

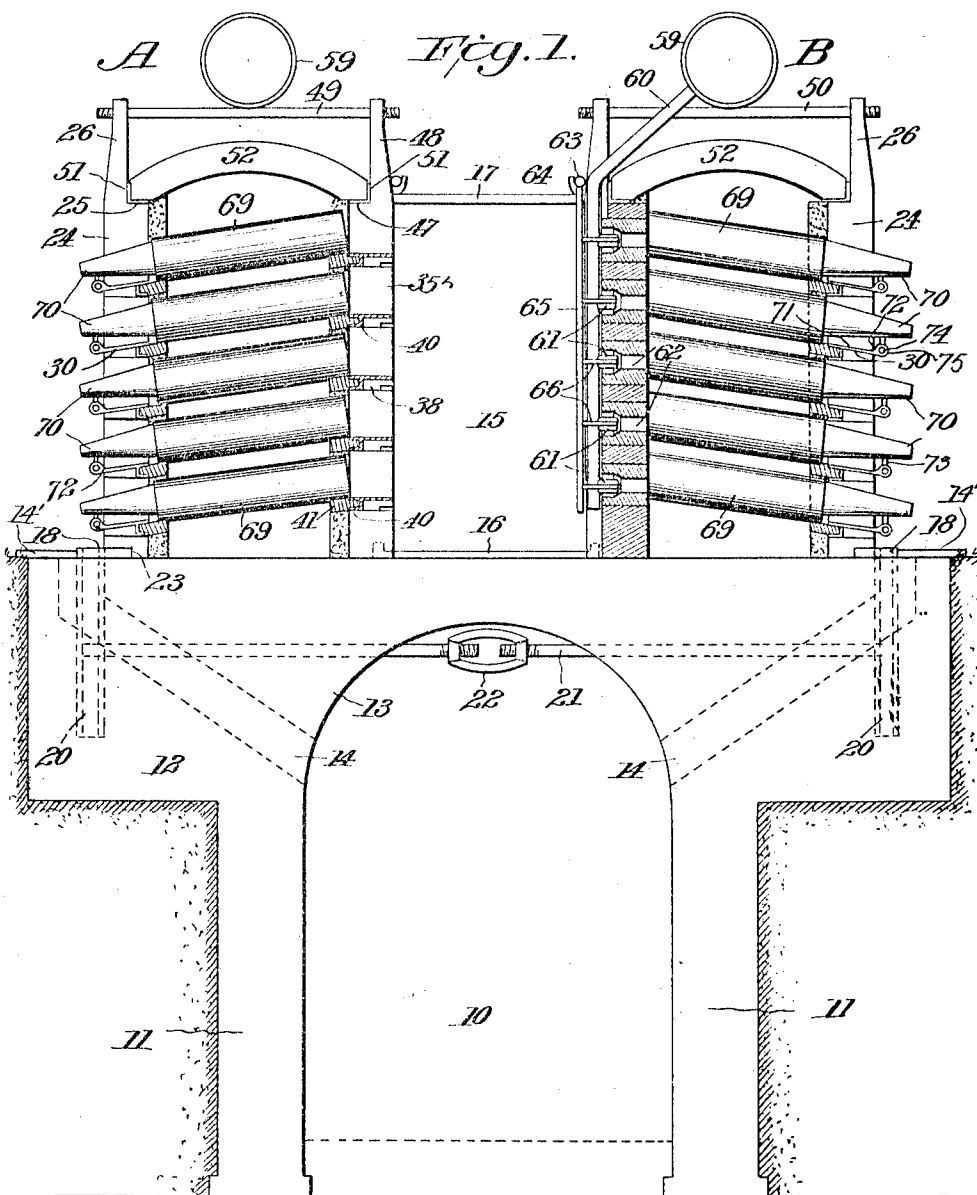
G. LONDRESS & W. WORLEY.
ZINC FURNACE.

APPLICATION FILED JUNE 25, 1912.

Patented Dec. 24, 1912.

4 SHEETS—SHEET 1.

1,048,420.



WITNESSES

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INVENTORS.

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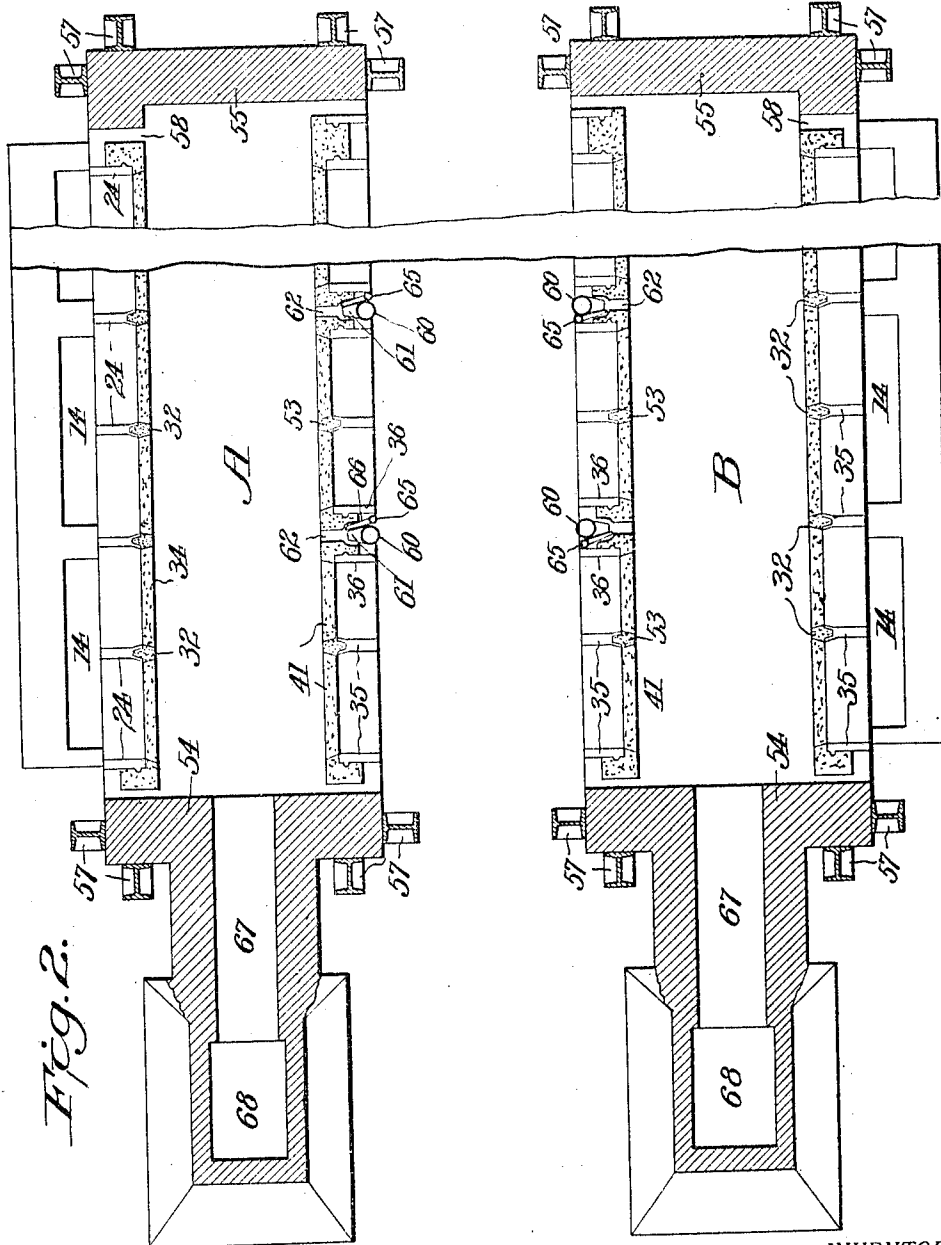


Fig. 2.

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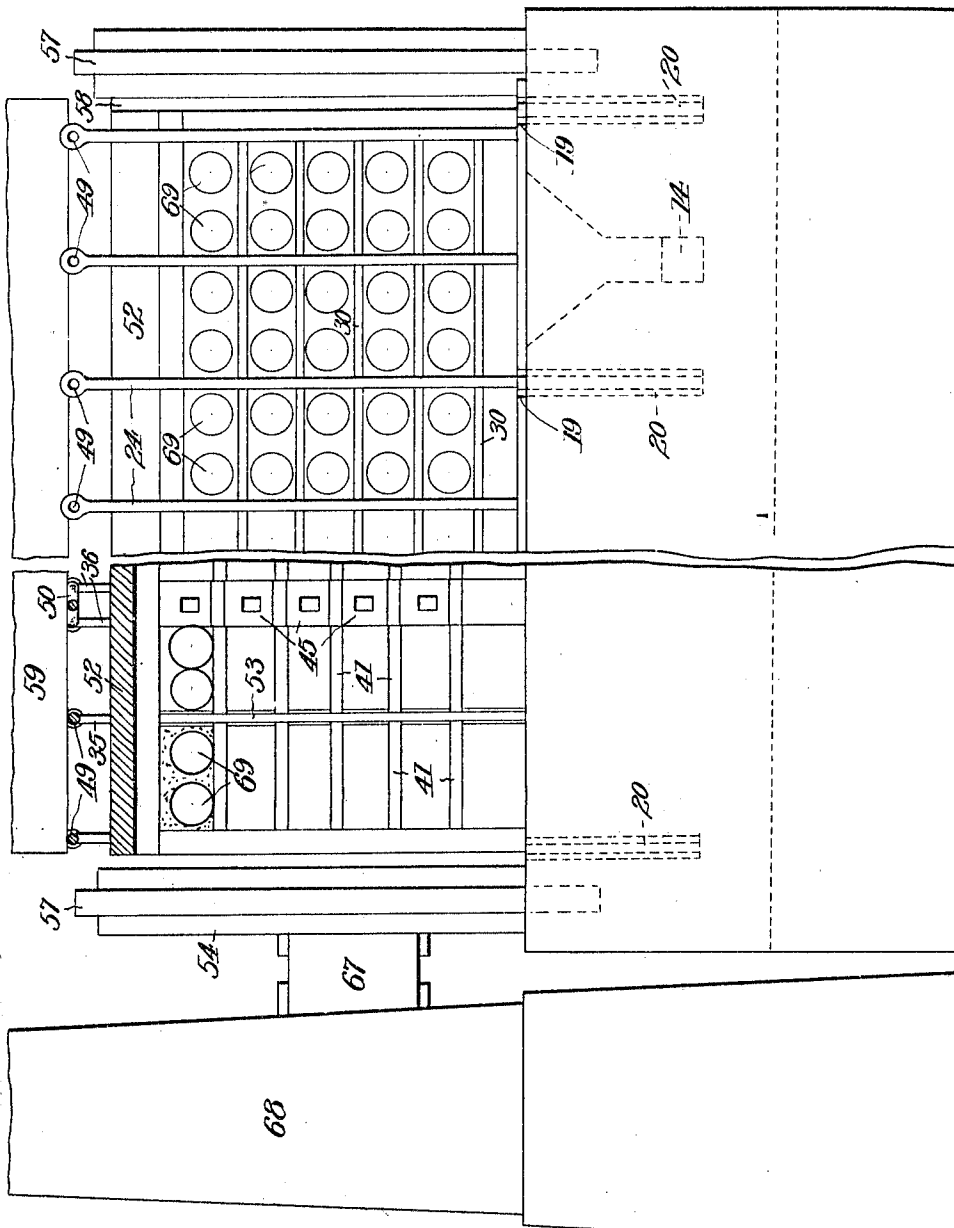
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Fig. 3.

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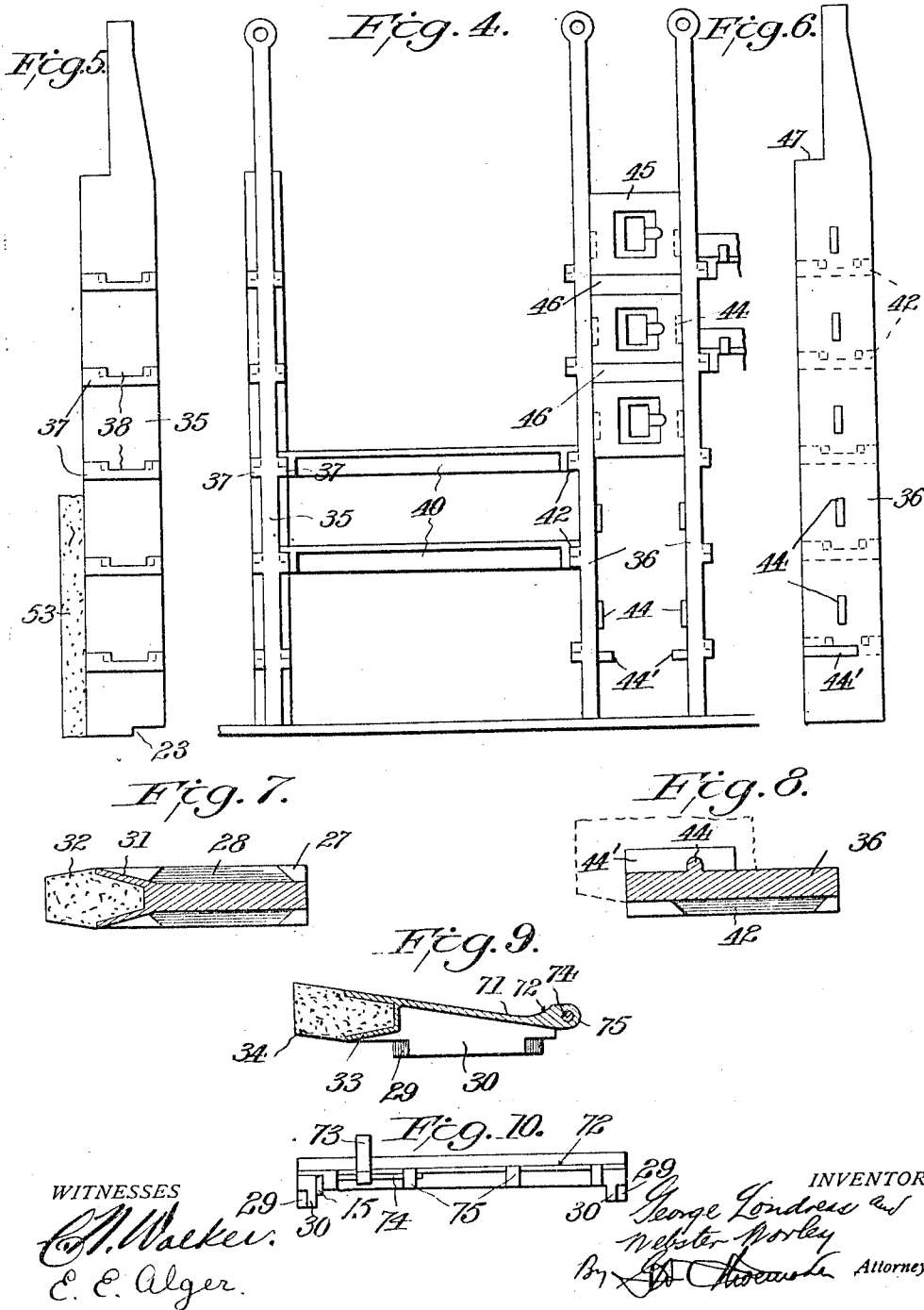
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UNITED STATES PATENT OFFICE.

GEORGE LONDRESS AND WEBSTER WORLEY, OF GRAFTON, WEST VIRGINIA.

ZINC-FURNACE.

1,048,420.

Specification of Letters Patent.

Patented Dec. 24, 1912.

Application filed June 25, 1912. Serial No. 705,834.

To all whom it may concern:

Be it known that we, GEORGE LONDRESS and WEBSTER WORLEY, citizens of the United States, residing at Grafton, in the county of Taylor and State of West Virginia, have invented certain new and useful Improvements in Zinc-Furnaces, of which the following is a specification.

This invention relates to smelting furnaces.

One object is to provide for the construction of a smelting furnace embodying such parts in the frame work thereof as to enable the furnace to be built at a comparatively small expense and with a minimum amount of labor without in any way depreciating the strength and life of the structure.

Another object resides in the provision of a smelting furnace which may be economically constructed and which is so designed, connected together, and constructed as to greatly prolong the life of the structure as compared with the life of the structures now in use for smelting purposes.

A still further object is to provide a plurality of smelting furnaces connected together and yet permitting the same access to the rear walls thereof as may be had to the front walls of the furnaces, there being a space arranged between adjacent furnaces through which an attendant may pass and by virtue of which he may mend a rear wall as easily as a front wall and through which attendants may pass for inspection of the rear walls at any time, the spaced furnaces being firmly connected together so that one will aid in supporting the other.

It is still further designed to provide a frame-work for building smelting or other furnaces wherein the various parts may be inexpensively manufactured and the parts readily assembled to facilitate the building of the furnaces with a minimum amount of labor.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings and particularly pointed out in the appended claims, it being understood that changes may be made in the form, proportion, size and minor details without departing from the scope or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a vertical transverse sectional view through two furnaces mounted over a tunnel. Fig. 2 is a horizontal sectional view through the furnaces. Fig. 3 is a side view partly in elevation and partly in section. Fig. 4 is a fragmentary view illustrating a series of blow boxes or hydrocarbon burners set up together with one of the adjacent rear buck-stays and the interlocking connections between them. Fig. 5 is a detail view of one of the buck-stays. Fig. 6 is another detail view of a buck-stay. Fig. 7 is a horizontal sectional view through one of the front buck-stays. Fig. 8 is a horizontal sectional view through one of the rear buck-stays. Fig. 9 is a transverse sectional view through one of the members for connecting the front stays together. Fig. 10 is a front view of one of the front buck-stay interlocking members.

Referring now more particularly to the accompanying drawings the reference character 10 indicates a tunnel through which trucks or other vehicles may pass and into which the residue from which the zinc is extracted in the furnace may be delivered when cleaning the retorts of the furnaces. This tunnel is formed by concrete abutments 11 and brick work 12 on the abutments with the tunnel including an arch 13, there being passages 14 leading into the tunnel as shown.

It is on top of the brick work 12 that our furnaces are disposed and it will be seen that the furnaces which are designated at A and B are disposed in spaced relation in contradistinction to separate furnaces connected together by a single center wall. We preferably form the furnaces in spaced relation so that an attendant may enter the space 15 between the furnaces to repair the backs or any part of the back of each of the furnaces, if repair should be necessary at the backs thereof. Between the furnaces at the bottom are spaced tie members 16 and between the furnaces at their upper portions are spaced tie members 17 which effectively sustain the rear walls of the furnaces in proper spaced relation.

The furnaces are preferably constructed alike and of any size necessary or desired and therefore in describing the same reference need be made to but one of them. On top of the brick work 12 are longitudinal

plates 18 each of which has a plurality of notches 19 on its outer edge in which may be disposed rail or other anchoring irons 20 which extend vertically into the brick work 12 with opposite anchors 20 connected together by tie rods 21 which are adjustable by means of turn buckles 22. These anchoring irons 20 prevent outward movement of the plates 18 to obviate lateral shifting of the outer walls of the furnaces.

Front wall buck-stays are indicated at 24 and each has a notch 23 at its outer lower end adapted to fit over the longitudinal plate 18, as shown in Fig. 1. These front buck-stays are preferably arranged throughout the front side of the furnace the same distance apart with relation to one another and each is reduced at its upper end to form a shoulder 25 and a vertical extension 26 provided with a screw threaded eye in its outer end for a purpose presently explained. On each side of each front buck-stay 24 will be seen (Fig. 7) a plurality of equidistant ribs 27 which are preferably cast therewith and each of which ribs has a dove-tailed recess 28 in its upper side which recesses are adapted to form sockets to receive the dove-tailed portions 29 of the buck-stay connecting members 30 (Fig. 9) which members 30, by virtue of their interlocking connection with the front buck-stays 24, serve to tie the front buck-stays together in proper spaced relation.

Each buck-stay 24 has a vertical groove 31 extending from the bottom thereof to said shoulder 25 for the reception of fire brick material 32 to prevent the front buck-stays from being exposed to the direct heat or flame of the furnace to prevent burning out of the stays and each of the members 30 has a horizontal recess 33 on its inner side to receive a fire brick 34 which is adapted to project from the groove or recess 33 to form a support for the retorts to be hereinafter referred to.

The rear buck-stays of each furnace are indicated at 35 and 36, each of the buck-stays 35 having its opposite faces provided with ribs 37 (Fig. 5) with each rib in its upper side formed with a dove-tailed recess 38 (Fig. 5) just like the recess formed in the front buck-stays for the reception of interlocking members 38 (Fig. 1) provided with dove-tailed portions adapted to fit in the recesses of the ribs of opposite stays 35 in the same manner that the interlocking members connect the front stays. These interlocking members 38 each have a horizontal recess 40 adapted to receive a horizontal supporting brick 41 adapted to prevent burning out of the interlocking members 38, that is to keep them from exposure from the heat or flame of the furnace and which project inwardly of the furnaces to support the inner ends of the retorts. The rear

buck-stays 36 have on their outer sides ribs 42 (Figs. 4 and 6) provided with dove-tailed recesses or sockets 43 therein similar to the recesses or sockets formed in the ribs 37 of the stays 35 so that interlocking members 38 may be disposed between the rear buck-stay 35 and a rear buck-stay 37 to interlock them together and hold them upright and in proper spaced relation. The inner sides of the buck-stays 36 have oppositely disposed ribs 44 on their inner sides on which ribs 44 are slidably mounted blow boxings or hydrocarbon burner casings 45, there being blocks 46 disposed between the vertically arranged casings 45 and having preferably the same cross sectional shape as the cross sectional shape of the casings 45. Lugs 44' support the lowermost casings 45.

The rear buck-stays 35 and 36 are preferably each reduced at their upper ends to form shoulders 47 and vertical extensions 48, the latter being provided with screw threaded openings adapted to receive tie rods 49 and 50, the latter tie rods being preferably Y-shaped (Fig. 3) and adapted to be used where two of the closely spaced rear buck-stays 36 are to be connected with a single front buck-stay 24.

Disposed on the shoulders 25 and 47 of the front and rear buck-stays 24 and 35 respectively are angle irons 51, which form abutments for the efficient support of the arch 52 of each furnace. Each of the rear buck-stays is provided with a longitudinal or vertically disposed groove adapted to receive the fire brick material 53 to shield the inner edges of the rear buck-stays from the heat or flame of the furnace and thereby prevent the rear buck-stays from burning out.

The casing 45 of the hydrocarbon burners are arranged in spaced sets throughout the length of the furnace as may be seen by reference to Fig. 2 of the accompanying drawings and the end walls 54 and 55 of the furnace are braced in any suitable manner, preferably by metallic or other beams 57, with the side walls of the structure terminating preferably short of the wall 55, leaving a space 58 so that by virtue of expansion of the side walls incident to heat the end walls 54 and 55 are not placed under undue stress because of the space 58 providing for ample longitudinal expansion of the walls incident to heat, it being understood that the side walls are mudded up between the buck-stays and interlocking members 30 and 38 in the usual manner together with any other spaces that may exist between the parts forming the skeleton work or supporting structure of the side walls.

The character 59 indicates an air pipe disposed over each furnace and which may lead from any suitable source. Communicating with each air pipe 59 are branch air pipes

60 which lead down along the rear side wall of each furnace in line with the hydrocarbon burners with each branch pipe 60 provided with an air nozzle 61 leading into the chamber 62. The gas pipe 63 leading from any suitable source may be supported in any suitable manner, as for instance by brackets 64 on the rear wall of each furnace, and it has branch pipes 65 leading downwardly alongside of the rear wall of each furnace adjacent the air branch pipes 59 and each provided with inwardly projecting nozzles 66 which terminate adjacent the inner end of the air nozzles 61 so that there may be an efficient mixing of the air and gas in the chambers 62 of the hydrocarbon burner casings 45 as to effect an efficient heating flame.

When a furnace has been constructed in accordance with our invention there is first started therein a wood fire, started preferably at one end of the furnace with the products of combustion passing through the flue 67 and into the smokestack 68. This fire eventually causes such heat as to result in a proper ignition of the vapor issuing from the chambers 62 of the first set nearest the smokestack end of the furnace and as the temperature gradually rises the heat spreads toward the opposite end of the furnace and causes ignition of the vapor issuing from the sets of hydrocarbon burners step by step according to the number of sets of hydrocarbon burners employed. Prior to starting the fire, the retorts 69 containing the ores are disposed in the furnace with the retorts resting upon the horizontally arranged fire bricks 34 and 41 of the front and rear interlocking members 30 and 38 respectively and with the retorts preferably disposed upon an incline and provided with a funnel 70 projecting outwardly of the furnace over the interlocking members 30 as clearly shown in Fig. 1 so that, by virtue of the inclination of the retorts the zinc as it is melted flows toward the other ends of the retorts into the funnels 70, the latter having their outer ends preferably choked or supplied with mud, charcoal or the like to prevent accidental escape of the molten material which is removed through the funnels when desired. The connection between the funnels and the retorts is preferably mudded but if there should be any leakage of the zinc from the retorts and the inner ends of the funnels 70 there would be a possibility of the escaping fluid dropping down and passing through the conduits 14 and going to waste. However, the upper faces 71 of the front interlocking members 30 are preferably inclined and by virtue of the shoulders 72 formed at the outer edges thereof, the melted zinc escaping, if any escapes, from between the retorts and their funnels, may accumulate on the upper faces

71 of the interlocking members 30 behind the shoulders 72 and may be conveniently removed therefrom. See Figs. 1 and 9.

The funnels 70 may be properly supported with relation to the retorts 69 by means of tongues 73 carried by the rods 74 swingingly mounted in the ears 75 at the outer edges of the front interlocking members 30, there being a handle part 76 on the rod 74 to facilitate swinging movement (see Figs. 1 and 4).

The retorts are preferably arranged in pairs, the interlocking members 30 and 38 being preferably of a length equal to slightly more than the width of the retorts as clearly shown in the drawings, and in the event that repairs should be necessary to some particular part of the furnace or in the event that access should be desired to the furnace at any particular point for any other reason, the supply of gaseous fluid to one or more of the sets of hydrocarbon burners could be cut off so as to permit repair by an attendant of any particular part of the furnace or to enable him to inspect any particular part thereof; and by virtue of the fact that the furnaces are spaced rather than two furnaces formed with a single center wall, the attendant has as easy access to the rear wall of a plurality of furnaces connected together as he has to the front sides of the furnaces.

When it is desired to remove the retorts from the furnaces it may be readily accomplished in the usual manner and after removal or prior thereto, that is, without removing the retorts from the furnaces the ores therein may be conveniently and readily discharged or passed through the conduits 14 and into the tunnel 10 where there is generally disposed a car or vehicle to carry away the residue discharged through said conduits. These conduits or passages preferably have a length the same as the length of the furnaces and it is preferred to keep their mouths closed by a suitable plate or other covering 14' when there is no good reason to permit passage of residue or escaping zinc therethrough.

From the foregoing it will be seen that we connect our furnaces up in spaced relation so that repairs may be made from either the front or the back of each furnace and which cannot be done when the furnaces are joined together with the usual common center wall. It will also be seen that by virtue of the front and rear buck-stays being connected together by the interlocking connecting members that each of them may be readily removed from connection with the respective buck-stays independently of other similar members. It will also be seen that the retorts may be easily seated or unseated as may be desired, one independently of another and that the interlocking mem-

bers are so formed that in the event of accidental escape of metal the escaping metal may be arrested and collected and thereby prevented from going to waste. It will also be seen that our furnace embodies among other characteristics means whereby in the event of accident or repair being necessary to any part of the structure that parts of the structure may be readily repaired without shutting down the entire furnace, there being means for charging sections of the furnace, whereby when charging one section is discontinued repairs may readily be made at that section where the charging has been discontinued. In addition to these advantages we provide a furnace embodying such characteristics as have long life.

What we claim is:

1. A furnace of the character described comprising front and rear buck-stays, interlocking connecting members between the front buck-stays to maintain the latter in spaced relation each of the interlocking members having a recess therein, and fire brick material in the recesses of said members to protect the same from heat and flame and adapted to form retort supports.

2. A furnace wall comprising vertically disposed buck-stays each having ribs on opposite sides, each rib being provided with a recess, and members each having projections to fit in the recesses of the ribs and form an interlocking connection between said members and the stays.

3. A furnace wall comprising vertically disposed buck-stays each having ribs on opposite sides each rib being provided with a recess, and members each having projections to fit in the recesses of the ribs and form an interlocking connection between said members and the stays, each stay also having a longitudinal recess in its inner edge for the reception of fire-brick material to prevent burning out of the stays.

4. A furnace wall comprising vertically disposed buck-stays some of which have ribs on opposite sides with each rib provided with a recess and others of which have short vertical ribs on one side, members each having projections to fit in the recesses of the ribs and form an interlocking connection between said members and the stays which have recessed ribs thereon, and hydrocarbon burners including casings provided with grooves to fit over said short ribs of the other stays.

5. A furnace wall comprising vertically disposed buck-stays some of which have ribs on opposite sides, each rib being provided with a recess and others of which stays have short vertical ribs on one side and on the same side on which the short vertical ribs are formed being also provided with supporting lugs at their lower ends, mem-

bers each having projections to fit in the recesses of the ribs to form interlocking connections between said members and the stays which have recessed ribs thereon and hydrocarbon burner casings provided with grooves to slide over said short ribs of the other sets of stays with the lowermost hydrocarbon burner casing supported on said lugs.

6. A furnace of the character described including single-piece front and rear buck-stays extending from the bottom to and above the top of the furnace, combined buck-stay interlocking members and means for supporting retorts in the furnace, end walls for the furnace, and means for connecting the front and rear buck-stays together.

7. The combination of a tunnel, passages leading to the tunnel, furnaces mounted above the tunnel, with the furnaces spaced from each other to permit access to the rear wall of each furnace, connecting means between the furnaces, each furnace having its front wall composed of equi-distant spaced buck-stays, means for connecting the front buck-stays together, the rear wall of each furnace including buck-stays, hydrocarbon burners supported by spaced sets of buck-stays of the rear wall of each furnace, means for supplying a combustible fluid to said hydrocarbon burners, means for connecting the front and rear buck-stays together, and end walls for each furnace.

8. A furnace of the character described including front and rear buck-stays each having a recess in its inner edge for the reception of fire brick material with each buck-stay having projecting portions on opposite sides, and members having interlocking connection with the projecting portions of the buck-stays to maintain the latter in spaced relation, and hydro-carbon burners for the furnace.

9. A furnace wall comprising vertically disposed buck-stays each having ribs on opposite sides with each rib provided intermediate its ends with a recess, and members each having projections to fit in the recesses of the ribs and form an interlocking connection between said members and said stays, each stay having a longitudinal recess in its inner edge for the reception of fire brick material to prevent burning out of the stays and each of said members having a recess therein for the reception of fire brick material to protect said members from heat and flame and adapted to form retort supports.

10. A furnace wall comprising vertically disposed buck-stays, spaced sets of hydrocarbon burners arranged in superimposed relation between adjacent buck-stays, and means for connecting together the buck-stays between said sets of hydro-carbon burners.

11. A furnace wall comprising vertically disposed buck-stays each having ribs on opposite sides with each rib provided with a recess, and members each having projections to fit in the recesses of the ribs and form an interlocking connection between said members and said stays, said interlocking members having inclined top surfaces and a shoulder at the outer edge thereof.

12. A furnace of the character described including in combination, front and rear walls composed of spaced buck-stays, end walls, members connecting the buck-stays of the front and rear walls to maintain the buck-stays in upright position, each of said connecting members having a recess therein, and fire brick material disposed in said recesses of the connecting members to protect the connecting members from heat and flame and to form retort supports.

13. A furnace of the character described including in combination, front and rear walls composed of spaced buck-stays, members connecting the buck-stays to maintain them in upright position, each of said connecting members having a recess therein, and fire brick material disposed in said recesses of the connecting members to protect the connecting members from heat and flame and to form retort supports, said connecting members having their upper surfaces formed to arrest any melted zinc that may

14. A furnace wall comprising vertically

disposed buck-stays, and connecting members between the buck-stays, each connecting member having a recess in its inner side and having its top formed on an incline and at its outer upper edge provided with a shoulder.

15. A furnace of the character described, including in combination, front and rear buck-stays, connecting members between the rear buck-stays, connecting members between the front buck-stays, the tops of the connecting members of the front stays being formed upon an incline and at their outer ends provided with a shoulder and spaced ears, each stay having a longitudinal recess in its inner edge for the reception of fire brick material to protect the stays from heat and flame, each of said connecting members having a recess in its inner side for the reception of fire brick material to protect the connecting members from heat and flame, retorts supported on the fire brick material of the connecting members, funnels mounted between the stays for coöperation with the retorts, and elements swingingly mounted in the ears of the connecting members of the front wall to support said funnels.

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

GEORGE LONDRESS.
WEBSTER WORLEY.

Witnesses:

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BERTHA SHAKESPEARE.