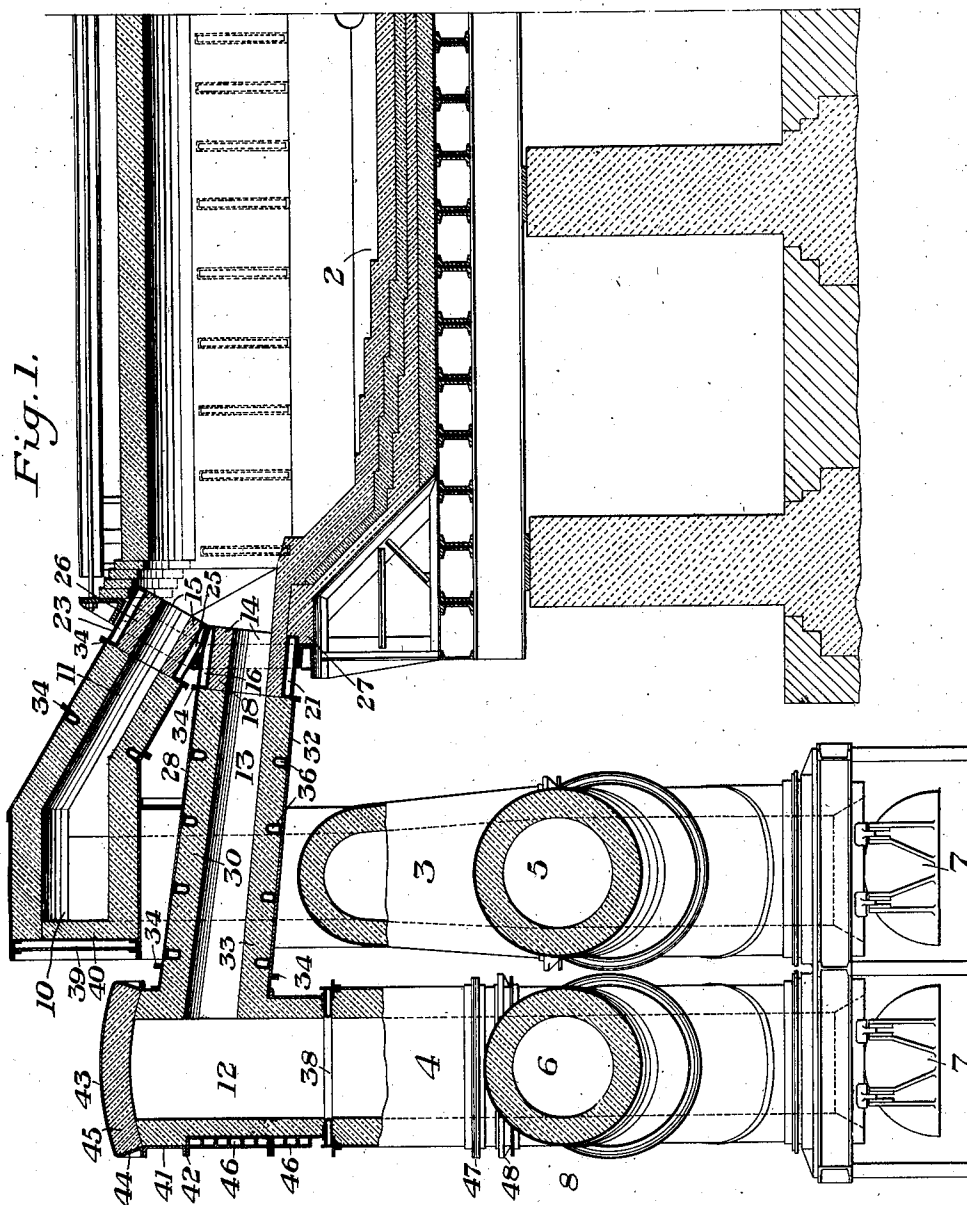


L. L. KNOX.
 REGENERATIVE REVERSING FURNACE.
 APPLICATION FILED MAR. 10, 1909.

938,246.

Patented Oct. 26, 1909.

2 SHEETS—SHEET 1.



WITNESSES

R. B. Balderson
G. L. Winters

INVENTOR

L. L. Knox,
 by *Baker, Byrnes & Parmelee,*
 his Attys.

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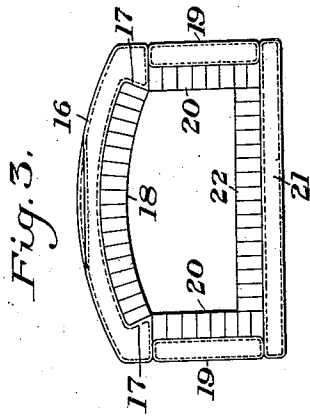
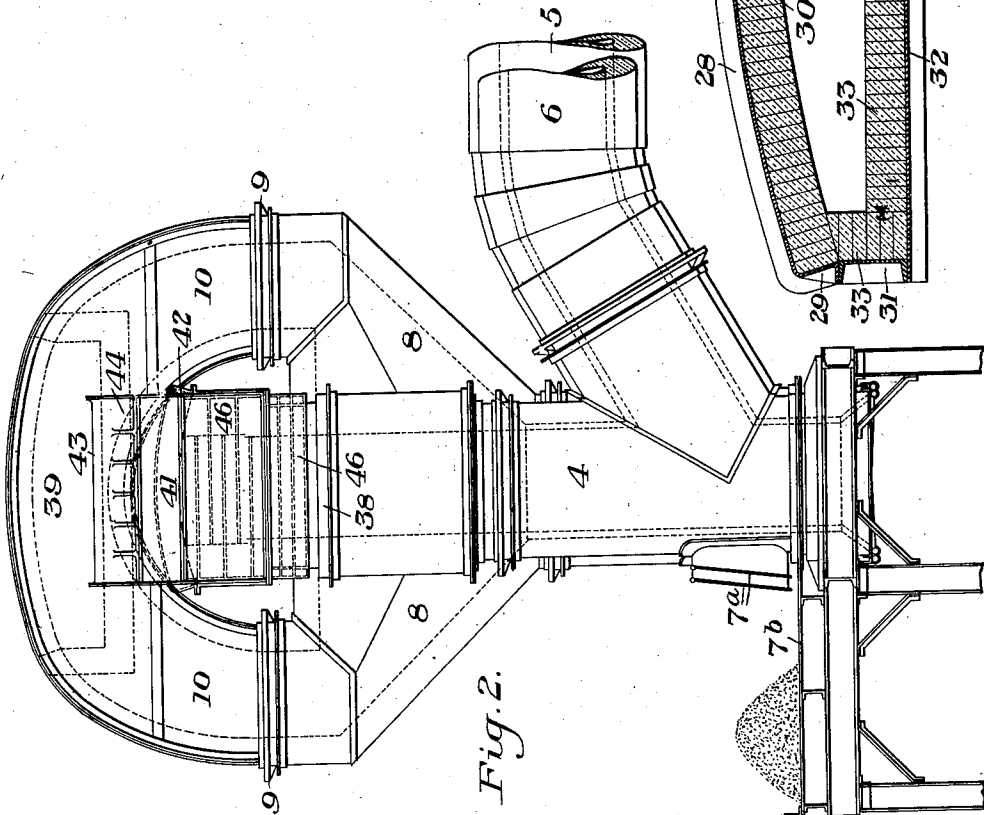
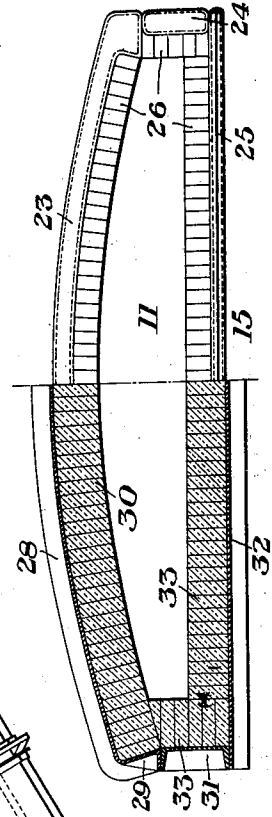


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

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

REGENERATIVE REVERSING-FURNACE.

938,246.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed March 10, 1909. Serial No. 482,473.

To all whom it may concern:

Be it known that I, LUTHER L. KNOX, of Ben Avon, Allegheny county, Pennsylvania, have invented a new and useful Regenerative Reversing-Furnace; 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 sectional elevation of one end portion of a furnace embodying my invention; Fig. 2 is an end view of the same; Fig. 3 is an end view of the gas port; and Fig. 4 is a view partly in end elevation and partly in vertical section of the air port.

My invention has relation to furnaces of the regenerative reversing type, and more particularly to the construction and arrangement of the gas and air ports; the object of the invention being to provide a construction and arrangement of these ports whereby the destructive action of the hot gases is reduced to a minimum, and whereby any portion or portions of the ports which may become burned out in service can be readily removed and replaced.

The nature of my invention will be best understood by reference to the accompanying drawings, in which I have shown the preferred embodiment thereof, which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of the parts without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to these drawings, the numeral 2 designates the hearth of an open hearth furnace, which may be of any usual or suitable construction.

3 designates the air up-take, and 4 the gas up-take at one end of the furnace. It will be understood that a similar arrangement of up-takes and of the ports, to be hereinafter described, is, in practice, provided at each end of the furnace.

5 designates the regenerator connection for the air port, and 6 the regenerator connection for the gas port. The up-takes 3 and 4 are provided with openings at their lower ends arranged to be closed by the hinged doors 7, thereby providing means for the discharge of slag, etc., into a suitable car or receptacle, which can be placed below said doors for

this purpose. The air up-take 3 is forked 55 or branched as indicated at 8, the two branches 8 being provided at their upper ends with the seats or supports 9 for the air box or chamber 10, which is transversely arched, as shown in Fig. 2, and which is 60 connected with the furnace chamber by a port or twyer 11. The gas up-take 4 is provided at its upper end with a seat for the gas box or chamber 12, which communicates with the furnace chamber by means of the 65 port or twyer 13.

The port or twyer 13 extends underneath the arch of the box or chamber 10, in the manner shown in Fig. 1, and enters the furnace chamber centrally below the air port 70 or twyer 11. Each of the ports or twyers 11 and 13 is provided at its inner or discharge end with a removable end portion 14 or 15. The detachable end portion 14 of the gas port or twyer 13 is provided with a surrounding water jacket. This water jacket is 75 preferably composed of an arched top section 16 having the skew-backs 17 which support the refractory arch 18; the side members 19 having the refractory lining 20, and 80 the base portion 21 having the refractory lining 22. The arched top 16 and 17 is supported upon the side walls 19 and 20 in the manner clearly shown in Fig. 3. The detachable end portion 15 of the air port or 85 twyer 11 is of similar construction, and consists of the hollow top casting 23, the side casting 24 and the base casting 25, with the refractory linings 26. The top casting 16 and the base casting 25 adjoin each other, as shown 90 in Fig. 1, thereby forming a double water-cooled protection at the discharge end portions of the two ports or twyers, this being the point where the destructive action is greatest. The end wall 27 of the furnace is 95 provided with an opening to receive these detachable ends, which discharge directly into the furnace chamber.

The body portion of each of the ports or twyers 11 and 13 consists of an outer shell 100 or casting, consisting of an arched top portion 28 having skew backs 29 for the refractory top arch 30; the side channels 31, and the base portion 32, with the inner refractory lining 33. These outer shells or castings are preferably made in sections having 105 bolting flanges 34, as shown in Fig. 1, so that any section can be readily removed and re-

placed. The detachable end ports 14 and 15, before described, are detachably secured to the bolting flanges 34 of the end sections of the body portions. These body portions may, if desired, be protected by the embedded cooling rings or boxes 36, as also shown in Fig. 1, any suitable number of these rings or boxes being employed in each port or twyer.

The arch 10, constituting the air box or chamber, is bodily removable from the seats or supports 9. The gas box or chamber 12 is also bodily removable from its support, a cooling box or ring 38 being preferably provided at the joints where this box is seated on the up-take 4.

The arch 10 is preferably constructed in a similar manner to the ports or twyers 11 and 13; that is to say, it has a metallic outer shell 39 with a refractory lining 40. The gas chamber or box 12 is also constructed with an outer metallic shell, preferably formed in sections 41, as indicated in Fig. 1 with bolting flanges 42 and with a removable top portion consisting of an outer shell or casting 43 having skew-backs 44 for carrying the top arch 45 of refractory material. The front or outer wall may be provided with a plurality of cooling boxes 46 to protect this wall against the cutting action of the hot gases. The up-take 4 may also be constructed in sections with joints as indicated at 47 and 48, so that any section can be readily removed. The downward extensions of the uptakes are preferably provided with side openings, normally closed by doors 7^a and through which, if desired, the accumulated deposits may be removed upon the platform 7^b as indicated in Fig. 2.

By reason of the arch form of the air box 10, the hot air and gases passing there-through have a curved path or sweep, thus obviating angles or corners in which their cutting action is increased. By the sectional construction described, any desired portion of the gas and air port structure can be readily taken out and replaced when necessary, being easily reached without the necessity of tearing down the entire structure. Inasmuch as the gas and air up-takes and the gas and air ports are constructed separately from each other, and from the body of the furnace, they are not only more readily accessible, but are also surrounded by air so that the air cooling effect is at a maximum.

Any suitable arrangement of water-circulating pipes may be connected to the hollow cooling boxes or sections in the manner well understood in the art.

It will be obvious that various changes may be made in the details of construction and arrangement of the parts. Thus, the gas and air ports or twyers may be made in any number of sections, the exact manner of building up and supporting the same may be

varied, and various other changes may be made.

I claim:—

1. In a regenerative reversing furnace, an air up-take constructed separately from the body of the furnace, and forked or branched at its upper portion, and an air box or chamber of transversely arched form supported on the branched end of the up-take, and having a port or twyer leading to the furnace; substantially as described.

2. In a regenerative reversing furnace, an air up-take constructed separately from the body of the furnace, and forked or branched at its upper portion, and an air box or chamber of transversely arched form supported on the branched end of the up-take and having a port or twyer leading to the furnace, said port or twyer having a detachable end portion; substantially as described.

3. In a regenerative reversing furnace, an air up-take constructed separately from the body of the furnace, and forked or branched at its upper portion, and an air box or chamber of transversely arched form supported on the branched end of the up-take and having a port or twyer leading to the furnace, said port or twyer having a water-cooled end portion; substantially as described.

4. In a regenerative reversing furnace, an air up-take constructed separately from the body of the furnace, and forked or branched at its upper portion, and an air box or chamber of transversely arched form supported on the branched end of the up-take and having a port or twyer leading to the furnace, said port or twyer being formed in a plurality of detachable sections; substantially as described.

5. In a regenerative reversing furnace, an air up-take constructed separately from the body of the furnace, and forked or branched at its upper portion, and an air box or chamber of transversely arched form supported on the branched end of the up-take and having a port or twyer leading to the furnace, said port or twyer being formed in a plurality of detachable sections, and also having water-cooling means; substantially as described.

6. In a regenerative reversing furnace, an air up-take branched or forked at its upper end portion, a transversely arched air box supported thereby, a separately constructed gas up-take, and a gas port connecting said up-take with the furnace and extending underneath the arch of the air box; substantially as described.

7. A regenerative reversing furnace having separately constructed gas and air up-takes, and separately constructed ports connecting said up-takes with the furnace chamber, each of said ports being formed in a plurality of sections; substantially as described.

8. A regenerative reversing furnace having separately constructed gas and air up-takes, and separately constructed ports connecting said up-takes with the furnace chamber, each of said ports being formed in a plurality of sections and having water-cooling means; substantially as described.

9. In a regenerative reversing furnace, a gas uptake, and a gas box or chamber removably supported on the upper end of the uptake, said box or chamber having a port leading to the furnace chamber, and also having a removable top or cover; substantially as described.

10. In a regenerative reversing furnace, separately constructed gas and air up-takes, a gas box or chamber removably supported upon the upper end of the gas up-take, and an air box or chamber removably supported on the upper end of the air up-take, said box or chambers having ports or twyers leading to the furnace chamber and constructed each in a plurality of detachable sections; substantially as described.

11. In a regenerative reversing furnace, having an up-take constructed separately from the body of the furnace and formed in detachable sections and a port removably supported upon the upper section of the uptake and connecting the same with the furnace chamber; substantially as described.

12. In a regenerative reversing furnace having an up-take constructed separately from the body of the furnace and formed in detachable sections, each of said sections having an outer metallic shell and a refractory lining; substantially as described.

13. In a regenerative reversing furnace,

gas and air up-takes, constructed separately from the body of the furnace and of each other, said up-takes having extensions below the regenerator connections, said extensions having discharge openings and means for normally closing said discharge openings; substantially as described.

14. In a regenerative reversible furnace, an uptake having a removable top section, a port or twyre leading from said top section to the furnace chamber, and a coaling box or casting applied to the outer surface of the front wall of said section opposite the entrance to the port or twyer; substantially as described.

15. In a regenerative reversing furnace, an uptake having its front wall provided with a hollow cooling box inset therein from the outer surface of the wall and protected at its inner side by a lining of refractory material, said box having a plurality of interior baffles or partitions; substantially as described.

16. In a regenerative reversing furnace, a gas uptake, a gas box or chamber removably supported upon the upper end of the uptake and having a port leading to the furnace chamber, and a water cooling box or casting inset into the outer wall of said box or chamber opposite the said port and extending throughout the major portion of the height of said box or chamber.

In testimony whereof, I have hereunto set my hand.

LUTHER L. KNOX.

Witnesses:

H. M. CORWIN,

GEO. H. PARMELEE.