

No. 647,663.

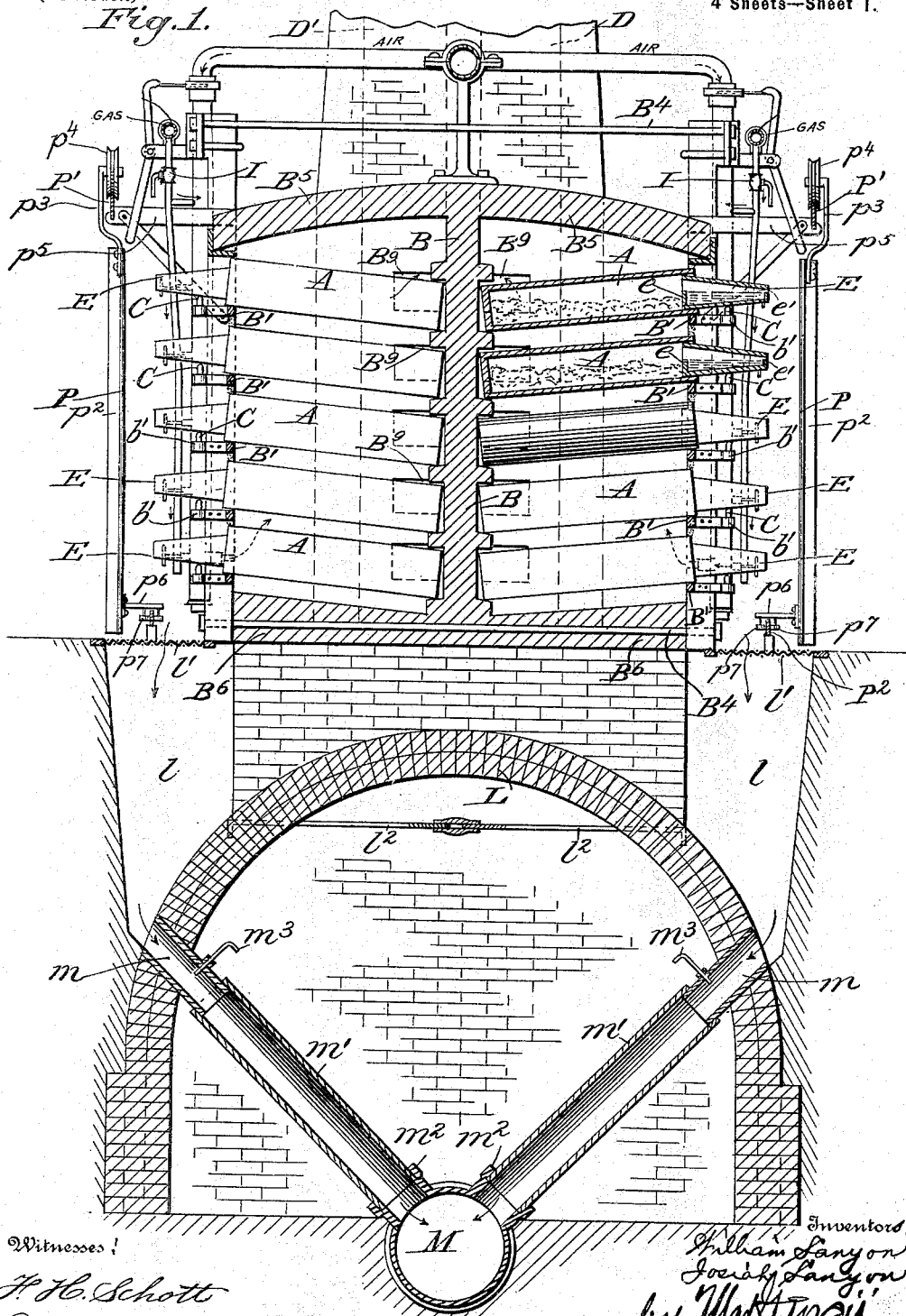
Patented Apr. 17, 1900.

W. & J. LANYON.  
METALLURGICAL FURNACE.

(Application filed May 25, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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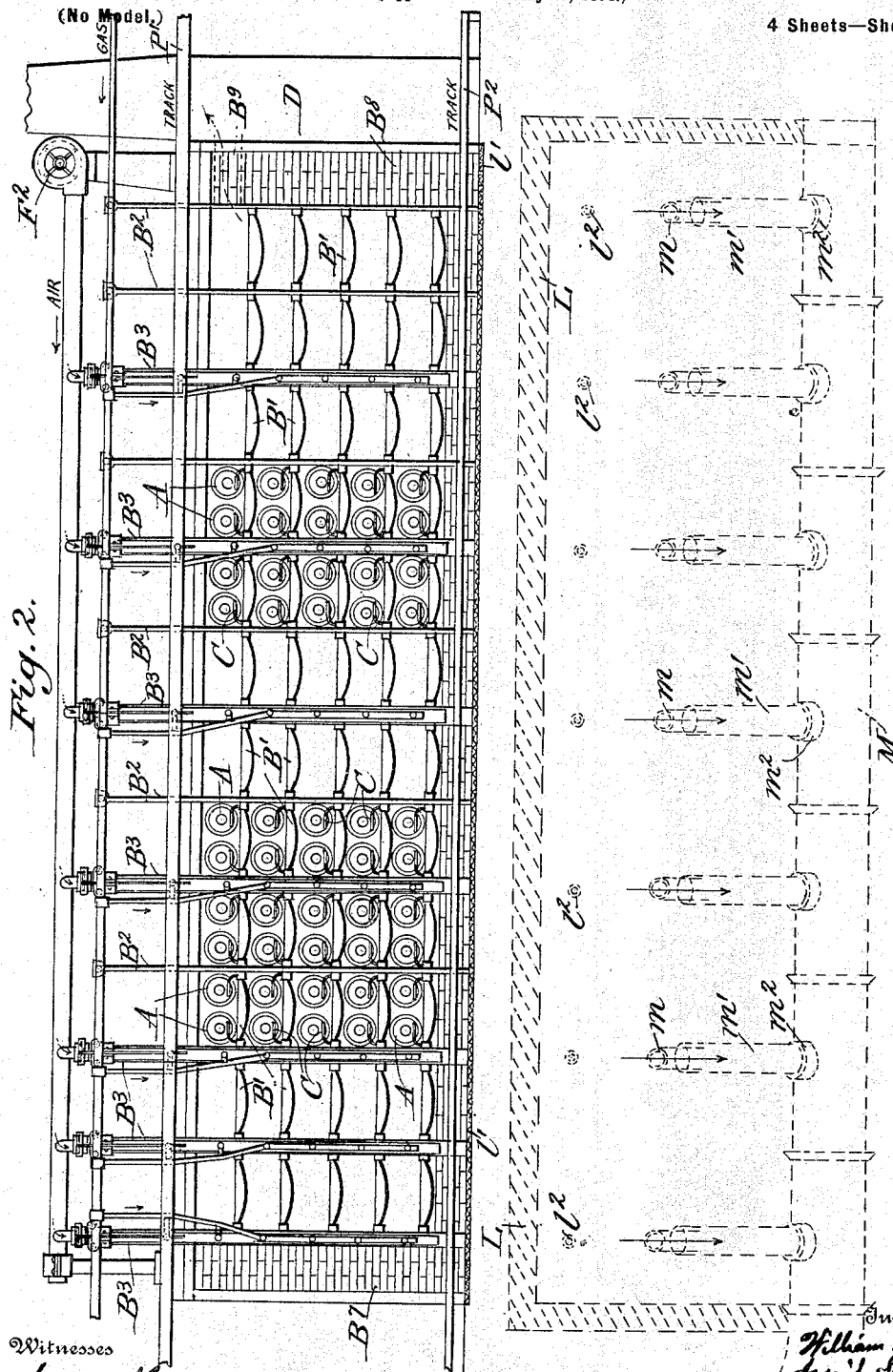
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(Application filed May 25, 1898.)

4 Sheets—Sheet 2.



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Fig. 4.

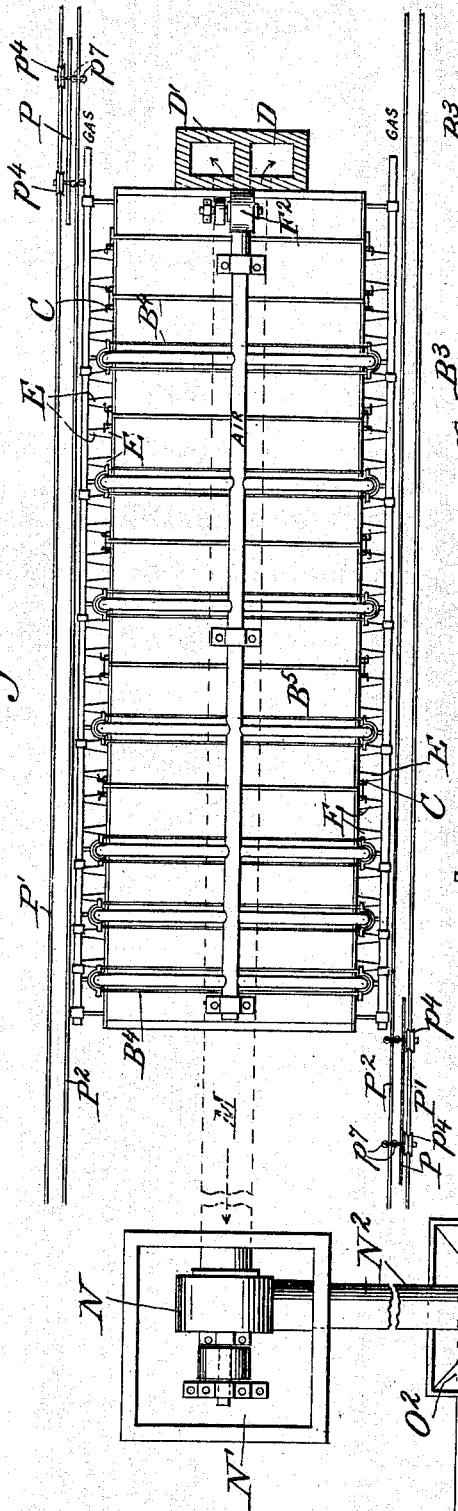
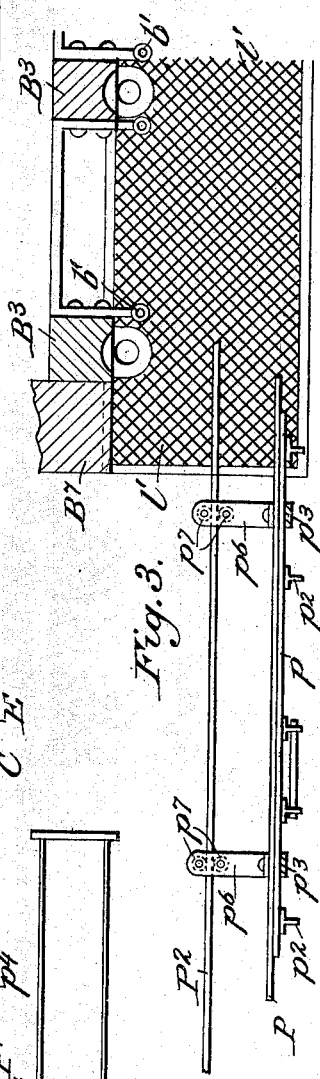


Fig. 3. I'



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(No Model.)

4 Sheets—Sheet 4.

Fig. 6.

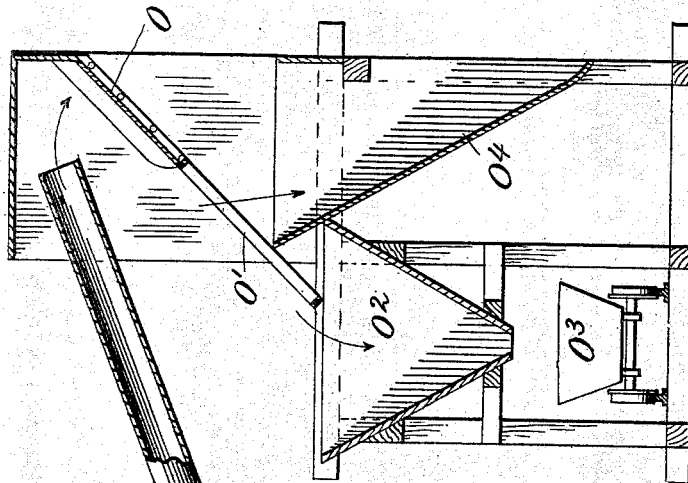
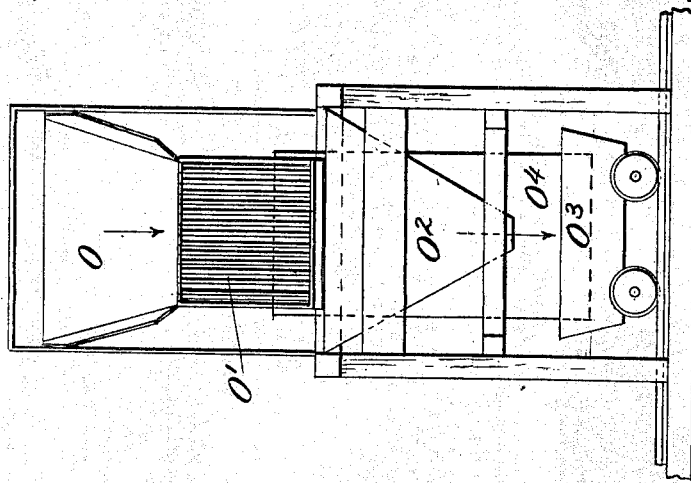
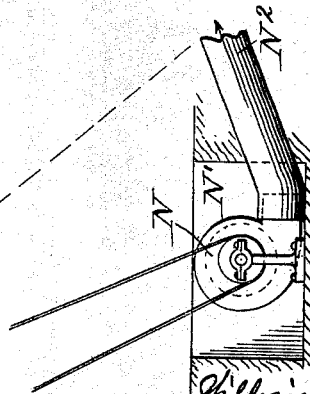


Fig. 5.



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# UNITED STATES PATENT OFFICE.

WILLIAM LANYON AND JOSIAH LANYON, OF PITTSBURG, KANSAS.

## METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 647,663, dated April 17, 1900.

Application filed May 25, 1898. Serial No. 681,718. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM LANYON and JOSIAH LANYON, citizens of the United States, residing at Pittsburg, in the county of Crawford and State of Kansas, have invented certain new and useful Improvements in Metallurgical Furnaces: and we do hereby declare the following to be a full, clear, and exact description of the invention, as such will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in metallurgical furnaces.

The object of our invention is to provide a plant particularly adapted for the smelting of metals, which will require less labor to operate than any such plants hitherto known to us.

With this object in view our invention consists in the features, details of construction, and combination of parts which will first be described in connection with the accompanying drawings and then particularly pointed out in the claims.

In the drawings, Figure 1 is a transverse section of a block of furnaces and a cellar beneath the same embodying our invention, this section being taken on the line 1 1, Fig. 2; Fig. 2, a front elevation of the block of furnaces, some of the retorts being removed, the cellar being shown in dotted lines; Fig. 3, a detail plan view showing a furnace-shield near one end of the track, a portion of one corner of the block of furnaces, and the screen near one end of the same; Fig. 4, a plan of the entire plant; Fig. 5, a sectional view of the screening apparatus, and Fig. 6, a front elevation of the same.

Referring to the drawings, A, Figs. 1 and 2, are retorts constructed in the usual manner with closed rear ends and open front ends, these retorts being set in a furnace in such a manner as to slope rearward, being in the present instance supported at the rear by a central wall B and at the front by bearing-bars B' of any desired construction carried by buckstays B<sup>2</sup> B<sup>3</sup>, Fig. 6, which extend vertically at intervals along the sides of the furnace and are tied together in the usual manner by tie-rods B<sup>4</sup> at the top and bottom of the furnace.

The top of the furnace is arched over, as indicated at B<sup>5</sup>, and the bottom of the furnace

is formed of brickwork or the like, as shown at B<sup>6</sup>. Suitable ends B<sup>7</sup> B<sup>8</sup> are formed, one of said ends B<sup>8</sup> having openings B<sup>9</sup>, arranged to permit the passage of the products of combustion to stacks D D'.

E are condensers constructed in the usual way, conical in form and each provided with a rear curtain-wall e, and a front tapping-hole, as indicated at e', arranged to be closed, when desired, by a plug of fire-clay or the like. The condensers are so constructed that their larger rear ends may be inserted into the front ends of the respective retorts A, being suitably luted in place, in a well-known manner, in order to connect the condenser and retort so that the products of distillation can pass from the retort to the condenser. In order to support the outer ends of these condensers E, any suitable means may be employed as, for example, the swinging arms C, Fig. 2.

The buckstays B<sup>2</sup> B<sup>3</sup> may be of any usual or preferred construction, and certain of them are provided with suitable means for supplying either air, gas, or air and gas to the furnace—such, for example as shown in our Letters Patent No. 621,576, dated March 21, 1899.

Each block of furnaces, comprising two series of retorts placed back to back, is located over a cellar wider than the furnace-block and having an arched roof L, the cellar extending the full length of the block of furnaces, the spaces immediately over each hip of the arched roof being left open, as shown at l, Fig. 1. Over each space at the level of the floor is a grating l', Figs. 1 and 3. The arched roof of the cellar is strengthened by tie-rods l<sup>2</sup>, and the hips of the arch are perforated at frequent intervals for the reception of the outer ends of branch conduits extending in an incline downward to the center of the cellar-floor, where they are connected to a main conduit M, preferably embedded in the floor of the cellar.

Each branch conduit is constructed of two parts, the outer part being a nipple m, extending through the hip of the arched roof L and secured therein, the other part, m', being telescopically arranged on the inner end of the nipple m and having its lower end inserted snugly, but detachably, into a bell-shaped socket m<sup>2</sup> on the main conduit. By this construction the portion m' of each conduit may

be slipped out of place and entirely removed when desired. In the nipples  $m$  are placed sliding cut-offs  $m^3$ .

At one end of the cellar the main conduit  $M$  extends some distance beyond the block of furnaces, being connected to an exhaust-fan  $N$ , Fig. 4, which is located in a pit  $N'$ . The exhaust-fan has a discharge-pipe  $N^2$ , Figs. 4 and 5, arranged to discharge onto an inclined apron  $O$ , Fig. 5, at the bottom of which is a screen  $O'$ , having a slope similar to that of the apron, said screen being arranged to discharge its tailings into a hopper  $O^2$ , preferably located enough above the ground or floor to permit a car  $O^3$ , cart, or the like to be run beneath the hopper, the latter having an opening in its bottom. Beneath the screen  $O'$  is placed a chute  $O^4$ , sloping in a direction opposite to the slope of the screen and arranged to catch the material passing through the screen and deliver it to a car or the like.

In connection with each series of retorts of a block of furnaces a furnace-shield is employed for protecting the workmen from the heat of the furnace when cleaning out the retorts. This shield is of any usual or preferred construction, and it is provided with the necessary opening or openings to permit access to the retorts. The particular form shown in this application is that shown and claimed in our Patent No. 621,577, dated March 21, 1899. This shield is carried by means of hangers  $p^3$  from grooved rollers  $p^4$ , arranged to run on a track  $P'$ , secured overhead in some suitable manner, as by brackets  $p^5$ , attached to the intermediate buckstays  $B^3$ . In order to prevent the shield from swinging laterally, it is provided on its rear face at the lower end with one or more inward-extending arms  $p^6$ , carrying rollers  $p^7$ , arranged in pairs which run on opposite sides of a lower track  $P^2$ , fixed in any suitable manner to the furnace, preferably about the level of the furnace-floor.

The operation of our plant is as follows: Assuming that the condensers  $E$  have been removed and a charge from which zinc is distilled introduced into the retorts  $A$  in the usual manner the condensers are thereupon replaced. The furnace is then heated in any ordinary manner, but usually by supplying air and gas through the hollow buckstays, the fan  $F^2$  being started in operation. The products of combustion escape through the openings  $B^3$  into the stacks  $D D'$ . The metal being volatilized in the retorts escapes to the condenser and is there condensed to its molten condition in the usual manner and is drawn off from time to time. When a row of retorts has been exhausted by the distillation of all its metal, the condensers are first removed in the usual manner, whereupon the furnace-shield is brought into operation and the residues of distillation are withdrawn. The material thus removed from the retorts falls through the wire screen or grating  $U$ , those pieces which are too large to pass through the meshes of said screen being caught on the

screen and removed in carts, barrows, or wagons, while the finer portions pass through the open space  $l$  and through the branch conduit  $m m'$  to the main conduit  $M$ , the material being drawn through said conduit by the action of the fan  $N$  and discharged onto the apron  $o$ , from which it slides onto the screen  $O'$ , where the ashes and slag fall through the screen-bars and slide down the chute  $O^4$ , while the cinders or coke, which are generally larger than the accompanying materials, are discharged into the hopper  $O^2$  and fall from there into a suitable cart, wagon, or car  $O^3$ , to be removed for further use. In case of the stoppage of any one of the branch conduits  $m m'$  the portion  $m'$  may be removed by slipping its end out of the socket  $m^2$  and then removing said end upward and drawing the upper end of the said portion  $m'$  off the inner end of the nipple portion  $m$ , there being enough play in the connection of the outer end of the portion  $m'$  and the inner end of the nipple  $m$  to permit this, it being understood that the gate or cut-off  $m^3$  is closed first. In case of the main conduit becoming plugged, so that it will not remove the material, the portions  $m'$  of all the branch pipes may be removed and the cut-offs  $m^3$  opened, thereby allowing the material coming from the furnace to pass into the cellar, from which place it may be removed manually until the conduit has been cleared ready for operation again.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a screen, and a retort arranged to discharge onto said screen, of a conduit having an opening below said screen, and means for moving material through the said conduit.

2. The combination, with series of retorts located above the level of the furnace-room floor, and a cellar beneath said retorts and below the furnace-room floor, of a conduit having its end projecting through the cellar-wall and opening beyond the outer ends of the retort, a screen located substantially at the level of the furnace-room floor, over the end of the conduit and arranged to receive the discharge from the retorts, and means for moving material through the said conduit.

3. The combination, with a block of furnaces, provided with retorts, and a cellar beneath said furnaces and arranged to extend beyond the retorts, of a branch conduit opening through the cellar-wall and arranged to receive the discharge from the retorts, a main conduit in connection with the branch conduit, and means for transporting material through said conduits.

4. The combination, with a block of furnaces, and cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which furnaces may discharge, of a plurality of branch conduits extending through and opening outside the hips of said arched roof, and

means for transporting material through the branch conduits.

5 The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which the furnaces may discharge, of a plurality of branch conduits extending through and opening outside the hips of said arched roof, a main conduit connected to said branch conduit, and means for moving material through the main conduits.

15 6. The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which the furnaces may discharge, of a plurality of branch conduits extending through and opening outside the hips of said arched roof, said branch conduits having removable portions, a main conduit connected to said branch conduits, and means for moving material through the conduits.

25 7. The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which the furnaces may discharge, of a plurality of branch conduits extending through and opening outside the hips of said arched roof, said branch conduits being provided with cut-offs and having removable portions, a main conduit connected with said branch conduits, and means for moving material through the conduits.

35 8. The combination, with a furnace, and a cellar arranged longitudinally beneath and wider than the block of furnaces, of a branch conduit extending beyond the cellar and open at its outer end, a retort in the furnace having its end arranged to discharge into the open end of the branch conduit, means for removing material from said branch conduit, and a screening device onto which said means discharges the material.

45 9. The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which said furnaces may discharge, of a plurality

of branch conduits extending through and opening outside the hips of said arched roof, a main conduit in communication with the branch conduits, a screening device, and a fan arranged to move material through the conduits and discharge it onto the screening device. 55

10. The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof onto which said furnaces may discharge, of a plurality of branch conduits extending through and opening outside the hips of said arched roof, said branch cut-off being provided with removable portions, a main conduit in communication with the branch conduit, a screening device, and a fan arranged to move material through the conduits and discharge said material onto the screening device. 60 65 70

11. The combination, with a block of furnaces, and a cellar arranged longitudinally beneath and wider than the block of furnaces, said cellar having an arched roof, of a plurality of branch conduits extending through and opening outside the hips of the arched roof, a plurality of retorts in the block of furnaces and arranged to discharge onto the hips of the arched roof, a main conduit connected to the branch conduits, a screening device, and means for moving material through the conduits and discharging it onto the screening device. 75 80

12. The combination, with a block of furnaces, a plurality of retorts therein, and a cellar arranged longitudinally beneath the block of furnaces, said cellar having openings through which the discharge from the retorts may fall, of tracks in front of the furnaces, and a fire-shield mounted on said tracks outside of said openings and provided with apertures to permit access to the retorts, substantially as described. 85 90

In testimony whereof we affix our signatures in presence of two witnesses.

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JOSIAH LANYON.

Witnesses:

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