J. Chilcott,

Steam-Boiler Fire-Tube.

No. 51,922. Patented Jan. 9, 1866.

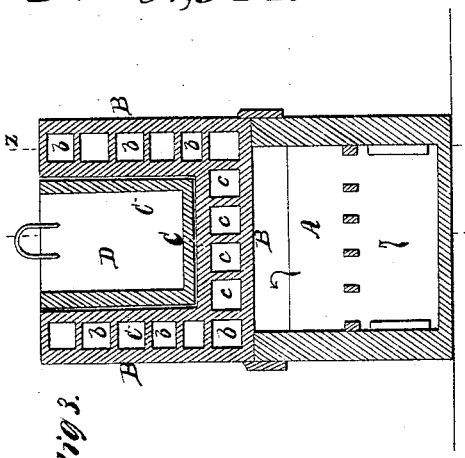

Fig 3.

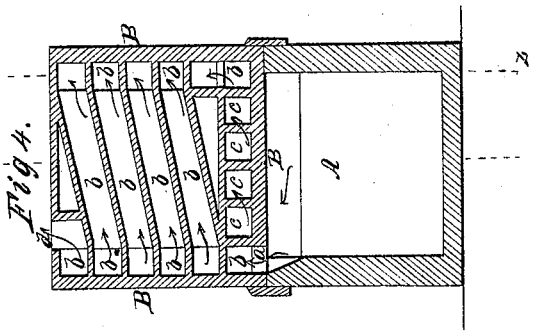

Fig 4.

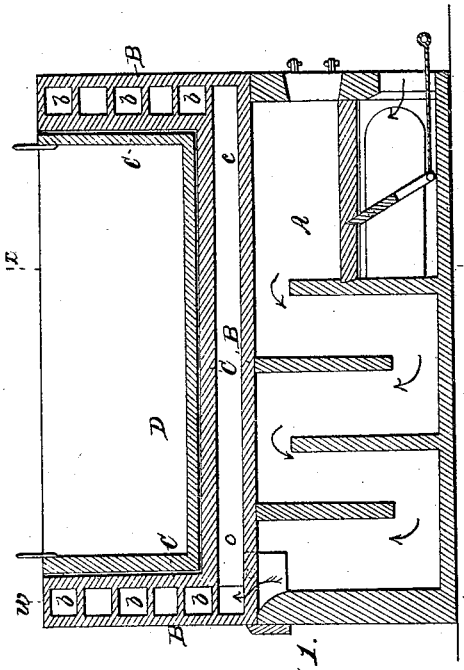

Fig 1.

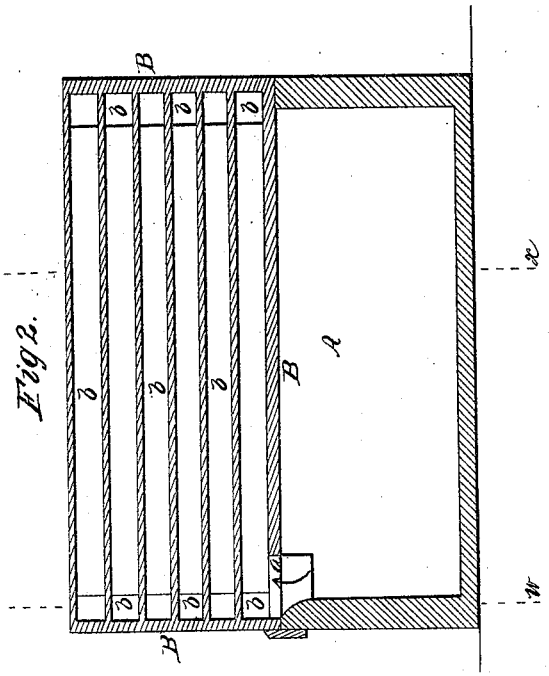

Fig 2.

Witnesses.

J. W. Coombs

G. W. Reed

Inventor.

John Chilcott

per Brown, Coombs & Co

Atty's.

UNITED STATES PATENT OFFICE.

JOHN CHILCOTT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN FLUES AND SETTING OF OPEN BOILERS.

Specification forming part of Letters Patent No. **51,922**, dated January 9, 1866; antedated December 28, 1865.

To all whom it may concern:

Be it known that I, JOHN CHILCOTT, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in the Flues and Setting of Open Boilers, Melting Pans, or Kettles; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a central vertical longitudinal section of an open boiler or melting-pan and its furnace, illustrating my invention. Fig. 2 is a vertical longitudinal section in a plane indicated by the line *z z* of Figs. 3 and 4. Fig. 3 is a transverse vertical section of the same in a plane indicated by the line *x x* of Figs. 1 and 2. Fig. 4 is a transverse vertical section through the plane indicated by line *w w* of Figs. 1 and 2.

Similar letters of reference indicate corresponding parts in the four figures.

My invention consists in a novel arrangement of flues for the circulation of the heat generated by combustion in a fire-box or furnace under the bottom and around the sides of an open tank or pan used for melting or boiling purposes.

To enable others skilled in the art to make and apply my invention, I will proceed to describe it with reference to the drawings.

Over the fire box or furnace A, of any known construction, is situated a double flue-jacket, B C, of cast-iron or fire-brick, within which is placed the pan or open boiler D. Between the outer shell, B, and the inner one, C, of the double jacket there is constructed a continuous system of flues, *c c b b*, into which there is an inlet, *a*, at one end and one side of the pan, Figs. 1, 2, and 4, for the entrance of the gaseous and volatile products of combustion from the furnace, and from which there is an outlet, *d*, Fig. 4, at the top, for the escape of the said products to the chimney or uptake. The flues *c c* are so constructed and arranged in the bottom of the jacket B C that the said gaseous and volatile products will circulate back and forth several times under the bottom of the pan or boiler before passing into the flues *b b*, which surround the jacket in several tiers in such manner that the said products of combustion circulate once around the jacket and pan in each tier, and through one tier after another several times around the jacket and pan before escaping to the chimney or uptake at *d*.

The flues *b b* are horizontal on three sides of the jacket, but on the fourth side are inclined in such manner (shown in Fig. 4) as to convey the gaseous and volatile products of combustion from one tier to the next above it, as indicated by the arrows in that figure.

The pan or boiler D may be of cast or wrought iron, or other metal, and of any desired form, the jacket being of corresponding form.

The heated gaseous and volatile products of combustion, circulating through the continuous system of flues several times back and forth under the bottom and around the sides of the jacket and pan, heat the contents of the pan very effectively, never burning the contents, as occurs in the heating or boiling of some substances when the bottom of the pan or boiler is exposed directly to the fire, and by being kept for a long time in the flues yield up all their available heat to the pan but what is unavoidably lost by radiation from the outside of the jacket or from the outer wall of any furnace, and no heat that could be utilized is permitted to escape to the chimney.

The flue-jacket and pan, instead of being placed directly over the fire-place or furnace, might be arranged in any other position relatively thereto, with a suitable communication from the fire-place or furnace to the opening *a*, Figs. 1, 2, and 4. In some cases the jacket and pan may be heated by the waste heat from a furnace used for some other purpose.

I do not claim surrrounding a pan or open boiler with a continuous series of external flues in communication with a fire acting directly on its bottom; but

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

The combination, for heating a melting pan, kettle, or open boiler, of a series of flues running back and forth under the bottom of the said pan, kettle, or boiler, and a series of flues surrounding the same, the whole forming a continous system through which there is a circulation from the furnace or fire-place to the chimney or uptake, substantially as and for the purpose herein specified.

Witnesses: JOHN CHILCOTT.

HIPPOLYTE MALI,

J. W. COMBS.