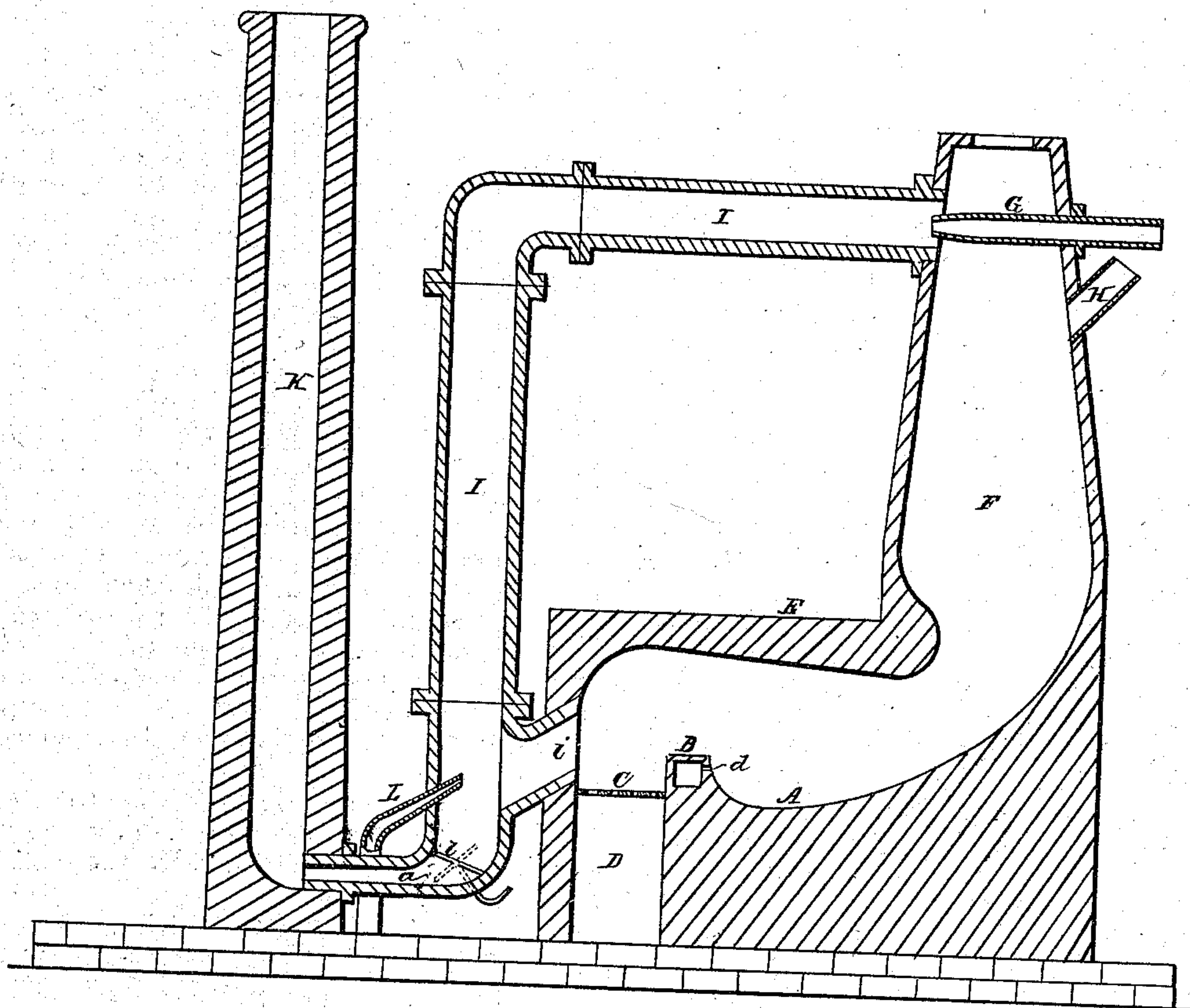


A. L. FLEURY & C. ADAMS.
MANUFACTURE OF IRON AND STEEL.

No. 35,276.

Patented May 13, 1862.



Witnesses:
Charles E. Foster
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UNITED STATES PATENT OFFICE.

ANTHONY L. FLEURY, OF PHILADELPHIA, AND CHARLES ADAMS, OF PITTSBURG, ASSIGNORS TO WALDRON J. CHEYNEY, OF PHILADELPHIA, PA.

IMPROVEMENT IN THE MANUFACTURE OF IRON AND STEEL.

Specification forming part of Letters Patent No. 35,276, dated May 13, 1862.

To all whom it may concern:

Be it known that we, ANTHONY L. FLEURY, of Philadelphia, Pennsylvania, and CHARLES ADAMS, of Pittsburg, in the same State, have invented certain new and useful Improvements in the Manufacture of Iron and Steel; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

Our invention consists in directing a jet of steam into or toward a pipe or passage, which forms a communication between the chimney or stack of a puddling-furnace, cupola, blast, or other furnace, and the fire-place of or body of ignited fuel within the said furnace, so as to impel a portion of the products of combustion along the said passage and toward the furnace, thereby causing a partial vacuum therein, and consequently increasing the draft, and also condensing the impurities which, in the form of oxygen and hydrogen compounds, are mixed with the products of combustion, at the same time the carbonic oxide mixed with carbonic acid, which mixture constitutes the greater portion of the products of combustion, is restored to the furnace, and, while it increases the heat, tends to oxidize the iron in the furnace.

Our invention further consists in introducing through the hollow bridge of a puddling-furnace hydrocarbon alone, or hydrocarbon mixed with nitrogenous substances or deoxidizing-vapors, thereby assisting in the desired oxidizing of the carbon in the iron, or in the carbonizing of the steel in the furnace.

In order to enable others skilled in the manufacture of iron and steel to practice our invention, we will now proceed to describe the manner in which it may be carried into effect.

The figure in the accompanying drawing, which forms a part of this specification, represents in section a view of a furnace and appliances for conducting our improvements in the manufacture of iron and steel.

A represents the bed of a puddling-furnace, of which B is the bridge; C, the fire-place; D, the ash-pit, and E the roof.

F represents a chimney communicating with the interior of the furnace; or it may represent a portion of a blast-furnace, as our improve-

ments are as applicable to the latter and to ordinary cupolas as to a puddling-furnace. Transversely through the upper end of the chimney F passes a pipe, G, which is slightly tapered at the end, this pipe communicating with the steam-space of a boiler.

H is the feed opening or hopper through which the ore is passed into the chimney F, when the latter forms part of a blast-furnace or cupola.

I is a pipe communicating with the interior of the chimney or stack of the furnace, near the top of the same, the pipe in the present instance taking the horizontal direction seen in the drawing, and then passing downward adjacent to the puddling-furnace, with which it communicates through the inclined passage *i*. The lower end of the pipe I has a branch, *a*, of diminished size, and is furnished with a valve, *b*, having a suitable handle for ready manipulation, the branch *a* communicating with the chimney K, through which the superfluous products of combustion are discharged into the air.

L is a pipe communicating with the steam of a boiler, and passing with its tapering end through the pipe I in a line with the inclined passage *i*.

It will be observed that the bridge B is hollow, and that there are passages *d*, forming communications between the interior of the bridge and the furnace.

When our improvements are used in connection with a puddling-furnace, as seen in the drawing, the jet of steam from the pipe G, being directed toward the pipe I, will cause the greater portion of the products of combustion passing from the furnace and upward through the chimney F to be forcibly impelled through the pipe I, thereby causing a partial vacuum in the furnace, and necessarily increasing the draft. The steam from the pipe I serves another purpose—namely, that of condensing the impurities mixed with the products of combustion—such as sulphur, phosphorus, arsenic, &c.—in the state of hydrogen or oxygen compounds. The steam passing through the pipe G also performs the following duty: The greater portion of the products of combustion from the furnace consists of carbonic oxide mixed with carbonic acid, and this also is impelled through the pipe I, and when the valve *b* is closed is

returned to the furnace through the inclined passage *d*. This mixture of carbonic oxide and carbonic acid, in connection with the steam, tends to increase the heat of the fire above the grate *C*, by partially decomposing the said steam, and will also aid in decarbonizing the iron in the puddling-furnace.

In manufacturing puddled steel, we introduce into the hollow bridge hydrocarbon alone, or mixed with nitrogenous substances—such as ammonia, cyanides, &c.—which, passing through the openings *d*, produce the desired carbonization of the iron. Other vapors may be caused to pass into the furnace—as, for instance, zinc may be placed in the interior of the bridge, and the vapors generated therefrom will tend to deoxidize the iron in the furnace.

The above description refers to our improvements as applied to a puddling-furnace. It will be readily seen that by a slight modification in the arrangements of the pipes, the same improvements may be applied to blast-furnaces, cupolas, &c. The pipe *G* may be continued to some distance through the pipe *I*, and the direction of the latter may be changed, as circumstances and the description of furnace to which our improvements are applied may suggest as the most suitable, the pipes being made of iron or formed of bricks or other material suitable for the purpose. The top of the chimney *F* may be furnished with an adjustable cover, thereby allowing more or less of the products of combustion to pass into the air, instead of through the pipe *I*.

In blast-furnaces and cupolas the pipe *I* should be rendered adjustable, or several pipes—one above another—may form a communication between the pipe *I* and the chimney, so as to insure the passage of the most available of the products of combustion into the said pipe *I*.

It will be readily seen that the propulsion of the products of combustion through the passage *I*, by the jet of steam, causes a hot-blast similar to that produced by mechanical appliances usually employed for the same purpose.

The heat of the steam may be increased by placing a mass of bricks, coke, or other equivalent substances in a box or reservoir, reducing the whole to a suitable degree of heat by an independent fire-place, or by close proximity to the furnace, and causing the blast to pass through the interstices formed between the pieces composing the said mass of bricks, &c.

We claim as our invention and desire to secure by Letters Patent—

1. Directing a jet of steam into or toward a pipe or passage which forms a communication between the chimney or stack of a puddling-furnace, cupola, blast, or other furnace and the fire-place or body of ignited fuel within the said furnace, so that said steam may be mixed with a portion of the products of combustion, and the whole propelled along the said passage toward the furnace, for the purpose specified.

2. Introducing through the hollow bridge of a puddling-furnace hydrocarbon alone, or hydrocarbon mixed with nitrogenous substances or deoxidizing-vapor, for the purpose specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ANTHONY L. FLEURY.
CHARLES ADAMS.

Witnesses:

HENRY HOWSON,
JOHN WHITE.