

(No Model.)

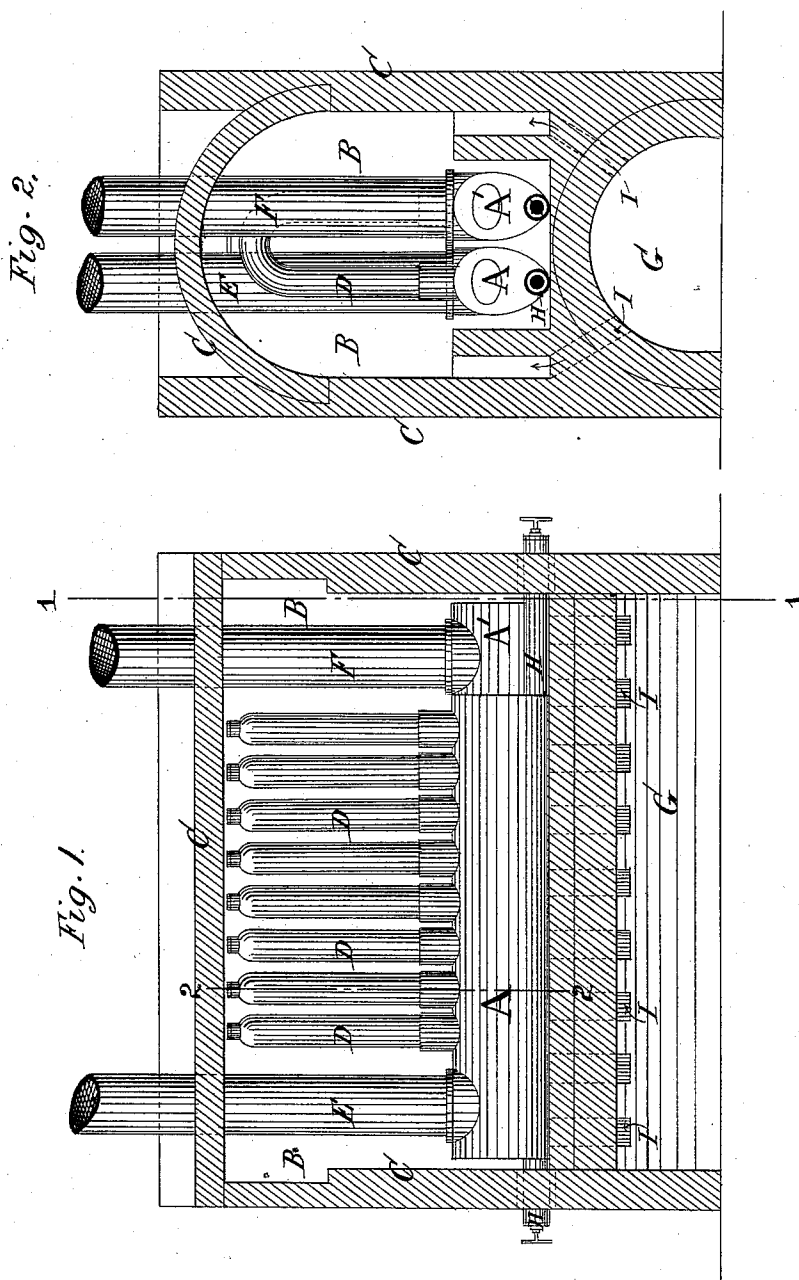
2 Sheets—Sheet 1.

E. WALSH, Jr.

APPARATUS FOR CONDENSING METALLIC ZINC.

No. 389,617.

Patented Sept. 18, 1888.



WITNESSES
S. R. Schrader,
Edwin Sauter

INVENTOR
Edward Walsh, Jr.
Paul Baker, atty.
his attorney

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Fig. 3.

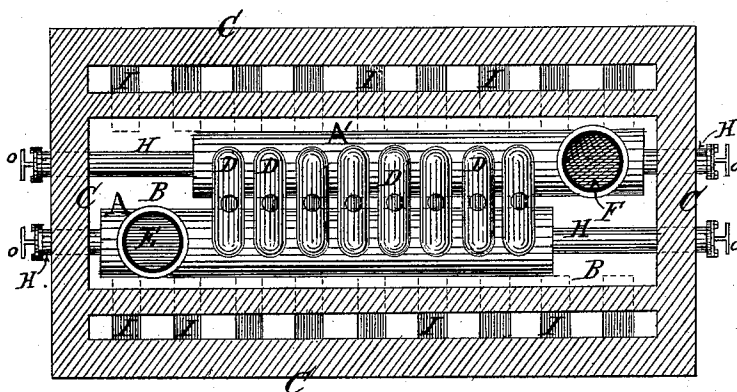


Fig. 4.

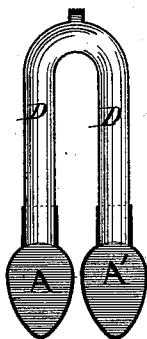
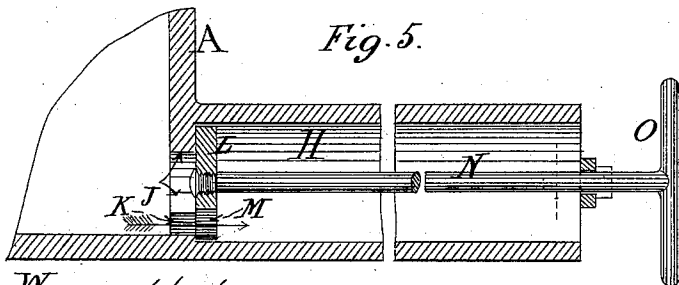
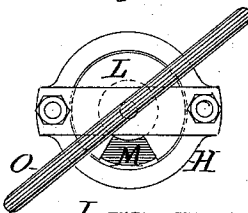


Fig. 5.



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Fig. 6.



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Paul Baker
his attorney

UNITED STATES PATENT OFFICE.

EDWARD WALSH, JR., OF ST. LOUIS, MISSOURI.

APPARATUS FOR CONDENSING METALLIC ZINC.

SPECIFICATION forming part of Letters Patent No. 389,617, dated September 18, 1888.

Application filed May 17, 1886. Serial No. 202,425. (No model.) Patented in France June 14, 1887, No. 184,211; in Eng'land and June 15, 1887, No. 8,599, and in Belgium June 16, 1887, No. 77,813.

To all whom it may concern:

Be it known that I, EDWARD WALSH, JR., a citizen of the United States, residing at the city of St. Louis, State of Missouri, have made
5 a new and useful Improvement in the Apparatus for Condensing Metallic Zinc from the Vapor in the Process of Zinc-Smelting, (for which I have obtained patents in Great Britain, No. 8,599, of June 15, 1887; in Belgium,
10 No. 77,813, of June 16, 1887, and in France, No. 184,211, of June 14, 1887,) of which the following is a full, clear, and exact description.

In my application for patent for improvement in the art relative to the reduction of the oxide of zinc in ores, filed in the United States Patent Office April 16, 1886, I have set forth and described the process by which zinc ore is reduced and volatilized in the cupola-furnace and carbonic-acid gas and zinc vapor generated in the furnace are made to pass through carbon or carbonaceous matter which is at a certain temperature.

My present invention relates to the apparatus for collecting and condensing the vaporized zinc, and has for its object to condense the zinc vapor, so that the zinc is deposited and withdrawn in a liquid state, and the carbonic oxide, nitrogen, and other uncondensable
30 gases expelled.

My invention consists, mainly, in a condenser composed of two horizontal receiving vessels or chambers of general egg-shaped cross-section, which are connected by a series of U-shaped vertical tubes and provided with an adit and exit for the gases, and, secondarily, in minor details of construction and combinations, all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

It is essential to keep the temperature of the condenser at not less than 780° Fahrenheit, for below that temperature the zinc would solidify, and at a temperature not exceeding 1,200° Fahrenheit, or the zinc would vaporize and be expelled from the condenser with the other gases, whereas between these temperatures the zinc will be deposited in a liquid
50 form, as required.

On the accompanying drawings, Figure 1

represents a side sectional elevation of condensing apparatus embodying my invention; Fig. 2, a transverse section on line 1 1 in Fig. 1, and Fig. 3 a sectional plan of the apparatus; Fig. 4, a transverse section through the condenser on line 2 2 in Fig. 1; and Figs. 5 and 6, longitudinal section and end view, respectively, to an enlarged scale, of one of the outlet or discharge pipes, showing the means
60 employed for regulating the discharge of the liquid zinc from the condenser.

Like letters of reference denote like parts in all the figures.

The condenser which I employ in this case
65 is composed of two cast-iron vessels or chambers, A A', of suitable length and preferably egg-shaped transversely. They are arranged side by side with the longest diameters of their transverse sections vertical and their narrowest portions downward on the floor of a flue-chamber, B, which is formed by brick-work C, and incloses the entire condenser, as shown. The vessels or chambers A A' are
70 connected and communicate with each other through their upper and widest portions by inverted U or siphon shaped pipes D, which extend upward into the flue chamber B, and are arranged parallel with each other at suitable distances apart.

Attached to and communicating with the vessel or chamber A through its upper and widest portion, in front of the connecting-pipes D, is an inlet or induction pipe, E, which extends upward or outward through the brick-work C of the flue-chamber B and communicates with the cupola, in which the zinc vapor and other gases are generated, while at the corresponding portion of the vessel or chamber A', behind the connecting-pipes D, is an
80 outlet or eduction pipe, F, extending upward or outward through the brick-work C, and either communicating with the flue or fire-space G beneath the flue-chamber B or conducted to other places where the gases may
85 be otherwise utilized.

Communicating with the lowest and narrowest portions of the vessels or chambers A A' and projecting from the ends of the latter through the brick-work C are discharge-pipes
100 H H, opening at their outer ends into the external air, and provided with suitable contriv-

ances for opening or closing their communications with the vessels or chambers A A', as hereinafter more particularly described.

For maintaining the condenser at a temperature of from 780° Fahrenheit to 1,200° Fahrenheit, I utilize the products of combustion arising from a furnace connected with the apparatus by directing them into the flue or fire-space G, from which they pass through the openings or passages I, leading from the flue or fire-space G into the flue-chamber B, where they surround the condenser and impart a uniform temperature thereto; or in lieu of the products of combustion from a furnace I may use heated air from any source.

The zinc vapor, carbonic oxide, and other gases passing from the cupola through the inlet or induction pipe E enter the vessel or chamber A, and thence circulate through the pipes D into the vessel or chamber A', and in so doing the expansion of the zinc vapor and the abstraction therefrom of heat by the simultaneous expansion of its associated gases cause the condensation and precipitation of the zinc in a liquid form to the bottom or narrowest portions of the vessels or chambers A A', from which it is discharged for use through the pipes H H, the carbonic oxide, nitrogen, and other associated uncondensed gases meanwhile escaping from the condenser through the outlet-pipe F either into the heating flues surrounding the condenser for utilization in heating the latter, or for other uses, as desired.

For regulating the discharge of the liquid zinc from the condenser through the pipes H, I surround the condenser end of each pipe H with a fillet or flange, J, having a slot, K, through its lower portion. Against the outer face of this fillet or flange J bears a circular plate, L, through which is a corresponding slot or opening, M, the plate L being provided with a central spindle, N, terminating in a

handle, O, by which the plate L is rotated from the outside of the open front end of the pipe H, so as to bring the slot or opening M over the slot K for permitting the discharge of the liquid zinc from the condenser and bringing the solid portion of the plate L over the slot K for shutting off the discharge of the liquid zinc from the condenser.

I do not herein claim the process of condensing the zinc vapors into liquid zinc, as the same has been made the subject-matter of a separate application, Serial No. 254,929, filed by me November 11, 1887.

I claim as my invention—

1. In a condenser for condensing zinc vapors into liquid zinc, the combination of two horizontal receiving chambers of substantially egg-shaped cross section and a series of vertical U-shaped connecting-tubes, substantially as and for the purposes specified.

2. In a condenser for condensing zinc vapors into liquid zinc, a condenser composed of two horizontal receiving chambers of general egg-shaped cross section, having an adit and an exit, and connected by a series of small U-shaped pipes, in combination with an inclosing-flue or combustion chamber, substantially as and for the purposes specified.

3. The combination of a condenser for condensing zinc vapors into liquid zinc, and a draw-off pipe provided with a rotary valve having a slot to register with a port or opening in the condenser-shell, substantially as and for the purposes specified.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 15th day of May, 1886.

EDWARD WALSH, JR.

Witnesses:

PAUL BAKEWELL,
S. L. SCHRADER.