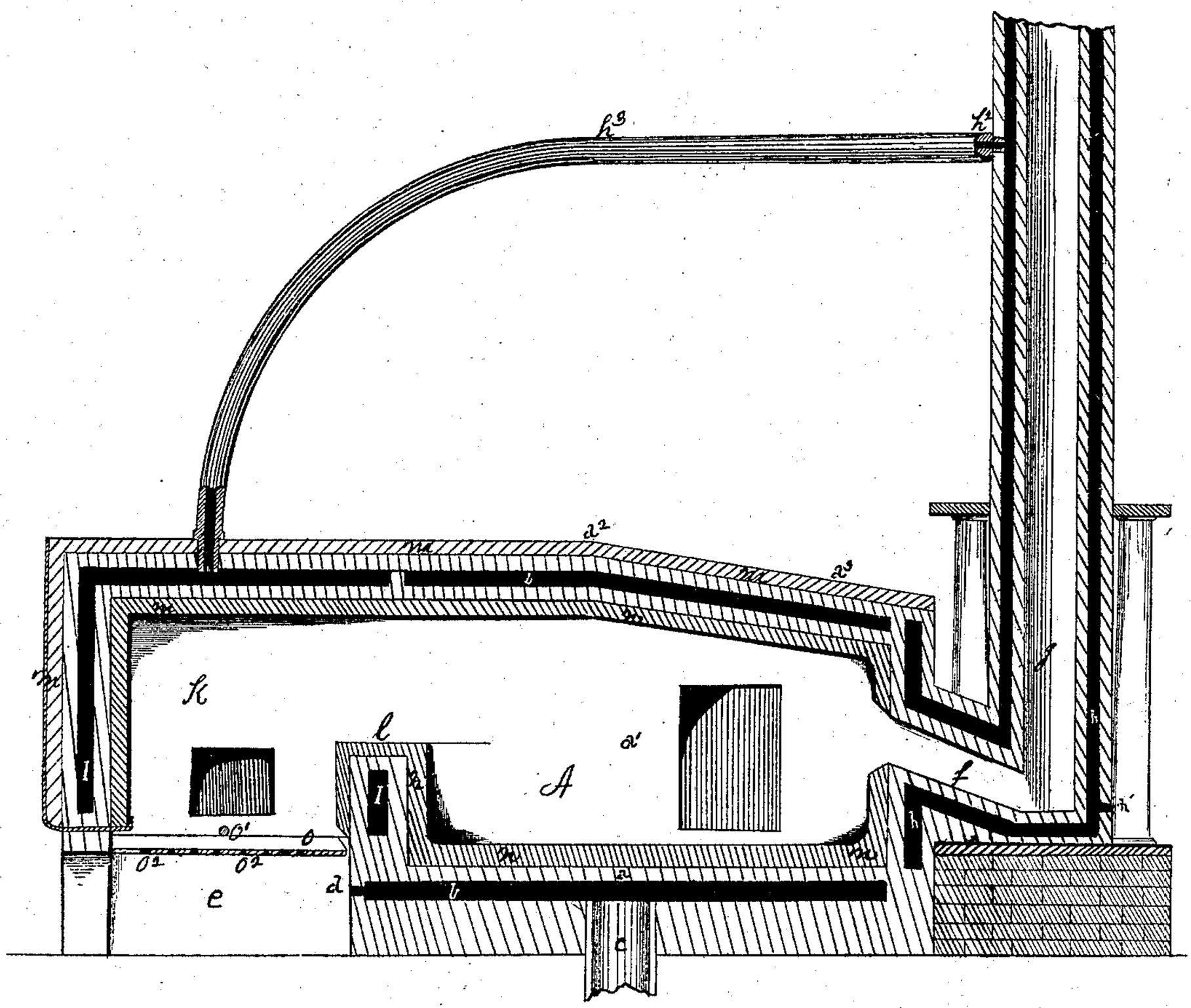
S. LANSDOWNE.

Metallurgic Furnace Linings.

No. 137,554. Patented April 8, 1873.



WITNESSES.

P. C. Brenshaw

James I. Kay

INVENTOR.

Samuel Lansdowne

by Baxwell Christy & Kerr

his attys

UNITED STATES PATENT OFFICE.

SAMUEL LANSDOWNE, OF SHARON, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND RICHARD DAVIS, OF SAME PLACE.

IMPROVEMENT IN METALLURGIC-FURNACE LININGS.

Specification forming part of Letters Patent No. **137,554**, dated April 8, 1873; application filed July 26, 1872.

To all whom it may concern:

Be it known that I, SAMUEL LANSDOWNE, of Sharon, in the county of Mercer and State of Pennsylvania, have invented a new and useful Improvement in Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing forming part of this specification, which is a longitudinal vertical section of a puddling-furnace, illustrating my improvement.

My invention relates to the construction of metallurgic-furnaces, and consists in the parts and things hereinafter claimed.

The form and general features of the furnace are the same as those in common use. The frame of the furnace is constructed of cast-iron, of which the parts forming the bed, the neck, fire-bridge, and the sides of the fire-chamber are made hollow. Extending through the hearth *a*, sides a^1, roof a^2, and jambs a^3, is an air-chamber, *b*, into which the air is forced through the opening *c*, and from which it escapes through the opening *d* into the ash-pit *e*. In the sides of the neck *f* and stack *g*, which are also made hollow, is a second chamber, *h*, into which water is admitted by a suitable opening, h^1, and in which it is heated. After being heated it passes out the opening h^2 and through the pipe h^3 forward to a third chamber, *i*, which extends throughout the hollow sides and top of the fire-chamber *k* and the fire-bridge *l*. This chamber is in reality a steam-generator, in which the water, previously heated in the chamber *h*, is turned into steam, after which it is taken off by a steam-pipe to a drum to be used for operating an engine, or for any other desired purpose. The outer surface of the top, jambs, and back of the furnace, and the inner sides of the fire-chamber, I line, as at *m*, with a composition consisting of cement, Kentucky clay, fire-brick dust, and sand, in equal or nearly equal parts. These ingredients are mixed with water to the consistency of mortar, applied to the parts named, and allowed to dry by a gentle heat, when the covering thus made will last a long time, but must occasionally be renewed in the fire-chamber. The inside of the bed I line, as at *n*, with a composition consisting of Missouri iron ore, Lake Superior iron ore, Port Entry iron ore, limestone, and charcoal cinders, all pulverized and mixed together with water in equal or nearly equal parts to the consistency of mortar. The whole inner surface of the bed A and neck *f* is lined with this composition, which is greatly superior to fire-brick or tile for this purpose, since if the brick is exposed it melts down into the iron and spoils the whole heat, while if this does melt the ingredients are such as will not injure but rather aid the quality of the iron. The grate-bars *o* are mounted upon a turning bar or pivot, o^1, which is operated by a crank. The purpose is to agitate or shake up the fire thoroughly, so as to accelerate combustion to break up the clinkers which are formed therein, and to aid in the operation of cleaning out the grate. In the grate-bars *o o* are a series of openings, o^2 o^2, which are for the purpose of letting air up through them into the fire.

Air from the chamber *b* is admitted through the opening *d* into the ash-pit *e*, from whence it ascends and forms a draft into the fire-chamber *k*, causes a more vivid combustion and greater heat. By this arrangement I am enabled to utilize coal containing a considerable percentage of sulphur, which has heretofore been totally unfit for the purpose. For this purpose I mix the sulphurous coal-slack with good coal and place them both in the fire-chamber. The draft or blast from below drives the sulphur, when eliminated, off through the opening *p*, which is partially closed with a piece of coal.

This furnace requires fixing when used, the lining described being simply a substitute for a brick lining.

The principal functions of the chambers *b*, *h*, and *i* are to cool the parts through which they extend so as to keep them from burning. By means of the water-chambers *h* and *i* I utilize heat, which otherwise would be waste, and at the same time generate steam with but little cost.

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

1. A chamber, *h*, in the neck and stack of the furnace, communicating, by a pipe, h^3, with the chamber *i*, arranged and combined substantially as and for the purposes set forth.

2. A furnace lined on its exterior, as at *m*, and in the fire-chamber with a composition consisting of cement, Kentucky clay, fire-brick dust, and sand, prepared with water, substantially as described.

3. A lining for furnaces, &c., consisting of cement, Kentucky clay, fire-brick dust, and sand, prepared as described.

4. A lining for the insides of furnaces, consisting of Missouri iron ore, Lake Superior iron ore, Port Entry iron ore, limestone, and charcoal cinders, prepared substantially as described.

In testimony whereof I, the said SAMUEL LANSDOWNE, have hereunto set my hand.

SAMUEL LANSDOWNE.

Witnesses:
A. S. NICHOLSON,
T. B. KERR.