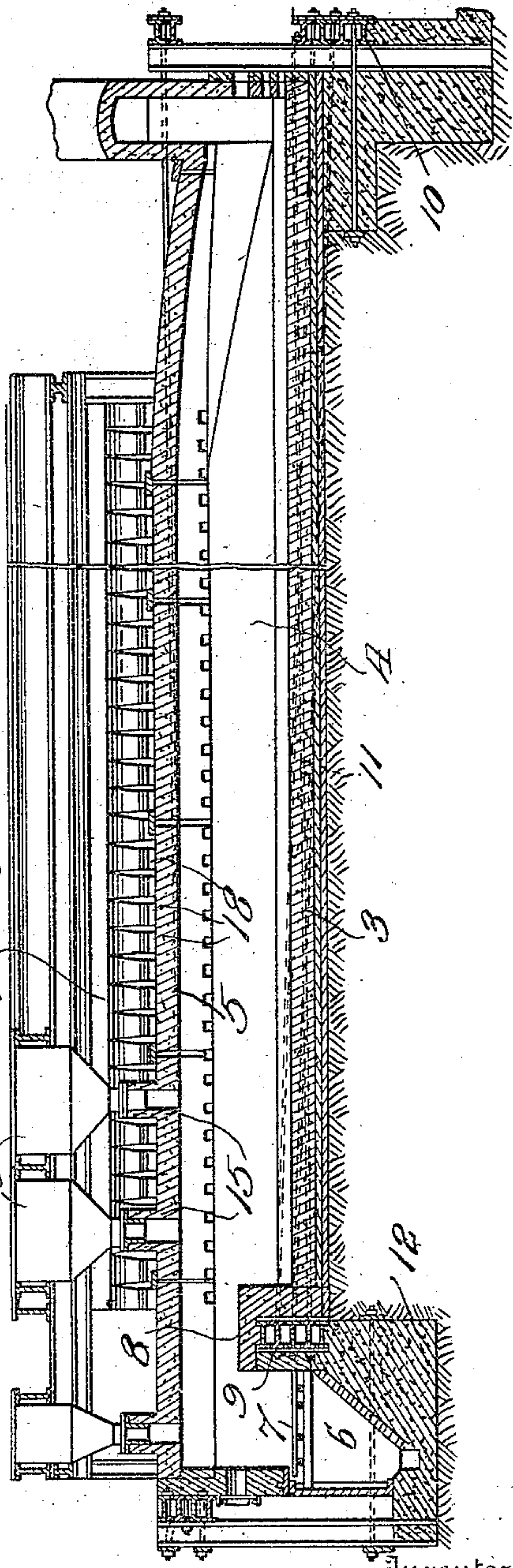
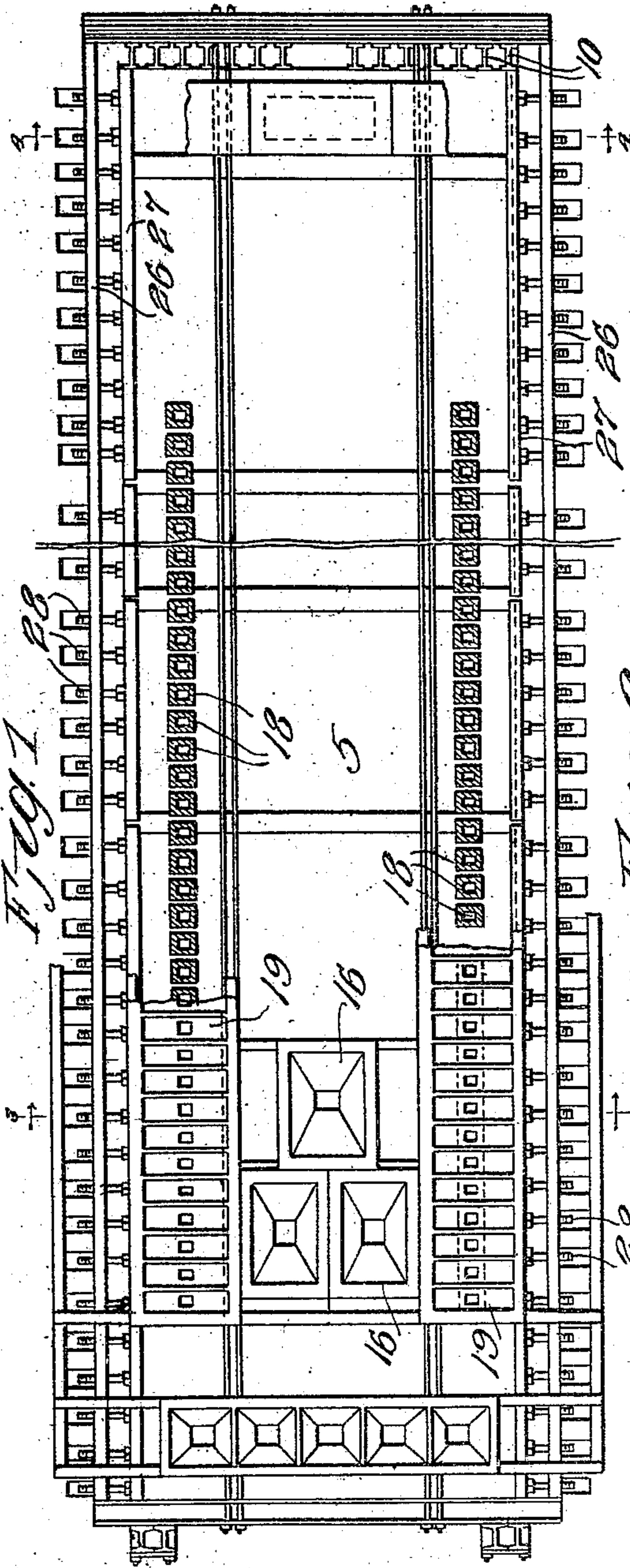


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 REVERBERATORY FURNACE.
 APPLICATION FILED NOV. 6, 1909.

966,285.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.



Witnesses

Frank Lough.

C. A. Himes.

Frederick W. Winkler,

By Victor J. Evans

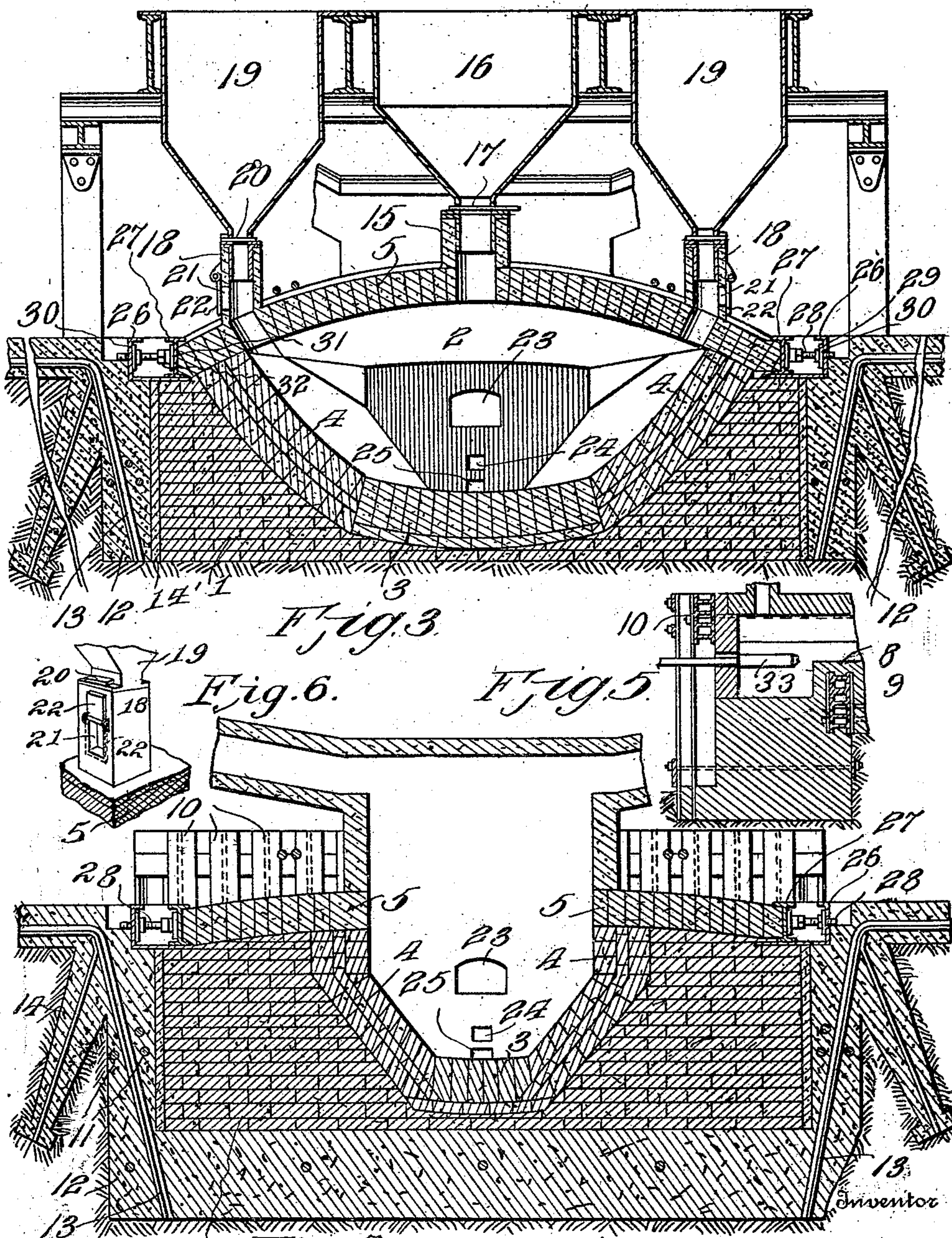
Attorney

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UNITED STATES PATENT OFFICE.

FREDERICK W. WINKLER, OF HANCOCK, MICHIGAN.

REVERBERATORY FURNACE.

966,285.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed November 6, 1909. Serial No. 526,577.

To all whom it may concern:

Be it known that I, FREDERICK W. WINKLER, a citizen of the United States, residing at Hancock, in the State of Michigan, have
5 invented new and useful Improvements in Reverberatory Furnaces, of which the following is a specification.

This invention relates to improvements in reverberatory furnaces, the objects of the
10 invention being to increase the area of the heating portion of the furnace chamber, to reduce the disintegrating action of the slag upon the walls thereof and the amount of repairs necessary to keep the furnace in
15 working condition, to provide for the ready relining of the walls when worn, to increase the strength and durability of the furnace and reduce the liability of injury thereto by expansion and contraction, and to provide
20 bracing means for the arch which may be adjusted to compensate for expansion and contraction.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of
25 parts hereinafter described and claimed, reference being had to the accompanying drawings, in which:

Figure 1 is a top plan view, partially in
30 section, of a reverberatory furnace embodying the invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a vertical cross section on line 3—3 of Fig. 1. Fig. 4 is a vertical cross section on the line
35 4—4 of Fig. 1. Fig. 5 is a longitudinal section through the fire box showing a modification. Fig. 6 is an outer, perspective view of one of the inlets, showing the door swung open to expose the peep hole.

Referring to the drawings, 1 designates the furnace base and 2, the smelting chamber formed by the bottom wall 3, side walls 4 and arch or crown wall 5, which walls are built up in the usual manner of fire
45 brick or other refractory material.

The furnace is provided at its forward end with any suitable type of fire box 6 within which is arranged a grate 7 and from the rear of which rises the usual bridge wall
50 8. The fire box body and bridge wall are formed of cement or other suitable material, the bridge wall having embedded therein brace beams 9 of angle iron or other suitable material which are connected with
55 similar brace beams 10 at the rear of the

furnace by longitudinal reinforcing and tie rods 11.

The base of the furnace is stayed and reinforced by outside brace walls 12 of concrete or other similar material, through
60 which the rods 11 extend, and in which brace walls are embedded angle metal stays 13 inclining upwardly and outwardly and reinforced by outwardly and downwardly inclined braces 14, forming trusses to firmly
65 support the walls. Between the sides of the furnace bed and the brace walls are arranged cushioning walls or layers 14' of asbestos, magnesia or other suitable more or less elastic fire-proof material, which permit the
70 sides of the bed to expand and contract to a determined degree without liability of injury or cracking of the bricks composing the same.

In the ordinary construction of reverberatory furnaces, the side walls of the furnace chamber are vertically arranged and the lower portions thereof are subject to disintegration caused by the intense heat and chemical action of the adhering slag, as a result
80 of which the inner faces of the walls are eaten away. To maintain the walls in proper working condition, it is necessary to reline them at intervals with a fire-proof plastic composition. When however, the
85 walls are disintegrated and weakened to a certain extent, it is necessary to shut down the furnace and rebuild the walls, otherwise caving in of the same is liable to occur through the excess weight of the upper
90 ends of the walls.

The primary purpose of my invention, in addition to strengthening the walls of the furnace, is to provide means by which the disintegrating action of the slag on the side
95 walls is reduced, the necessity of relining the same at the ordinary frequent intervals obviated, the heating area of the furnace chamber increased, and certain of the ore inlets arranged so as to be employed for the
100 introduction of the material and tools in relining, so that this work may be more readily and easily accomplished.

It will be observed that the bottom wall 3 of the furnace chamber is curved on a
105 suitable arc, while the side walls 4 curve or incline downwardly and inwardly thereto. As a result of this form and arrangement of the walls 4, the slag is shed to a greater extent and a reduction of the disintegrating
110

action secured. When however, disintegration occurs to such an extent as to weaken the walls, their angle of inclination prevents collapse thereof, as will be readily understood.

The furnace is provided with one or more central rows of ore feed inlets 15 with each of which communicates a hopper 16 having a controlling valve or gate 17, and with longitudinal side rows of inlets 18 and corresponding rows of hoppers 19 provided with similar controlling valves or gates 20, the inlets 18 being arranged immediate above the inner faces of the upper ends of the side walls 4 so that the ore entering therethrough will slide down said walls and tend to free or dislodge the slag adhering thereto on its passage, as well as to prevent all of the heat of the slag from being transmitted to the walls. The contact of the ore with the slag also sets up a sufficient chemical reaction to reduce the chemical action of the slag upon the wall, thus retarding the burning out and disintegration of the latter. Each inlet 18 is provided with a peep hole 21 through which the progress of the smelting operation at the respective sides of the furnace may be observed, which hole is normally closed by a hinged door 22. The holes are of such size as to readily permit of the introduction of the plastic material and tools used in relining the walls when occasion requires, obviating the necessity of breaking down a portion of the furnace in making repairs of this character.

The rear end of the furnace is provided with the usual skimming opening 23 and below the same with superposed tap holes 24 and 25, adapted to be normally closed by plugs or other suitable stoppers. The upper hole 24 is employed ordinarily for the discharge of the molten metal, while the hole 25 is employed only at such times when it is desired to withdraw practically the entire amount of the metal down to the line of the bottom of the furnace chamber, as in shutting down the furnace for repairs, etc.

The brace walls 12 are formed with shoulders against which abut I-beams 26, the base portions of which are extended inward to form supports for similar beams 27, a pair of such beams being arranged at each side of the furnace. The inner beams 27 receive and abut against the side edges of the arch or crown wall 5 and serve as supports to prevent outward movement or displacement thereof. Each pair of beams 26 and 27 is adapted for relative adjustment to compen-

sate for expansion and contraction of the arch. To this end an adjusting screw 28 passes through the outer beam 26 and is provided with a washer 29 to bear against the same and a nut 30 to engage the washer, the inner end of the nut being formed with a head 31 bearing against the beam 27 and adapted to be secured in adjusted position by a nut 32. By means of these connecting screws or bolts the beams 27 may be adjusted in and out to relieve the arch of excess pressure or to bear with greater force against the same, as occasion may require in the expansion and contraction of the arch.

In Fig. 5 the bottom of the fire-box is built up to a higher level and a transverse series of oil burners 33 employed in lieu of the grate.

Having thus described my invention, what I claim is—

1. A reverberatory furnace embodying a smelting chamber, a base therefor, bracing walls on the outer sides of the base, and cushioning linings between said base and bracing walls.

2. A reverberatory furnace embodying a base, a smelting chamber, bracing walls on the outer sides of the base, reinforcements embedded in said walls, and cushioning linings between the base and walls.

3. A reverberatory furnace embodying a base, and a crown wall, outer beams supported by the base, inner beams bearing against the side edges of the crown wall and movable relatively to said outer beam, and adjusting connections between the beams.

4. A reverberatory furnace having a smelting chamber embodying a base, an arch, side walls inclining upwardly and outwardly from the base to the sides of the arch, and feed openings formed in the arch adjacent the upper ends of the inner faces of the side walls.

5. A reverberatory furnace having a smelting chamber embodying a bottom wall, an arch, side walls inclining upwardly and outwardly from the bottom walls to the sides of the arch, said arch being provided with inlets adjacent the upper ends of the side walls, said inlets having openings therein, and closures for said openings.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK W. WINKLER.

Witnesses:

C. C. HINES,
JOHN L. FLETCHER.