

No. 674,936.

Patented May 28, 1901.

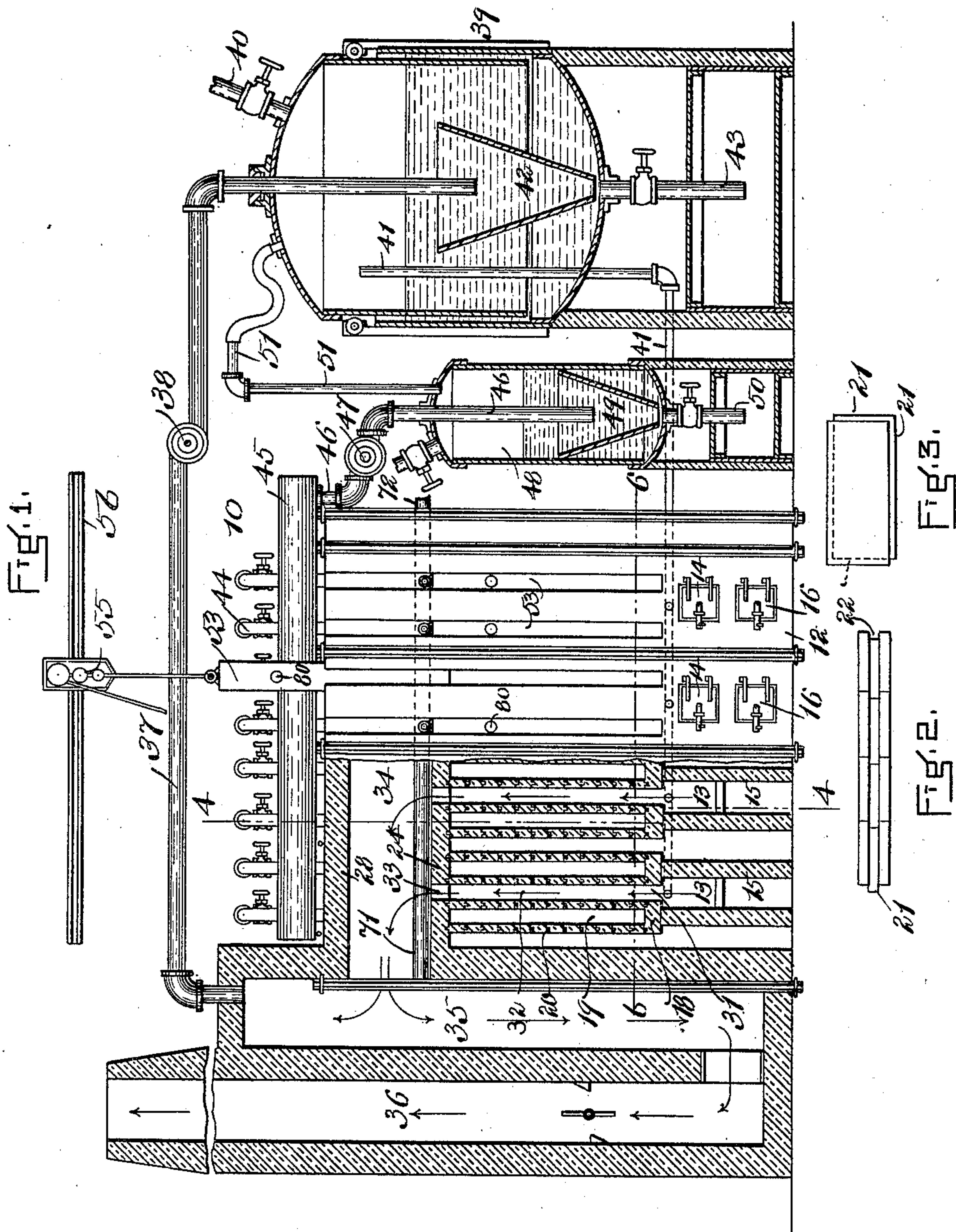
H. B. MEECH.

FURNACE FOR THE REDUCTION OF ZINC ORES.

(Application filed Sept. 26, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:  
Louis A. Jones  
Sydney E. Taft.

INVENTOR:  
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by his Attorney  
Charles S. Gooding.

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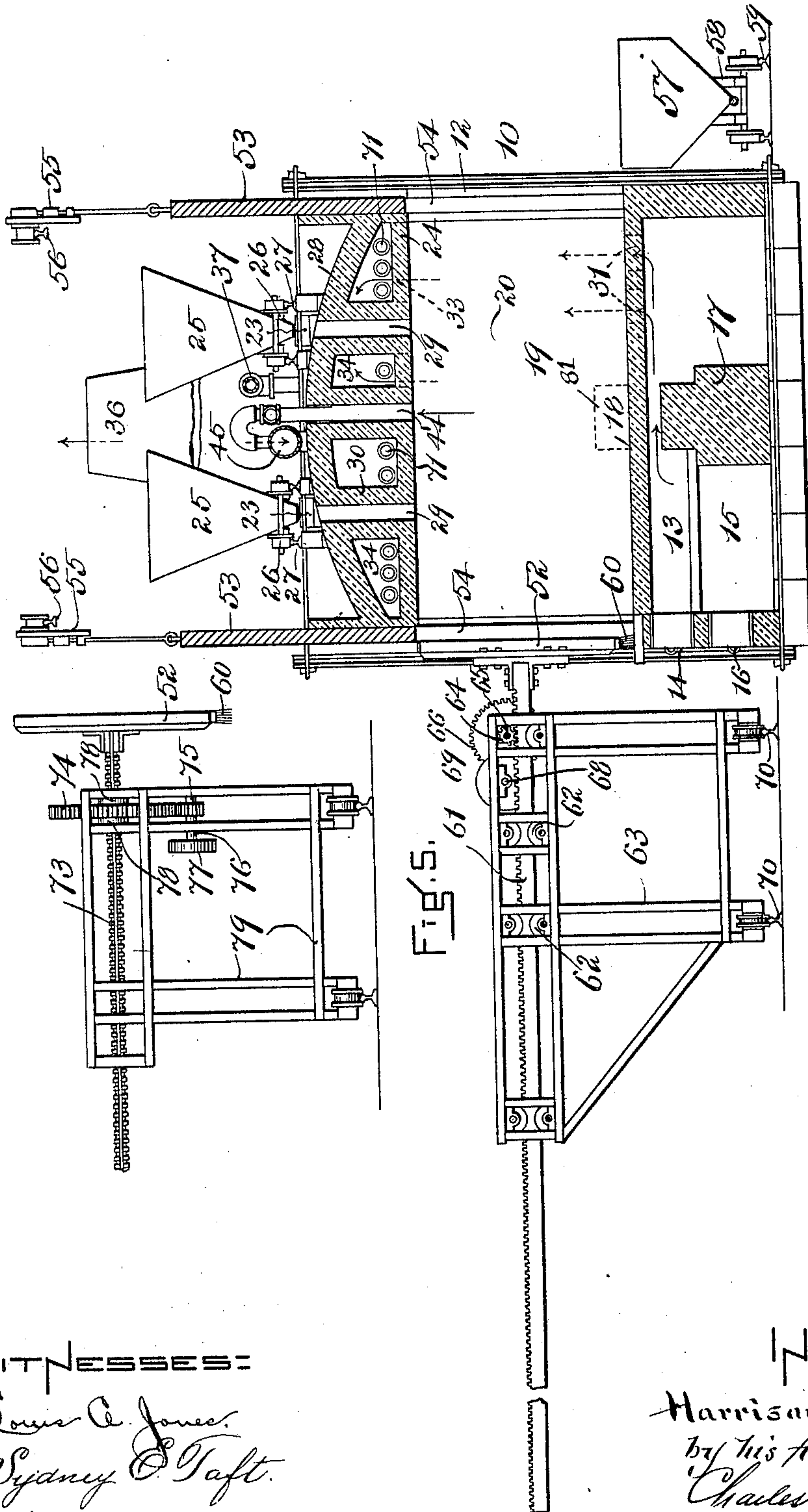
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FURNACE FOR THE REDUCTION OF ZINC ORES.

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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

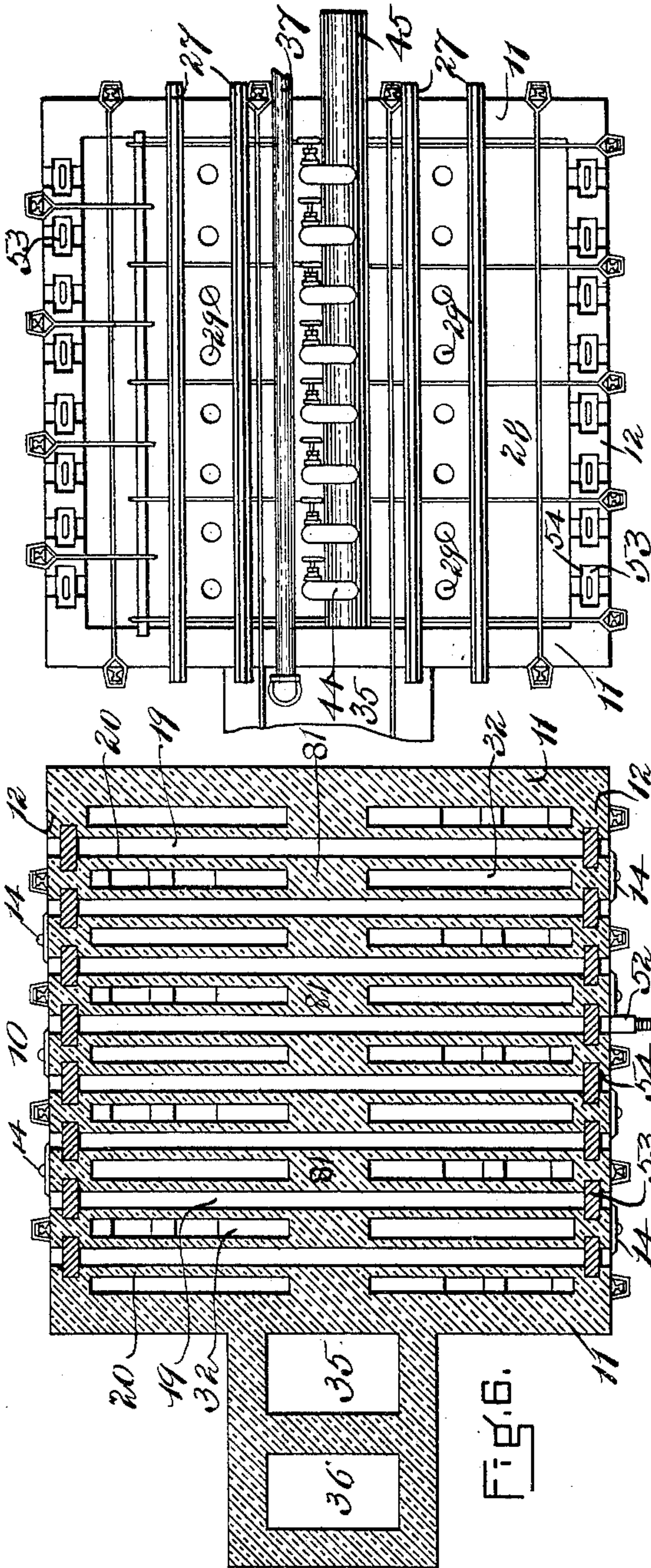


Fig. 6.

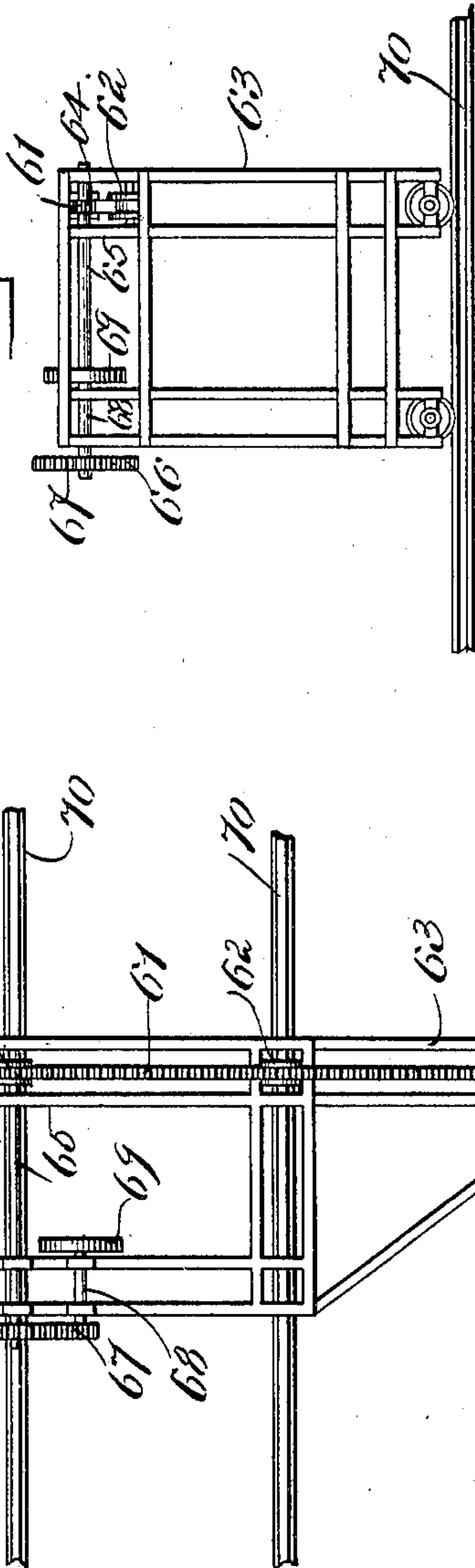


Fig. 7.

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# UNITED STATES PATENT OFFICE.

HARRISON B. MEECH, OF DENVER, COLORADO.

## FURNACE FOR THE REDUCTION OF ZINC ORES.

SPECIFICATION forming part of Letters Patent No. 674,936, dated May 28, 1901.

Application filed September 26, 1900. Serial No. 31,206. (No model.)

*To all whom it may concern:*

Be it known that I, HARRISON B. MEECH, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Furnaces for the Reduction of Zinc Ores, of which the following is a specification.

The object of this invention is to produce a furnace for the reduction of zinc ores which shall be economical in construction, in the handling of the ores, and in the fuel consumed and which shall be capable of reducing a large amount of ores with a proportionately small amount of fuel.

The object of my invention is, further, to embody in a small space a large amount of heating-surface and to so construct and arrange the retorts and flues relatively to each other that the retorts shall be durable and can be easily filled with ore and the refuse from said ore can be easily and speedily removed from the retorts without cooling the furnace to any appreciable extent.

The invention consists in a furnace comprising in its construction a series of retorts arranged side by side, in combination with a gasometer to receive the gases and fumes from said retorts and to solidify said fumes.

The invention further consists in mechanism for cleaning the residue out of said retorts.

The invention still further consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings, Figure 1 is a vertical longitudinal section, partly in elevation as viewed from the front, of my improved furnace for reducing zinc ores. Fig. 2 is a plan view of the specially-formed bricks used in the construction of the retorts. Fig. 3 is a side elevation of one of said bricks. Fig. 4 is a vertical transverse section taken on line 4 4, Fig. 1. Fig. 5 is a side elevation of a modified form of mechanism for operating the pusher-plate. Fig. 6 is a detail plan section of the furnace, taken on line 6 6, Fig. 1, with the pusher-plate mechanism in plan attached thereto. Fig. 7 is an end elevation of the pusher-plate mechanism. Fig. 8 is a plan of the furnace.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is the furnace, consisting of side walls 11 and end walls 12. A series of fire-boxes 13 13, arranged in parallel rows, open alternately through the front and rear end walls by doors 14. Each fire-box has the ordinary ash-pit 15, with doors 16, and extends from the end wall 12 to the bridge 17. The bottom 18 of each of the retorts 19 extends across the furnace 10, between the ends 12 thereof. Said retorts are arranged in series parallel to each other. The vertical side walls 20 of said retorts are built of a specially-constructed fire-brick, Figs. 2 and 3, having a tongue 21 and groove 22 at the opposite sides and ends thereof. The side walls 20 of each retort are separated from the side wall of the retort adjacent thereto by a flue 32. The top of each retort is formed by a horizontal partition 24, extending across the furnace between the side and end walls 11 and 12.

The zinc ore is loaded in hoppers 25, supported upon trucks 26, which run upon tracks 27, extending across the top 28 of the furnace 10 from right to left, Fig. 8. The ore passes from the hoppers 25 through the conduits 29 into the retorts 19. Said conduits 29 extend through the top of the furnace 28 and the horizontal partition 24 and are surrounded by brick walls 30, joining said furnace-top and partition. A brick stopper 23 is used to cover the conduit 29 when the retort has been filled with ore. The composition of the charge in the retorts is pulverized zinc-blende ores mixed with pulverized charcoal or coke and silicates varying according to the character of the zinc ores to be treated. The heated gases and flames from the fire of coal or coke in the fire-boxes 13 pass over the bridge-wall 17 upwardly through holes 31 in the horizontal partition 18, through the flues 32 between the retorts 19, thence through holes 33 in the horizontal partition 24 and along horizontal flues 34 between the horizontal partition 24 and the top 28 of the furnace to a flue-chamber 35, thence through the stack 36 to the outer air, or are forced through a pipe 37 by a suction-blower 38 to a gasometer 39, where the gas is separated from the fumes and passes out through the pipe 40, or, if desired, said



gas is conducted back by a pipe 41, Fig. 1, to be discharged and burned in the fire-boxes 13, together with other gases, thus creating intense heat and rapidly reducing the ores in the retorts 19. The side walls 20 are reinforced by fire-brick 81, Figs. 4 and 6, extending across the flues 32, at the bottom of said flues and between said side walls. The fumes in the gases from the fire-boxes 13 are solidified in the funnel 42 in the gasometer 39 and drawn off through the pipe 43. The fumes and gases from the zinc ores in the retorts 19, consisting of zinc fumes and sulfureted hydrocarbon gas, pass out of said retorts at the top thereof through pipes 44 44 into a main conductor 45 and are forced thence through a pipe 46 by an exhaust-fan 47 into a condenser 48. The zinc fumes solidify in a funnel 49 in said condenser and are drawn off through a pipe 50. The gases in the condenser 48 pass out through the pipe 51 into the gasometer 39 and mix with the gases from the fire-boxes therein.

After the zinc has been reduced, as described, from the ore in the retorts 19 the ashes or residue are removed from said retorts by a pusher-plate 52. Both ends of each retort are provided with a vertical door 53, which slides in grooves 54, formed in the end walls 12 of the furnace. Said doors are raised and lowered by tackle-blocks 55, arranged to slide from one door 53 to another upon tracks 56.

When it is desired to clean the ashes out of a retort, the doors 53 are raised and the pusher-plate 52 is pushed lengthwise of the retort by mechanism hereinafter described, pushing said ashes and residue out of the retort 19 and into the car 57. This car 57 is supported upon a truck 58 and runs upon a track 59, extending across the furnace, so that the car 57 can be readily placed opposite the exit-opening of each retort as desired. The pusher-plate 52 is provided with a brush 60, fast to the under side thereof, and is pushed forward and backward through the retorts 19 by a rack-frame 61, to which it is fastened. Said rack-frame is supported upon rolls 62, journaled upon bearings on the carriage 63. The rack-frame is reciprocated by a pinion 64, fast to a shaft 65, said shaft being rotated by a gear 66, fast thereto and meshing with a pinion 67, fast to the counter-shaft 68, said counter-shaft being driven in opposite directions by a pulley 69, said pulley receiving power to rotate it from any convenient source. The carriage 63 runs upon a track 70, which runs across the front of furnace 10, so that said pusher-plate can be brought in front of each of the retorts 19 as desired. In each of the doors 53 I provide a plug-hole 80, through which to introduce a hand-poker to level the zinc ores in the retorts.

In the flues 34 I provide pipes 71, filled with air or gases, which becoming heated pass out through the pipe 72 to be used for heating purposes.

It is evident that the pusher-plate 52 may be reciprocated by a variety of mechanisms without departing from the spirit of my invention, and in Fig. 5 I have illustrated one of such mechanisms in which 52 is the pusher-plate, fast to a screw-threaded rod 73. Said rod is prevented from rotating by a spline and is reciprocated by a gear 74, which is rotated by the gear 75 meshing therein. Said gear 75 is fast to a counter-shaft 76, to which is attached a pulley 77.

The gear 74 is screw-threaded to engage the screw-threaded rod 73 and is prevented from moving lengthwise thereof by collars 78, bearing against the frame of the carriage 79.

Having thus described my invention, what I claim, and desire by Letters Patent to secure, is—

1. A furnace for reducing ores comprising in series retorts arranged side by side, each retort having a solid bottom and an opening at two opposite ends thereof, a door closing each of said openings and means to open and close said doors, a flue between each of said retorts leading from a fire-box to a point of exit, and a fire-box between each retort, said fire-boxes arranged to open alternately from opposite sides of said furnace, substantially as described.

2. A furnace for reducing ores comprising in series retorts arranged side by side, the walls of said retorts formed of tongue-and-grooved fire-brick, each retort having a solid bottom and an opening at two opposite ends thereof, a door closing each of said openings and means to open and close said doors, a flue between each of said retorts leading from a fire-box to a point of exit, a fire-box beneath each flue, said fire-boxes arranged to open alternately from opposite sides of said furnace, substantially as shown and described.

3. A furnace for reducing ores comprising in series retorts arranged side by side, each retort having a solid bottom and an opening at two opposite ends thereof, a door closing each of said openings and means to open and close said doors, a flue between each of said retorts leading from a fire-box to a point of exit, a fire-box beneath each of said flues, said fire-boxes arranged to open alternately from opposite sides of said furnace, substantially as shown and described; in combination with a main conducting-pipe, a condenser connected to said main conducting-pipe, an exhaust-fan whereby the fumes from said ores are drawn from said retorts and precipitated in said condenser, and means for draining off said precipitated fumes from said condenser, substantially as described for the purpose specified.

4. A furnace for reducing ores comprising a series of retorts arranged side by side, an exit-pipe from each retort, each of said retorts having a solid bottom; a main conducting-pipe to which each of said exit-pipes is connected, a condenser connected to said



main conducting-pipe, an exhaust-fan whereby the fumes from said ores are drawn from said retorts and precipitated in said condenser, and means for draining off said precipitated fumes from said condenser; in combination with a series of flues leading from fire-boxes between said retorts to a point of exit, a fire-box located beneath each of said flues, said fire-boxes opening alternately from opposite sides of said furnace, a gasometer, a connecting-pipe from said gasometer to said flues, an exhaust-fan whereby the gases from said flues are forced into said gasometer, and a connecting-pipe from said condenser to said gasometer, substantially as described for the purpose specified.

5. A furnace for reducing ores comprising in series retorts arranged side by side, each retort having a solid bottom and an opening at two opposite ends thereof, a door closing each of said openings and means to open and close said doors, a flue between each of said retorts leading from a fire-box to a point of exit, a fire-box beneath each of said flues, said fire-boxes arranged to open alternately from opposite sides of said furnace, a pusher-plate constructed and operated substantially as described arranged to enter said retorts, and mechanism for imparting a reciprocating motion to said pusher-plate lengthwise of said retorts, substantially as shown and described.

6. A furnace for reducing ores comprising

a series of retorts arranged side by side, an exit-pipe from each retort, each of said retorts having a solid bottom, a main conducting-pipe to which each of said exit-pipes is connected, a condenser connected to said main conducting-pipe, an exhaust-fan whereby the fumes from said ores are drawn from said retorts and precipitated in said condenser, and means for draining off said precipitated fumes from said condenser; in combination with a series of flues leading from fire-boxes between said retorts to a point of exit, a fire-box located beneath each of said flues, said fire-boxes opening alternately from opposite sides of said furnace, a gasometer, a connecting-pipe from said gasometer to said flues, an exhaust-fan whereby the gases from said flues are forced into said gasometer, a connecting-pipe from said condenser to said gasometer, a pusher-plate constructed and operated substantially as described arranged to enter said retorts, and mechanism for imparting a reciprocating motion to said pusher-plate lengthwise of said retorts, substantially as described for the purpose specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HARRISON B. MEECH.

Witnesses:

CHARLES S. GOODING,  
W. CARLETON BARNES.