

UNITED STATES PATENT OFFICE.

JAMES GAYLEY, OF BRADDOCK, PENNSYLVANIA.

BLAST-FURNACE LINING.

SPECIFICATION forming part of Letters Patent No. 463,147, dated November 17, 1891.

Application filed May 4, 1891. Serial No. 391,551. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES GAYLEY, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and
5 useful Improvement in Blast-Furnace Linings, of which the following is a full, clear, and exact description.

In constructing a blast-furnace the inclosing-walls have heretofore been made com-
15 monly of a refractory quality of fire-brick. In the lower portion, commonly known as the "hearth" and "bosh," it is of great importance that the brick-work should be maintained as near as possible to its original thickness, for
15 as the wear increases there is increased irregularity in the conduct of the process, which entails greater expense; but in this portion the wear is very rapid by reason of the chemical action of the molten cinder, which under the
20 intense heat has a corrosive and destructive action on the brick-work. As such corrosion proceeds, there is substituted, however through the reactions of the blast-furnace process a more refractory material, composed largely of
25 carbon, which, to some extent arrests the destructive action. It is to this carbon coating that the endurance of the hearth and bosh walls is due. I have repaired walls that were originally thirty-six inches thick, where but
30 six inches of the original brick-work remained, which was protected by a coating of this carbon material for a thickness of eighteen inches.

I have discovered that when the furnace-
35 lining is new and before the carbon coating can have had time to form the deterioration of the walls at the bosh and hearth is very rapid, and during the work of the furnace the character of the charge is apt to vary at
40 times and to produce a corrosive cinder of such chemical nature as will eat away the natural carbon coating and will attack the brick walls.

It has occurred to me that the furnace-walls
45 would be much better preserved if the natural process of carbon deposit could be assisted and supplemented by constructing the walls of the hearth and crucible and bosh of material composed largely of carbon. The diffi-
50 culty consists in securing the carbon in the form of a brick or tile that will be sufficiently

strong to maintain the rigidity of the wall. I have overcome this by making a brick of coke (or its equivalent, as hereinafter described) and tar, which acts as the binding material
55 for the brick. The tar, through heating, has the volatile matter driven off and leaves behind a hard and durable residue that cements the particles of coke into a firm mass.

To make the bricks I prefer to proceed as
60 follows: Select good hard coke, well burnt and having a graphitic appearance and preferably low in ash. This is ground in an ordinary pug-mill or dry-pan and afterward is mixed with five to fifteen per cent. of tar.
65 The percentage of tar preferably to be used varies with the amount of pressure obtainable at the molding-machine in which the bricks are pressed. In mixing the materials either the coke or tar should be heated, preferably both, in order to thoroughly amalgam-
70 ate the tar with the coke. This amalgamation is done best in a pan. In addition to coke, anthracite coal and charcoal containing as little volatile material as possible may be
75 used. When a thorough mixture has been obtained, the material is given the desired shape in a brick-molding machine. The burning of these bricks is preferably done in a muffle-furnace to avoid an oxidation of the
80 carbon, and it is necessary to obtain only a low heat sufficient to drive off the volatile elements of the tar. Treated in this manner the bricks are very hard and durable. I then
85 build these bricks into the walls of the hearth or crucible and bosh of the blast-furnace, so that they will constitute eighteen inches (more or less) of the thickness of these walls. Where the bosh brick-work is exposed it is
90 preferable to use the ordinary fire-brick on exposed portions; but where the walls are jacketed with iron, as is often the case for both bosh and hearth, these bricks can be
95 used throughout. When these bricks are used as the furnace-lining, it will be found that the natural rebuilding process caused by
100 deposit of carbon on the in-wall begins at an early stage of use of the furnace and is maintained throughout its operation and that the life of the furnace is correspondingly pro-
longed.

I claim—

1. A blast-furnace lining having in the in-walls of its bosh bricks composed of carbon and tar, substantially as and for the purposes described.

5 2. A blast-furnace having in the in-walls of its bosh and hearth bricks composed of carbon and tar, substantially as described.

In testimony whereof I have hereunto set my hand this 2d day of May, A. D. 1891.

JAMES GAYLEY.

Witnesses:

W. B. CORWIN,
H. M. CORWIN.