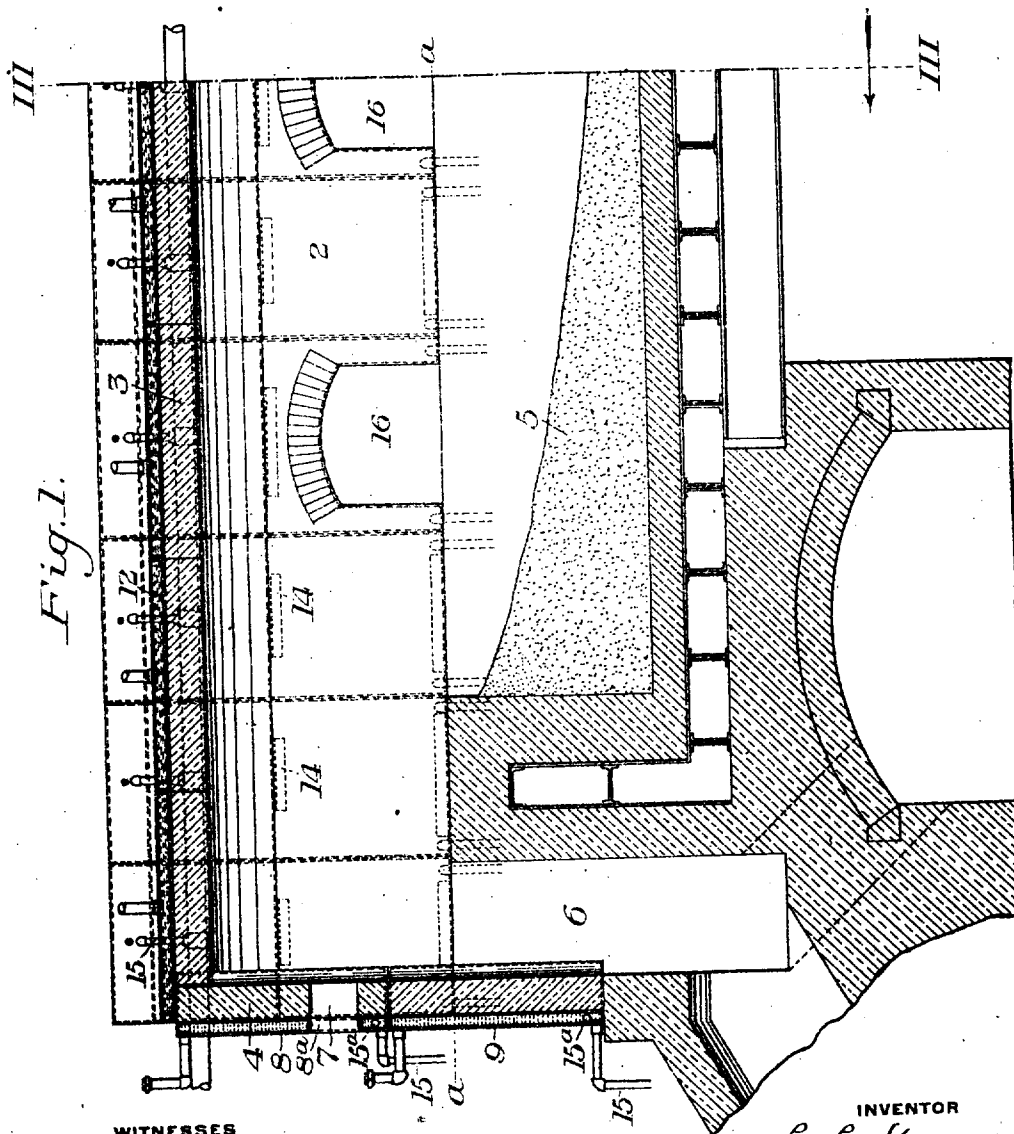


APPLICATION FILED MAY 12, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



**WITNESSES**

RA Balderson  
Walter Famaries

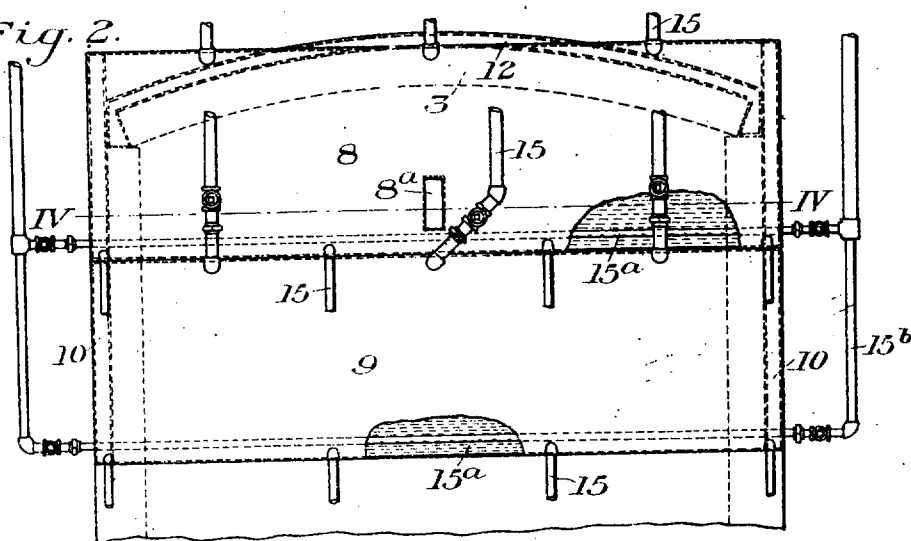
**INVENTOR**

C. C. Know,  
by Baker, Byrnes & Carmichael,  
his Attys.

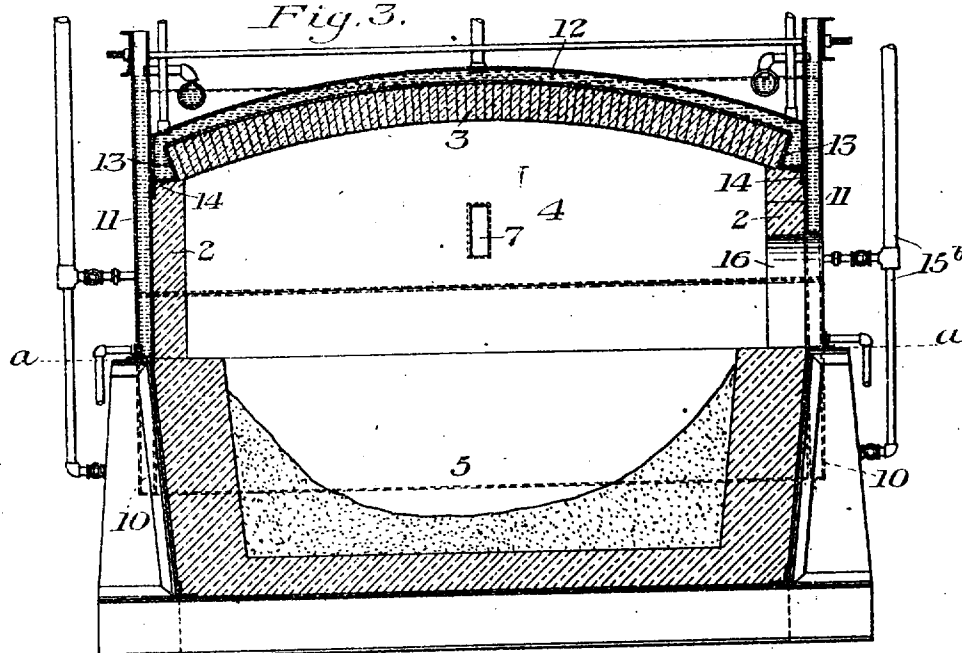
APPLICATION FILED MAY 12, 1910.

2 SHEETS—SHEET 2.

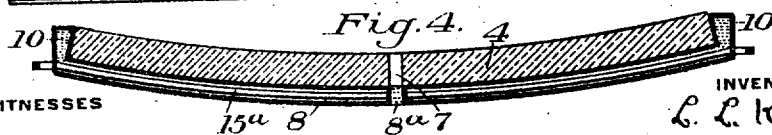
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



**WITNESSES**

**INVENTOR**

RA Balderson.  
Walter Famariss,

L. L. Knox,  
by Bahurser, Byrnes & Camilleri,  
his Attys.

# UNITED STATES PATENT OFFICE.

LUTHER L. KNOX, OF AVALON, PENNSYLVANIA, ASSIGNOR TO KEYSTONE FURNACE CONSTRUCTION COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FURNACE.

973,943.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed May 12, 1910. Serial No. 560,856.

*To all whom it may concern:*

Be it known that I, LUTHER L. KNOX, of Avalon, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section of one end portion of a furnace embodying my invention; Fig. 2 is an end view of the same with portions of the water jacket broken away; Fig. 3 is a section on the line III—III of Fig. 1; and Fig. 4 is a section on the line IV—IV of Fig. 2.

My invention has relation to certain new and useful improvements in furnaces, and more particularly to open hearth furnaces, and is designed to provide a novel system and arrangement of water-jacketing for the protection of the furnace.

The nature of my invention will be best understood by reference to the drawings, in which I have shown the same applied to an open hearth furnace of the oil-fired type, although the invention is applicable in many of its features to other types of furnaces.

In these drawings, the numeral 2 designates the side walls of the furnace, 3 the top or roof, and 4 the bulk head or end wall. 5 is the hearth, and 6 the air uptake.

7 designates the hole for the burner, which extends through the end wall or bulk head 4.

The end wall or bulk head 4 is projected by means of the hollow water-cooled plates 8 and 9 on its outer surface, these plates being arranged one above the other and extending transversely of the furnace. The plate 8 has an opening 8<sup>a</sup> therein registering with the opening 7 for the oil burner. The end wall, together with the cooling plates 8 and 9, is preferably arched transversely as shown in Fig. 4, the cooling plate having skew-backs 10 which hold the refractory material.

The upper portion of the furnace above the line *a—*a** (see Figs. 1 and 3), which is at the bottom of the furnace doors is preferably constructed separately from the base portion of the furnace below said line, so that such upper portion can be readily rebuilt when necessary. This upper portion is protected by a series of hollow cooling plates 11, which are arranged vertically side

by side, and which preferably cover the entire area of the side walls of the furnace above the line *a—*a**.

The roof of the furnace consists of a refractory inner wall and an outer series of cooling plates 12, both wall and plates being arched, and the plates having skew-backs 13 which support the wall. These skew-backs are shown as resting upon a series of angles 14. The water-cooled plates preferably extend over the entire area of the roof. These plates, together with the refractory lining of the roof, being in sections, any section of the roof can be readily removed and replaced.

15 wherever seen designates circulating pipes for the cooling plates. These pipes may be arranged in various ways, but are preferably so arranged that in all cases the cooled water will enter at the lower portion of a plate, while the heated water will escape from its upper portion.

The end plates 8 and 9 preferably have spray pipes 15<sup>a</sup> extending transversely across their lower ends, and supplied from feed-pipes 15<sup>b</sup> at each side. The pipes 16<sup>a</sup> are perforated and are arranged to discharge the cooling fluid directly against the lower walls of the cooler.

While I have shown only a portion of a complete furnace, it will be understood that both end walls of the furnace are preferably water-cooled in the manner described, and that the cooling plates for the roof and side walls extend throughout the entire length of the furnace. The cooling plates for the side walls of the furnace are fitted around the charging doors 16 in the manner shown in Fig. 1.

It will be noted that all the cooling plates will be arranged exteriorly of the furnace; that they can be readily applied to the furnace walls and roof; and that they afford an efficient protection to all portions of the furnace which are most subjected to the destructive action of heat.

What I claim is:—

1. In a regenerative furnace, an end wall or bulk head for the uptakes and ports, comprising a plurality of outer hollow cooling plates and an inner refractory wall or lining, the said wall or lining and plates being arched transversely and the cooling plates having skew-backs which support and carry the wall or lining; substantially as described.

2. In a regenerative furnace, an end wall or bulk head for the uptakes and ports, comprising a plurality of outer hollow cooling plates arranged transversely across the uptakes one above another and an inner refractory wall or lining, the said wall or lining and plates being arched transversely and the cooling plates having skew-backs which support and carry the wall or lining; substantially as described.

3. In a furnace, an arched roof comprising an inner refractory wall and a plurality of hollow closed cooling plates, each of said plates having means which support and carry a section of the refractory wall; substantially as described.

4. In a furnace, an arched roof comprising an inner refractory wall and a plurality of hollow closed cooling plates, each of said plates having skew-backs which support and carry a section of the refractory wall, said plates extending continuously across the arch; substantially as described.

5. In a furnace, a transversely arched roof consisting of an inner refractory wall, and a series of transversely arched hollow cooling plates which cover substantially the entire roof of the furnace, each plate having skew backs at its ends which carry a section of the refractory wall; substantially as described.

6. An open hearth furnace having refractory side walls and a binder for said walls consisting of water cooled plates which cover the major portion of the area of said walls, said plates extending upwardly above the roof of the furnace, and securing means engaging the upper portions of the plates; substantially as described.

7. An open hearth furnace having refractory end, side and roof walls, and a series of hollow water cooled plates covering the

major portion of the outer surface of each of said walls the plates at the ends and sides forming the furnace binders, and the roof plates supporting the refractory roof of the furnace; substantially as described.

8. An open hearth furnace having refractory end, side and roof walls, and a series of hollow water cooled plates covering the major portion of the outer surface of each of said walls, the side plates extending upwardly from the bottoms of the furnace doors, and the roof plates supporting and carrying the refractory roof wall; substantially as described.

9. An open hearth furnace having its hearth portion, and the portion above the hearth provided with separate and separable frames, and with separable walls, the line of separation being at substantially the bottom of the furnace doors; substantially as described.

10. An open hearth furnace having its hearth portion, and the portion above the hearth constructed with separate and separable frames, and with separable walls, the line of separation being adjacent to the bottom of the furnace doors, the upper portion having its side walls covered exteriorly by hollow cooling plates which extend upwardly from the line of separation; substantially as described.

11. A cooling member for furnaces, having therein a spray pipe arranged to discharge against a wall thereof, said pipe extending through opposite walls of the member; substantially as described.

In testimony whereof, I have hereunto set my hand.

LUTHER L. KNOX.

Witnesses:

H. M. CORWIN,  
GEO. H. PARMELEE.