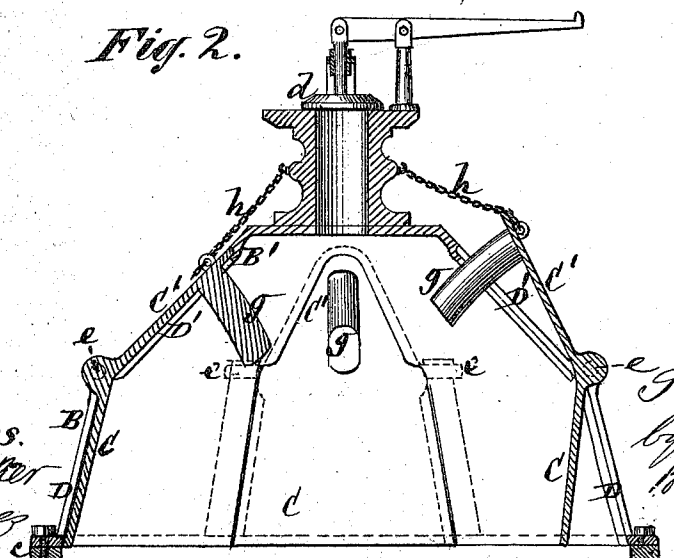
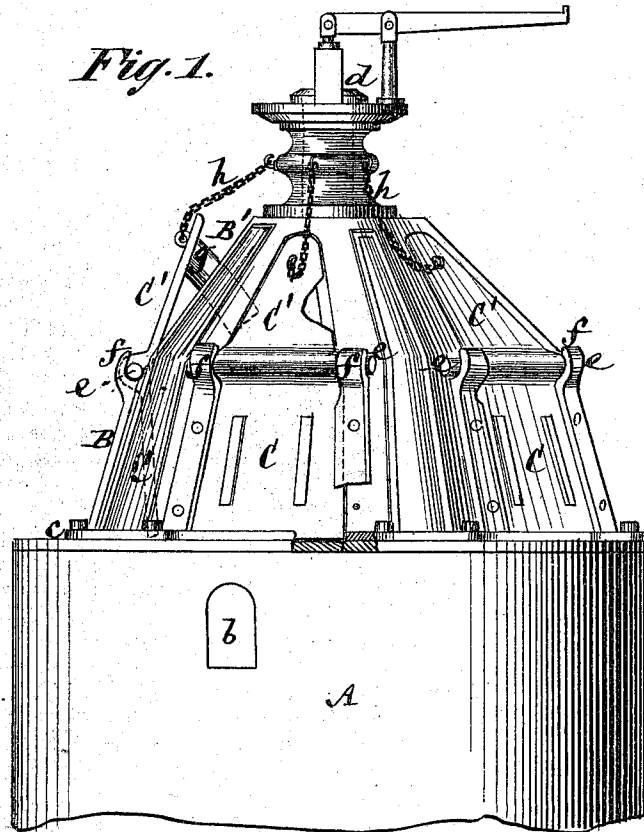


S. W. HARRIS.

Blast-Furnaces for Smelting Iron and Other Ores.

No. 142,464.

Patented September 2, 1873.



Witnesses.

John Pecker
Fred Haynes

S. W. Harris
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

SAMUEL W. HARRIS, OF ALBANY, ASSIGNOR TO BENJAMIN RAY, OF HUDSON,
AND IRA JAGGER AND THEODORE F. MINER, OF ALBANY, NEW YORK.

IMPROVEMENT IN BLAST-FURNACES FOR SMELTING IRON AND OTHER ORES.

Specification forming part of Letters Patent No. **142,464**, dated September 2, 1873; application filed
July 24, 1873.

To all whom it may concern:

Be it known that I, SAMUEL WASHINGTON HARRIS, of the city of Albany, in the county of Albany and State of New York, have invented an Improvement in the Tops of Furnaces for the Smelting of Iron and other Ores, of which the following is a specification:

This invention more particularly relates to blast-furnaces in which a hot-blast is used, as in the reissue No. 5,397, dated May 6, 1873, of original Letters Patent No. 123,894, dated February 20, 1872, granted me conjointly with others. The invention has for one of its objects the economy of the gases evolved in the smelting process, and their conduct in a cold dead state, by proper channels, to any desired place or places where they are to be used for heating the pipe-ovens or steam-boilers, or for illuminating and other purposes. The other general objects are, economy of fuel, increased production, and an improved quality of the metal, and the regulation of its quality, and increased durability of the upper part of the furnace. To these ends, I use a cover applied to the head of the furnace above an opening or openings provided for the exit of the gases to the place or places where they are to be utilized, and provide said cover with one or more charging-apertures, and swinging lids or doors for closing the same; and, furthermore, provide said cover with an opening for the escape of surplus gas, and a damper to regulate such escape. This improvement consists in a novel construction of the cover on the head of the furnace, and of the swinging doors or lids for closing the same automatically, whereby increased facility is afforded for charging, the swinging lids or doors are effectually closed, and an upward escape away from the face of the laborer engaged in entering the charge is provided for the gases through the charging opening or openings in the cover.

Figure 1 is a side view of the upper part of an ordinary blast-furnace with my improvement applied; and Fig. 2, a central vertical

section of the improved cover with its attached doors.

Similar letters of reference indicate corresponding parts.

A represents the upper part of the body of the furnace, having one or more openings, *b*, for the exit of the gases to be utilized; and B B' is the cover on the head of the furnace above the openings *b*. This cover, which is of polygonal shape in its transverse section, is composed of a main-body portion, B, mounted on the tree-nail plate *c*, and of an upper portion, B', the lower or main-body portion being constructed to slightly incline inward in an upwardly direction, and the upper portion B contracting more rapidly in the same direction, and being provided with a top opening and valve or damper *d* for the escape of any surplus gas. C C' are vertically-swinging doors, arranged to close charging-openings D D' in the sides of the cover. These doors are hung, by horizontal pivots or trunnions *ee*, intermediately of their length or height, within bearings *ff* at or near the junction of the top part B of the cover with the lower portion B' thereof; and said doors are so shaped, constructed, and arranged that the lower halves or portions C of the doors close against the outside thereof; and the inwardly-sloping construction of the tops of the doors away from the trunnions *ee* gives an overhanging weight in favor of the closing of the doors, even though the lower portion of the cover, against which the doors shut from the inside, inclines inwardly in an upward direction, or is out of vertical position, which greatly favors the charging of the furnace. Weights *g g* may also be added to the upper portions of the doors to insure the automatic closing of the latter; and chains *h h* be appended to restrain the opening of the doors beyond a given limit. But the main advantage of the openings D' in the upper portion B' of the cover, closed from the outside by the upper halves or portions C' of the doors, is that, when charging the furnace with fuel, ore, or flux by barrow pushed against the lower half of either swinging door, an outlet

is provided above for escaping gases away from the face of the laborer engaged in entering the charge, and the upper portions of the doors act as shields to protect him therefrom.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination, with the cover *B B'* of the vertically-swinging doors *C C'*, arranged to rock on intermediate pivots or centers *ee*, and

to open outwardly and inwardly in relation with the openings *D D'* against closing-weight applied to the upper portions of the doors, substantially as and for the purposes herein set forth.

SAM. W. HARRIS.

Witnesses:

JNO. TEMPLETON,
D. S. MANN.