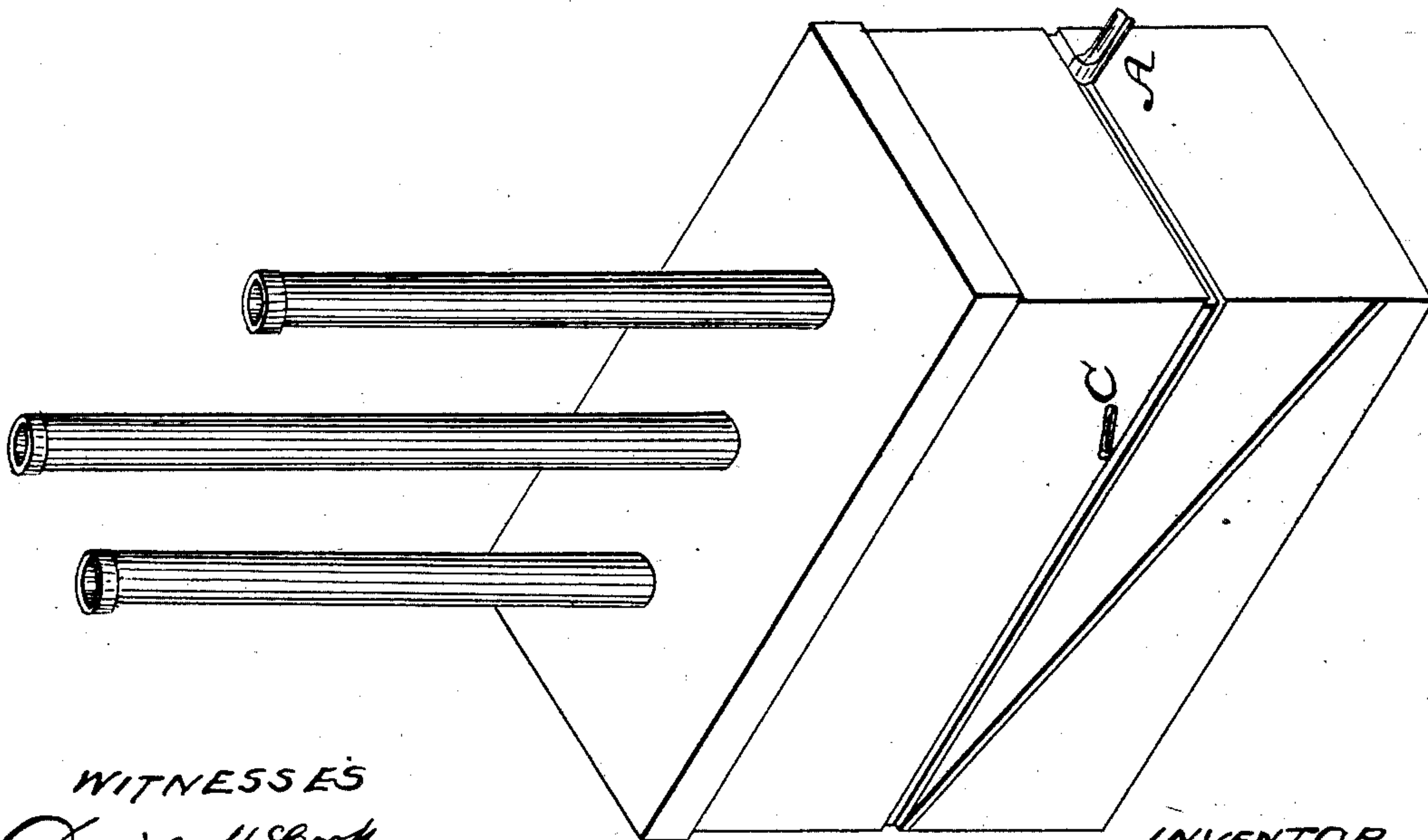
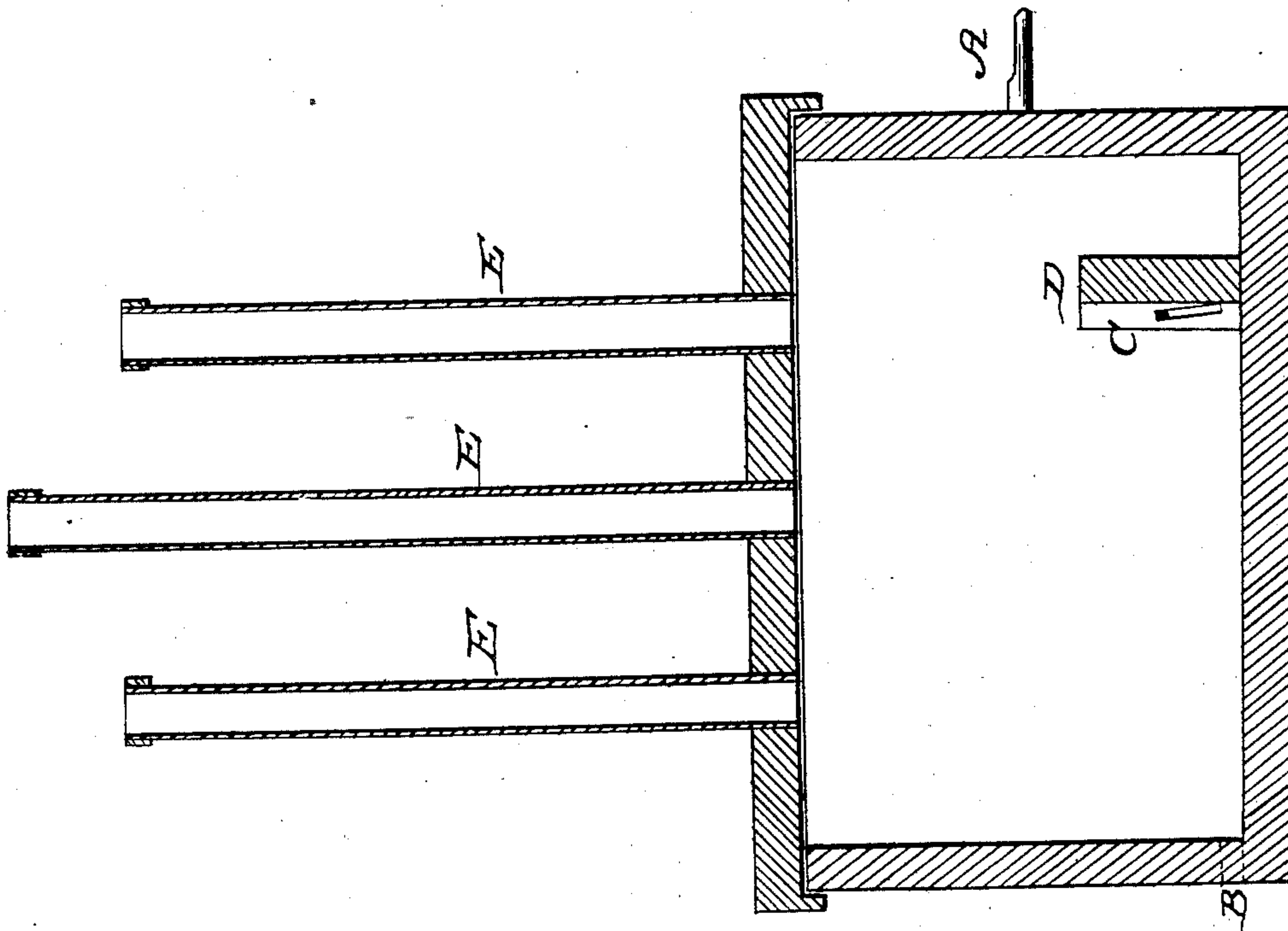


C. SHUNK.
Refining Iron.

No. 24,766.

Patented July 12, 1859.



WITNESSES
Daniel M. Cook
John H. Hengeman

INVENTOR
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UNITED STATES PATENT OFFICE.

CHRISTIAN SHUNK, OF CANTON, OHIO.

IMPROVEMENT IN REFINING IRON.

Specification forming part of Letters Patent No. **24,766**, dated July 12, 1859.

To all whom it may concern:

Be it known that I, CHRISTIAN SHUNK, of the town of Canton, in the county of Stark, in the State of Ohio, have invented a new and useful improvement for the refining and decarbonizing liquid or molten metal after being drawn from the hearth of the common blast-furnace in the manufacture of pig-iron from the ore, of which the following is a specification.

My improvement consists in the use of an outside or auxiliary hearth placed at a convenient distance from the base of blast-furnace, so depressed in the earth that a gutter from the tapping-notch in the hearth of the blast-furnace will conduct the molten metal to the reception-opening in the auxiliary hearth near the metal line, when my auxiliary tuyere-pipe is employed for the introduction of a current of atmospheric air for the refining and decarbonizing the liquid metal as it enters into the auxiliary hearth before its being cast into pig-iron.

The hearth can be made of the same material that the hearths of the ordinary blast-furnaces are made; or they can be made of other compact material, using the common fire-proof brick for lining and a cast-metal plate for a covering or top plate, with the necessary conductors or flues to enable the carbonic-acid gas and other impurities to escape, which are generated and emitted in the decarbonizing of the metal; or it may be made of cast-metal plates with lining of fire-proof bricks, with the metal top above described.

A is the reception-gutter, formed in the ground for conducting the metal from the hearth of the blast-furnace into the auxiliary hearth. B is the tapping-hole at the bottom of the auxiliary hearth, through which the metal is drawn to be molded into pig-iron. C is a permanent tuyere, made of graphite, plum-bago, or any other incombustible material, made to dip into the molten metal, which is

protected at its nozzle by the upright stone D, or in mason-work arranged in such a manner as to receive the blast-pipe, and to produce the desired deflection of the blast in the hearth during the refining process.

D is an upright stone projecting from and forming a part of the bottom of the auxiliary hearth, placed at a convenient angle with the sides of the hearth, which not only acts as a protector to the nozzle of the tuyere-pipe from the pressure of the metal entering the auxiliary hearth, but against which the blast from the tuyere-pipe is directed, so as to give the metal entering the hearth a spiral motion, and keeping it in circulation until the iron in the hearth has passed through the boiling or refining process, and ready to be withdrawn and cast into pig.

E E E are three conductors or flues, through which the carbonic-acid gas and other impurities generated and emitted from the metal in its refinement escape.

I do not confine myself to the precise form or size of the auxiliary hearth, nor the precise mode of applying the tuyere therein. They may be enlarged or diminished to suit the size or capacity of the hearth in the blast-furnace. The hearth may be made square, round, or octagon to suit the taste of the builders.

What I claim as my invention and improvement, and for which I desire to obtain Letters Patent, is—

The use of the external crucible or hearth, having the tuyere-pipe C, the projecting stone D, and the escape-pipe E, constructed as described, operating in such a manner that the blast shall deflect from the side of the upright stone and produce a rotary movement in the melted metal for the purpose of refining the same, as specified.

CHRISTIAN SHUNK.

Witnesses:

DANIEL MCCOOK,
JOHN S. HOLLINGSHEAD.