

No. 695,182.

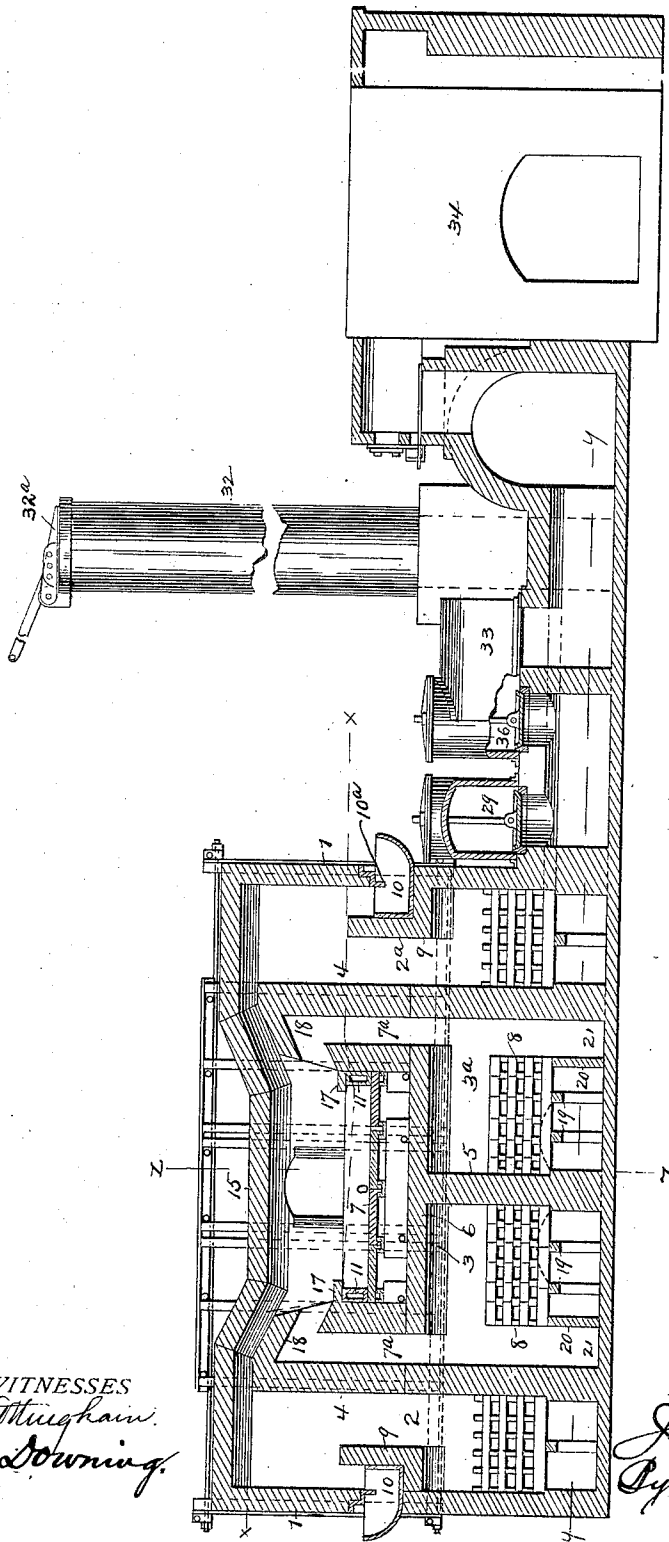
Patented Mar. 11, 1902.

J. D. SWINDELL.
PUDDLING FURNACE.

(Application filed Apr. 22, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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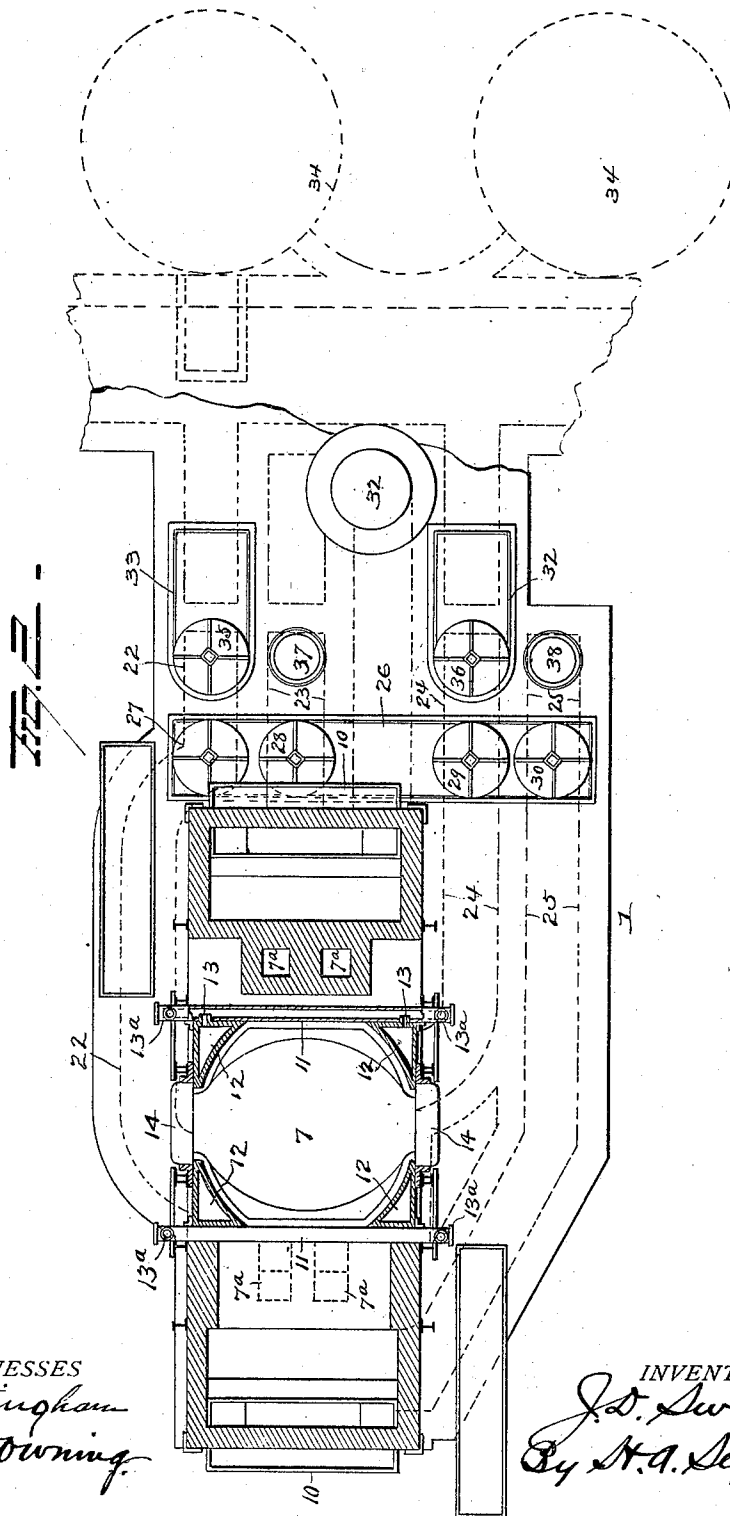
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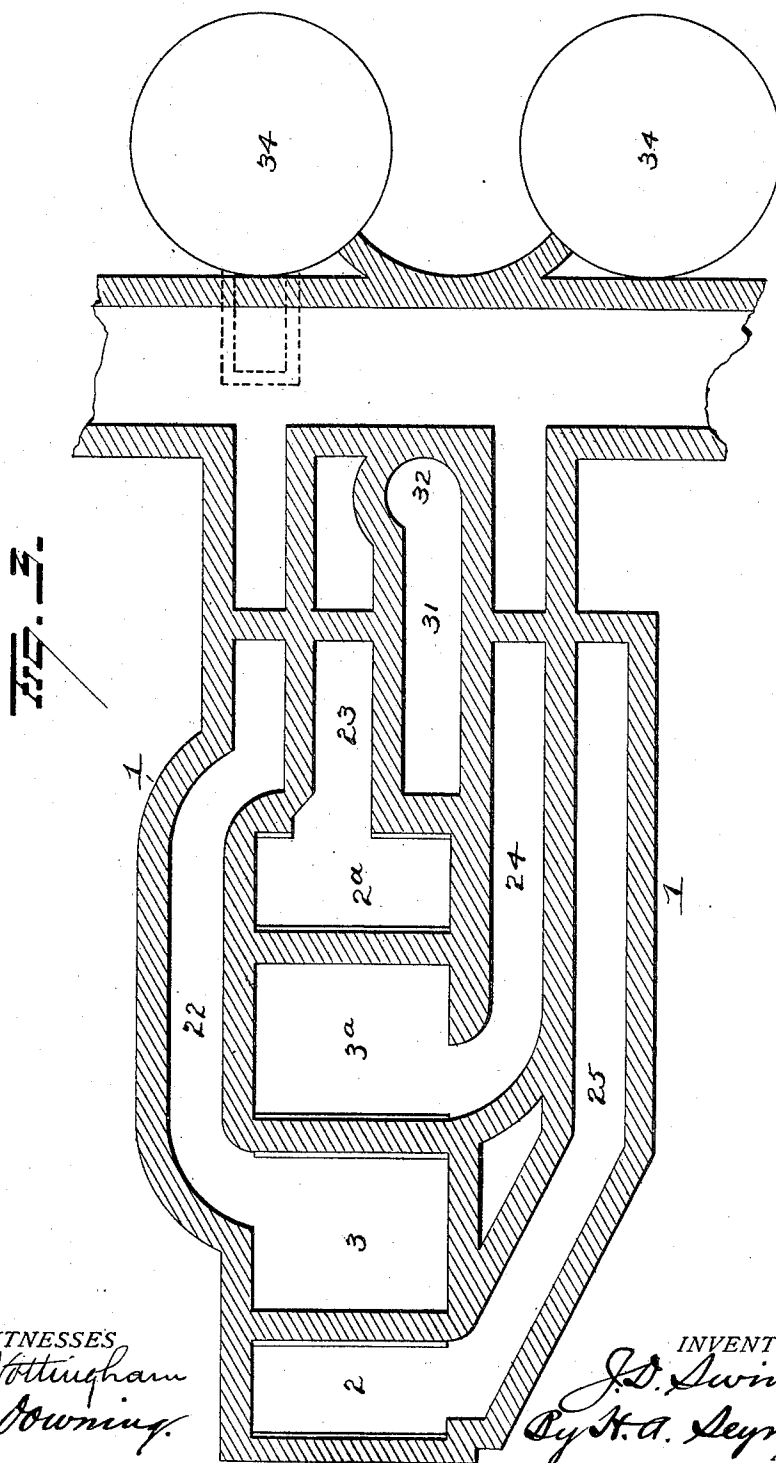
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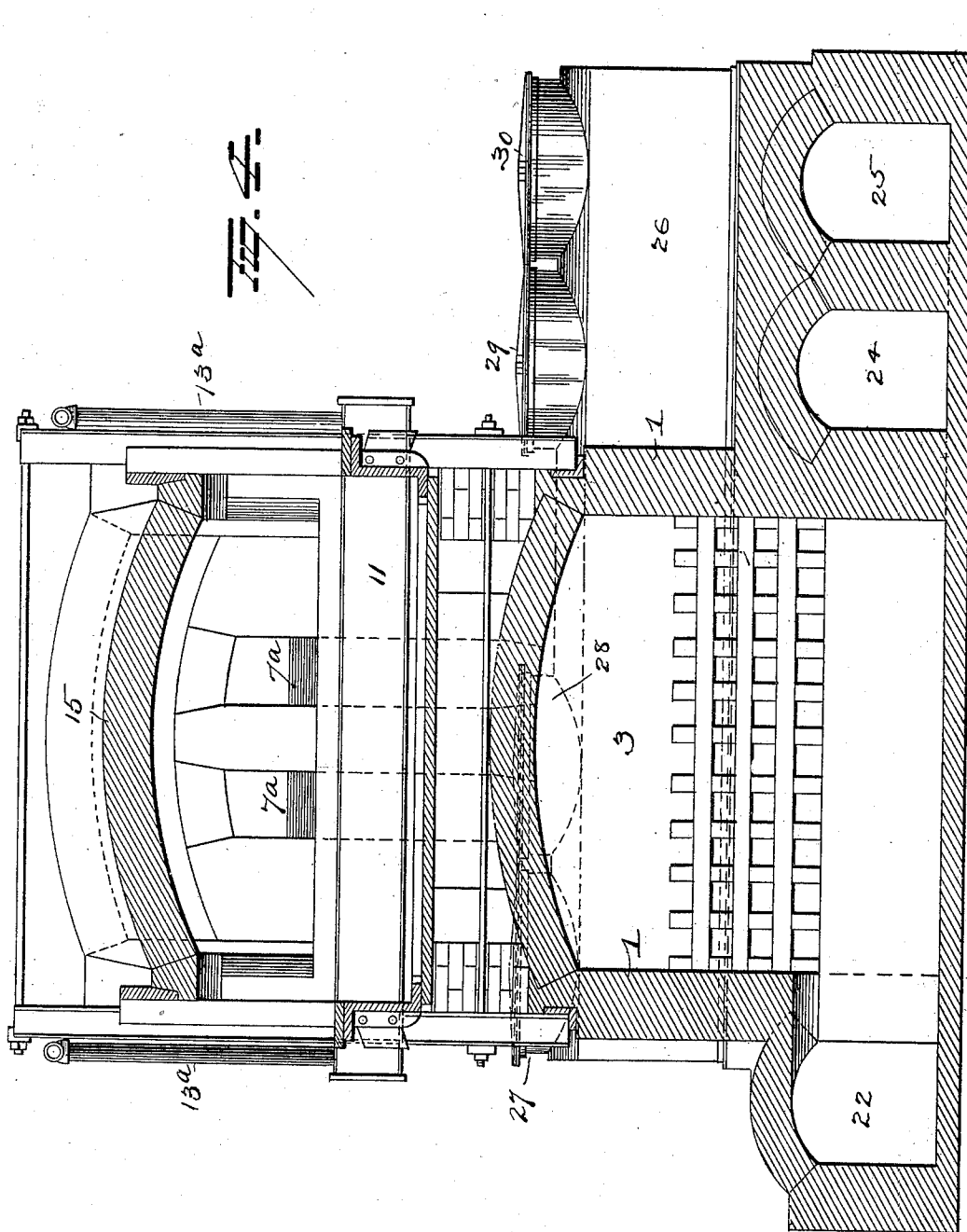
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

JAMES D. SWINDELL, OF PITTSBURG, PENNSYLVANIA.

PUDDLING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 695,182, dated March 11, 1902.

Application filed April 22, 1901. Serial No. 56,969. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. SWINDELL, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Puddling-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in puddling-furnaces, the object of the invention being to provide a furnace of this character with improved means for catching refuse material from the iron and prevent the same entering the flues to interfere with the perfect operation of the furnace.

A further object is to provide a furnace of this character which will utilize the greatest amount of heat and which will be extremely simple in construction and most effectual when in operation.

A further object is to provide an improved puddling-chamber for a furnace the lining of which will at all times be maintained cool.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in longitudinal section, illustrating my improvements. Fig. 2 is a view in section on the line *x x* of Fig. 1. Fig. 3 is a view in section on the line *y y* of Fig. 1, and Fig. 4 is a view in section on the line *z z* of Fig. 1.

1 represents walls of masonry arranged to form the furnace, which will now be described. Air-chambers 2 2^a are provided at the respective ends of the furnace and are separated from gas-chambers 3 3^a by partition-walls 4, extending nearly to the top of the furnace, but leaving a space above the same for a purpose which will hereinafter appear. The gas-chambers 3 3^a are separated by a wall 5, on which latter a support 6 for the puddling chamber or receptacle 7 is located, and said support 6 is made with flues 7^a for the passage of gas to chamber 7, and checker-work 8 is provided in each gas-chamber, but located inside the vertical plane of the flues

7^a out of the way of refuse material which may escape from the puddling-chamber. The air-chambers 2 and 2^a are also provided with checker-work, and the end walls of the furnace are made with openings communicating with the air-chambers, and platforms of masonry 9, preferably L shape in cross-section, are provided in the interior of air-chambers 2 2^a, at the openings in the end walls of the furnace, to support thereon metal receptacles for water, forming traps 10 to catch refuse particles which would otherwise be carried into the flues, and the walls are made with downwardly-projecting lips 10^a, normally submerged in the water of the traps to make the same air-tight.

The puddling-chamber 7 is provided on opposite sides with water-bridge boxes 11, connected with water-jamb boxes 12 at the corners of the chamber 7 by nipples 13, and said boxes 12 are made with curved inner walls to give to the interior of the puddling-chamber a general elliptical contour, and the boxes 11 are provided at each end with stand-pipes 13^a to relieve any pressure therein. Suitable door-openings 14 are provided in the side walls of the furnace, between the jamb-boxes 12, and are intended to be normally closed by doors. (Not shown.)

The top of the furnace is preferably dished, as shown at 15, to direct the flame down onto the material in the puddling-chamber, and the upright sides of the support 6 are made with inwardly-projecting flanges 17, of masonry, extending over boxes 11 to protect them from the flame, and the upright walls 4 are provided at their upper ends with inwardly-projecting arches 18, extending over the flues 7^a to prevent as far as possible the refuse particles of iron which are carried off by the draft from falling down into the gas-chambers.

The checker-work in the gas and air chambers is supported on arches 19, and beneath said arches flues communicate, as will be hereinafter described, and the gas-chambers are provided with solid walls 20, supporting one end of the checker-work and spaced from the walls 4, so as to form receptacles 21 beneath flues 7^a and in which the refuse material will collect and not be carried into the flues.

With the gas-chamber 3 a flue 22 commu-

nicates, and with gas-chamber 3^a a flue 24
 communicates, and said flues are preferably
 located on opposite sides of the furnace proper
 and extend forward beyond the furnace and
 parallel with each other. A flue 25 commu-
 nicates with air-chamber 2 and a flue 23 with
 air-chamber 2^a, and said flues 25 and 23 ex-
 tend beyond the furnace and parallel with
 flues 22 and 24, and a chamber 26 extends
 across all of said flues and communicates
 therewith by openings normally closed by
 valves 27, 28, 29, and 30, respectively, and
 said chamber 26 also communicates by a flue
 31 with a suitable stack 32 for carrying off the
 waste gases and products of combustion, and
 the stack 32 is preferably provided with a
 hinged cap or closure 32^a to regulate the draft
 therethrough. The flues 22 and 24 commu-
 nicate by means of chambers 33 with suitable
 gas-generators 34, and valves 35 and 36, re-
 spectively, are provided in the openings con-
 necting flues 22 and 24 with chambers 33 to
 open and close the openings and regulate the
 admission of gas to the furnace. Air-inlet
 valves 37 and 38 are located at or near the
 ends of flues 23 and 25, respectively, to regu-
 late the admission of air to the furnace, and
 all of said valves above enumerated are pro-
 vided with suitable counterbalanced mechan-
 ism (not shown) for operating them.
 The operation of my improvements is as
 follows: Assuming that all of the valves are
 closed and the operation of the furnace is just
 beginning, ore in sufficient quantity is passed
 through one of the door-openings into pud-
 dling-chamber 7. Valves 35, 38, 28, and 29
 are opened, and gas will pass through flue 22
 into gas-chamber 3 and up through flues 7^a,
 and air which enters chamber 2 through flue
 25 will pass up over wall 4 and commingle
 with the gas, and combustion will take place
 in chamber 7 to melt the ore therein, and a
 small portion of the products of combustion
 and waste gases will pass down flues 7^a into
 gas-chamber 3^a and through flue 24 into cham-
 ber 26 and from thence out through the stack
 32. The greater portion of the products of
 combustion and waste gases will, however,
 pass over the top of wall 4, through air-cham-
 ber 2^a, and out through flue 23 to the chamber
 26. The passage of the products of combustion
 through the checker-work in said chambers
 will heat the same to an intense degree to as-
 sist combustion when the direction of flow of
 the air and gas is reversed, as will be herein-
 after explained. Owing to the strong draft,
 small refuse particles are liable to and in fact
 are carried off in the products of combustion
 and waste gases, and the refuse particles which
 are carried into gas-chamber 3^a will fall be-
 hind walls 20, and the latter will serve to pre-
 vent the refuse being drawn into the flues
 and become burned cinder to choke the flues
 and prevent the perfect operation of the fur-

nace. The refuse material which is carried
 over wall 4 into air-chamber 2^a will, owing to
 their momentum, be carried over into trap 10,
 and when a large amount collects therein the
 trap can be emptied and the metal found there-
 in can be again treated in the furnace.

To reverse the flow of air and gas through
 the furnace, valves 35, 38, 28, and 29 are closed
 and valves 37, 36, 27, and 30 opened, and gas
 will enter chamber 3^a, air-chamber 2^a, and the
 air and gas will commingle in chamber 7, and
 the products of combustion escape through
 chambers 2 and 3, as will be readily under-
 stood.

Various slight changes might be resorted to
 in the general form and arrangement of the
 several parts described without departing
 from the spirit and scope of my invention,
 and hence I would have it understood that I
 do not wish to limit myself to the precise de-
 tails set forth, but consider myself at liberty
 to make such slight changes and alterations
 as fairly fall within the spirit and scope of
 my invention as claimed.

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

1. In a puddling-furnace, the combination
 with an outlet for the escape of burned gases
 and products of combustion, of a water-trap
 projecting into said outlet between the ends
 thereof to catch the refuse particles in the
 waste gases and products of combustion.

2. In a puddling-furnace, the combination
 of a puddling-chamber, means for supplying
 air and gas thereto, a flue for carrying off the
 products of combustion, and a water-trap pro-
 jecting into said flue for catching the refuse
 particles in said products of combustion.

3. In a puddling-furnace, the combination
 with a puddling-chamber, air and gas cham-
 bers communicating therewith and means for
 supplying air and gas to said chambers and
 for carrying off the products of combustion
 therefrom, of water-traps projecting into said
 air-chambers between the ends thereof to
 catch refuse material and a receptacle in each
 gas-chamber to catch the refuse material con-
 veyed thereto.

4. In a puddling-furnace, the combination
 of a puddling-chamber, gas and air chambers
 communicating therewith, and removable wa-
 ter-traps mounted in the furnace-wall and
 projecting into the outlets between the ends
 thereof to catch the refuse particles in the
 products of combustion and waste gases.

In testimony whereof I have signed this
 specification in the presence of two subscrib-
 ing witnesses.

JAMES D. SWINDELL.

Witnesses:

JAS. H. SWINDELL,
F. O. HENZI.