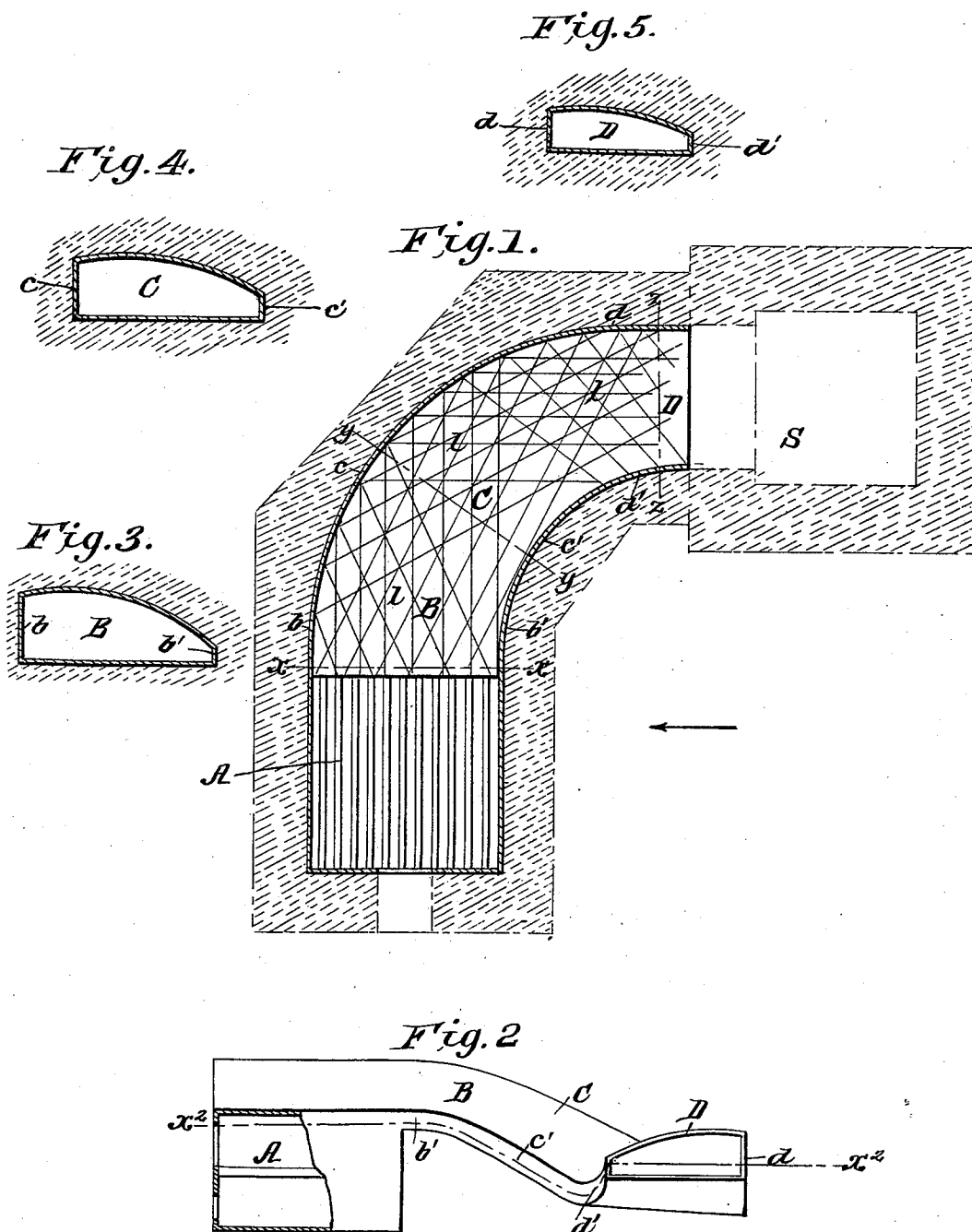


(No Model.)

E. CARTWRIGHT.
SMOKE CONSUMING FURNACE.

No. 478,401.

Patented July 5, 1892.



WITNESSES:
Fred G. Dietrich
Edw. W. Pyru.

INVENTOR:
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UNITED STATES PATENT OFFICE.

EDWARD CARTWRIGHT, OF WILBER, NEBRASKA, ASSIGNOR OF SEVENTH-NINTHS TO WILLIAM H. MANN, JOHN W. WEHN, JR., ALFRED BIGELOW, AND FRANK JELENIK, JR., OF SAME PLACE, JAMES A. PADDOCK, OF DEADWOOD, SOUTH DAKOTA, ERVIN W. CLANCY AND EMERIC LONGTIN, OF BEATRICE, AND TOBIAS CASTOR, OF LINCOLN, NEBRASKA.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 478,401, dated July 5, 1892.

Application filed April 28, 1891. Serial No. 390,831. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CARTWRIGHT, of Wilber, in the county of Saline and State of Nebraska, have invented a new and useful Improvement in Smoke-Consuming Furnaces, of which the following is a specification.

My invention is in the nature of an improved furnace for heating boilers, metallurgical and other uses, which is so constructed as to completely consume the smoke without the use of a blast; and it consists in the peculiar shape and arrangement of the outlet-flue or discharge-conduit, whereby I make available the effects of reflection and concentration of heat to secure the above results, which I will now proceed to describe with reference to the drawings, in which—

Figure 1 is a horizontal section taken through the furnace on line $x^2 x^2$ of Fig. 2, an interior shell only being shown and the masonry being indicated in dotted lines. Fig. 2 is a side elevation of a model or shell of the furnace, looking in the direction of the arrow in Fig. 1, the fire-box being broken away to show the position of the grate-bars; and Figs. 3, 4, and 5 are vertical cross-sectional views taken, respectively, through the lines $x x$, $y y$, and $z z$ of Fig. 1.

In the drawings, A represents the grate-bars of the furnace, having the usual fire-box above and around them and the ash-pit below.

Leading from the fire-box is the outlet-flue or discharge-conduit B C D for the products of combustion, the said flue extending from the side walls of the fire-box and entering the chimney-stack S. This fire-box and outlet-flue will in practice be built of fire-brick, as shown in dotted lines in Fig. 1; but for purposes of illustration it is shown in the form of a detached shell to better show its shape. The outlet-flue in passing from the fire-box to the chimney-stack S curves through a horizontal arc of ninety degrees, and as it proceeds from the furnace to the chimney it gradually tapers to a smaller transverse dimension. The outer wall $b c d$ of this flue or

conduit is of much greater vertical depth than the inner wall $b' c' d'$, and the roof portion is arched in cross-section, as shown in Figs. 3, 4, and 5. About the bridge-wall or middle of the flue it dips downwardly, as seen in Fig. 2, and at its end D it rises again slightly. All these peculiarities contribute to the perfect action of my furnace in consuming the smoke in the following way: As the hot gases and products of combustion turn the curve of the flue they are from centrifugal action thrown against the outer wall of the curve, where the conduit is made deeper in vertical direction to accommodate them, and in their passage around this wall of the curve they remain for a maximum length of time (being the longer path) in a position where they receive a maximum amount of heat, first, from the direct radiation of heat from the living coals on the hearth, (see lines l ,) and, secondly, from the flaming products of combustion. The heat rays l , striking the concave side of this outer curve, are also reflected along down the tapering flue and the heat concentrated in the tapering channel until the high temperature stimulates a complete union of the carbon particles of the smoke with oxygen, absolutely burning up the smoke and securing the most effective and economical combination of the fuel. The arched roof of the flue and the dipping down of the same at the bridge-wall at point C also have a useful effect in concentrating and intensifying the heat, while the upward cant of the end of the flue at D secures a quick discharge of the contents of combustion without retardation.

My furnace will be found chiefly useful in heating steam-boilers in smelting and in other metallurgical operations; but I do not confine it to this use, but may make it available in all kinds of furnaces.

Having thus described my invention, what I claim as new is—

1. A furnace having an outlet-flue curved from the side walls of the fire-box through a horizontal arc of ninety degrees and having greater vertical depth along the outer or

longer arc than it has along the inner or shorter arc, substantially as shown and described.

- 5 2. A furnace having a tapered or contracting outlet-flue curved from the side walls of the fire-box through a horizontal arc of ninety degrees and dipping down at a point between the ends of the flue and also having a greater vertical depth upon the outer or

large arc of the curve than it has upon the inner or smaller arc, substantially as shown and described.

EDWARD CARTWRIGHT.

Witnesses:

S. D. DAVIS,
J. H. GRIMM,
S. HAYEKAFB.

It is hereby certified that in Letters Patent No. 478,401, granted July 5, 1892, upon the application of Edward Cartwright, of Wilber, Nebraska, for an improvement in "Smoke-Consuming Furnaces," an error appears requiring the following correction, viz.: In line 7 of the grant and in the printed head of the specification, it is stated that said Cartwright assigned seven-ninths to William H. Mann, John W. Wehn, jr., Alfred Bigelow, and Frank Jelenik, jr., of same place, James A. Paddock, of Deadwood, South Dakota, Ervin W. Clancy and Emeric Longtin, of Beatrice, and Tobias Castor, of Lincoln, Nebraska, whereas it should have been stated that he assigned *five-sixths* to said parties; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 2d day of August, A. D. 1892.

[SEAL.]

CYRUS BUSSEY,

Assistant Secretary of the Interior.

Countersigned:

N. L. FROTHINGHAM,

Acting Commissioner of Patents.