,709.

Patented May 14, 1872.

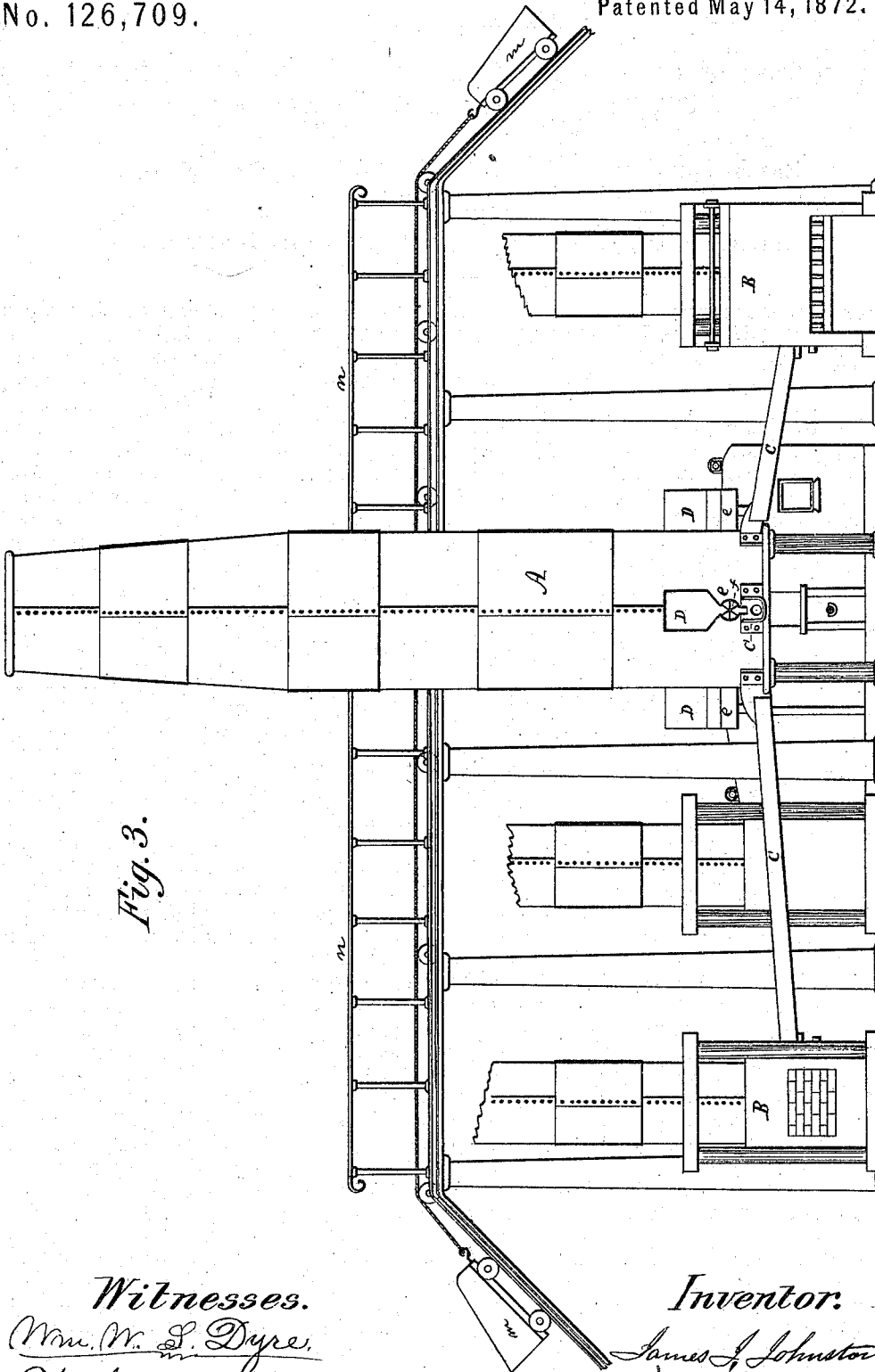


Fig. 3.

Witnesses.

Wm. W. L. Dyre,

W. H. Blodgett

Inventor.

James J. Johnston

UNITED STATES PATENT OFFICE.

JAMES J. JOHNSTON, OF COLUMBIANA, OHIO, ASSIGNOR TO S. D. HUBBARD
& CO., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN THE MANUFACTURE OF IRON.

Specification forming part of Letters Patent No. 126,709, dated May 14, 1872.

To all whom it may concern:

Be it known that I, JAMES J. JOHNSTON, of Columbiana, county of Columbiana, and State of Ohio, have invented a certain new and useful Improvement in the Manufacture of Iron; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

The nature of my invention consists in mixing together pulverized iron ore and the nitrate of soda, and then heating the mixed mass and mixing it with molten cast-iron, substantially as hereinafter described.

To enable others skilled in the art to make and use my invention, I will proceed to describe it more fully.

In the accompanying drawing, which forms part of my specification, Figure 1 represents a cupola or smelting-furnace, surrounded with a series of puddling or boiling furnaces. Fig. 2 represents a side elevation of the same. Fig. 3 represents a side elevation with one of the puddling or boiling furnaces removed.

The cupola or smelting-furnace A is of the ordinary construction, except that it has four outlets for the molten metal, which are provided with channels C leading into the working-chambers of the puddling-furnaces B, surrounding it at a point directly opposite their working-doors. Attached to the cupola and immediately over the channels are placed receptacles D for receiving the heated and mixed pulverized ore and nitrate of soda. These receptacles are provided at their lower end with a cylindrical chamber, *e*, furnished with a discharge-tube, *f*. In the cylindrical chamber *e* is arranged a shaft, *h*, from which radiate a series of wings. This shaft *h* is furnished with a crank or other device for turning it. The arrangement of the receptacles D with relation to the cupola A and channels C leading into the furnaces B will be readily understood by reference to the accompanying drawing. The form and construction of the receptacles D are sufficiently indicated from the foregoing, reference being had to Figs. 1 and 3, to enable the skillful mechanic to make them. The puddling or boiling furnaces B are of the ordinary form and construction, and are provided with

all the tools and appendages which are common to such furnaces. The fuel, ore, or metal is conveyed through the medium of trucks *m* and railway or gallery *n* to the charging-door of the furnace or cupola, and it is charged and otherwise manipulated, as in the ordinary furnace or cupola. The pulverized ore should be sufficiently fine to pass through the meshes of a "No. 8 sieve." The nitrate of soda is mixed with the ore by dissolving the soda in just sufficient water to hold it in solution, and the solution is sprinkled over the ore, stirring and mixing it so that all the particles of the ore are brought in contact with the particles of the solution. About five pounds of the nitrate of soda (dissolved) is mixed with about one hundred pounds of the pulverized ore. The pulverized ore, after being mixed with the nitrate of soda, as described, is allowed to stand exposed to the action of the atmosphere for twenty-four (24) or forty-eight (48) hours, or longer if desirable. It is then heated in a suitable drying-oven to about 600° Fahrenheit, care being taken to prevent it from caking in lumps. The heated ore, treated as hereinbefore described, is placed in the receptacles D. The cupola or furnace is "tapped" so as to allow a small stream of molten metal to flow from it into the channel C, and along it into the working-chamber of the puddling-furnace B. As soon as the molten metal commences to flow from the cupola or furnace the shaft *h* is rotated, which will cause the treated, mixed, and heated pulverized ore to flow in a steady stream down upon the molten metal as it flows into the channel C from the cupola or furnace, thereby mixing the pulverized ore with the molten metal in its passage from the cupola or smelting-furnace to the puddling-furnace B, and as soon as the bottom of the puddling-chamber is covered with the molten metal flowing into it from the channel C, the puddler commences the operation of stirring and otherwise manipulating the molten metal in the puddling-furnace, so as to form puddled balls, which are afterward subjected to the squeezing or hammering process, and then rolled into merchantable bar-iron. The quantity of the pulverized, treated, and heated ore mixed with the molten metal, as hereinbefore

described, will vary from ten (10) to thirty (30) pounds to each one hundred (100) of the molten metal.

The advantages of my improvement consist in saving time, labor, and cost of manufacturing the raw material into merchantable bar-iron, and producing a better article of iron with ordinary intelligent labor.

Having thus described my improvement, what I claim as of my invention is—

1. A cupola or smelting-furnace, A, communicating with one or more puddling furnaces, B, through the medium of channels C, com-

bined with an ore-distributing receptacle, D, substantially as herein described, and for the purpose set forth.

2. In the process of manufacturing wrought-iron, mixing and combining heated pulverized iron ore and nitrate of soda with molten metal, substantially as hereinbefore described, and for the purpose set forth.

JAMES J. JOHNSTON.

Witnesses:

WM. W. S. DYRE,

EDM. F. BROWN.