3 Sheets—Sheet 1.

J. WEBSTER.

Manufacture of Zinc.

No. 46,198. Patented Jan'y 31, 1865.

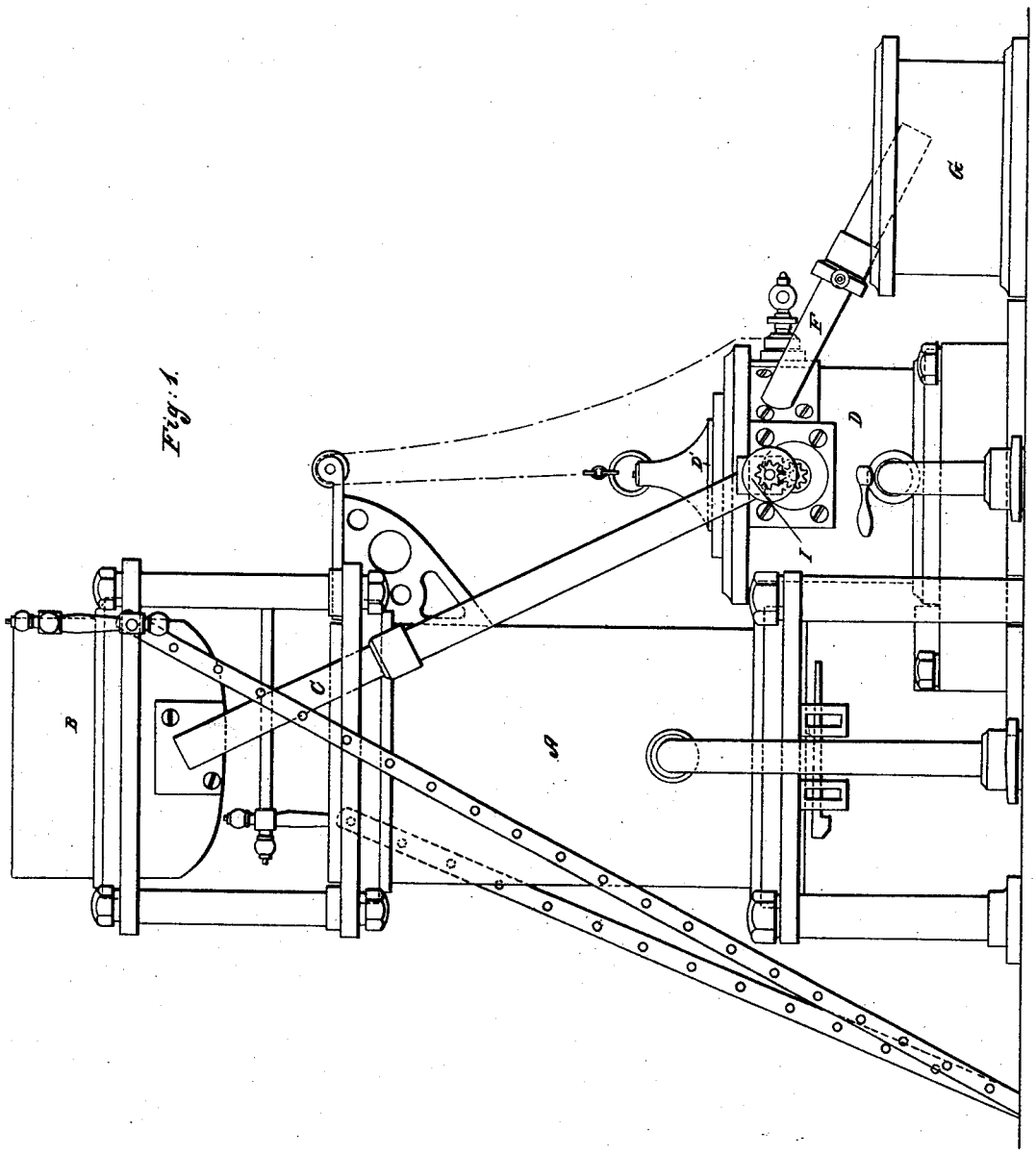

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Fig. 2.

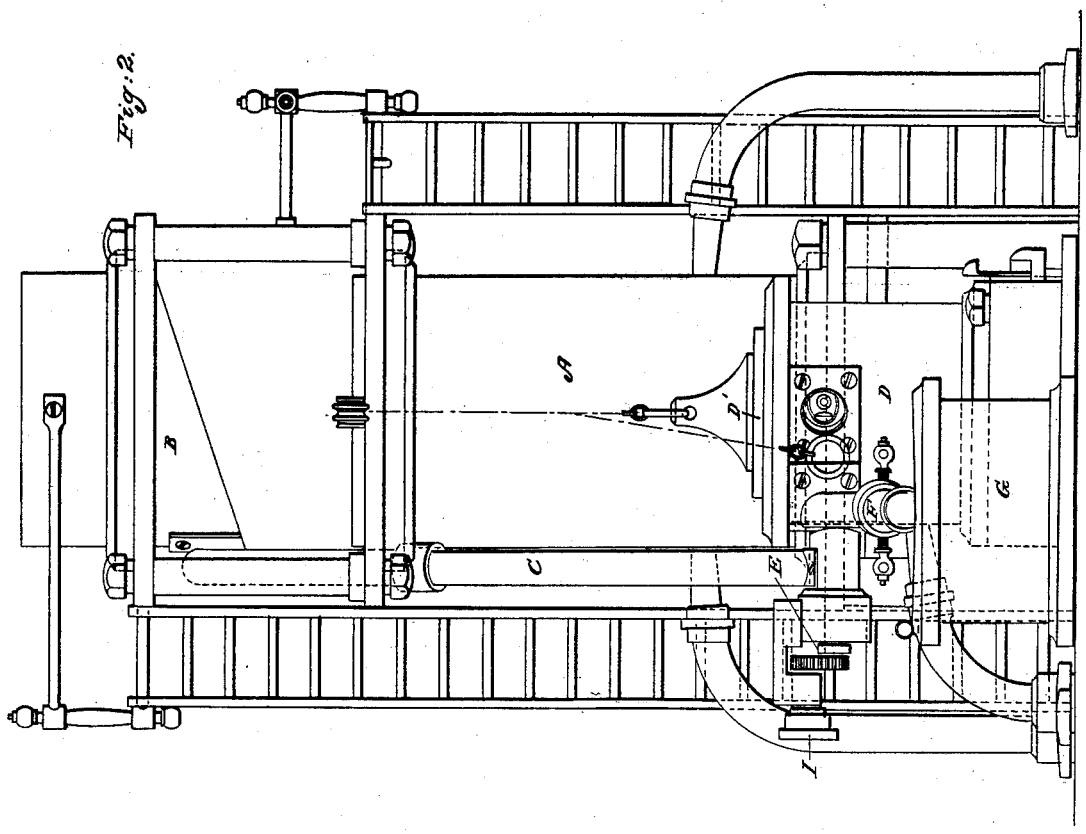

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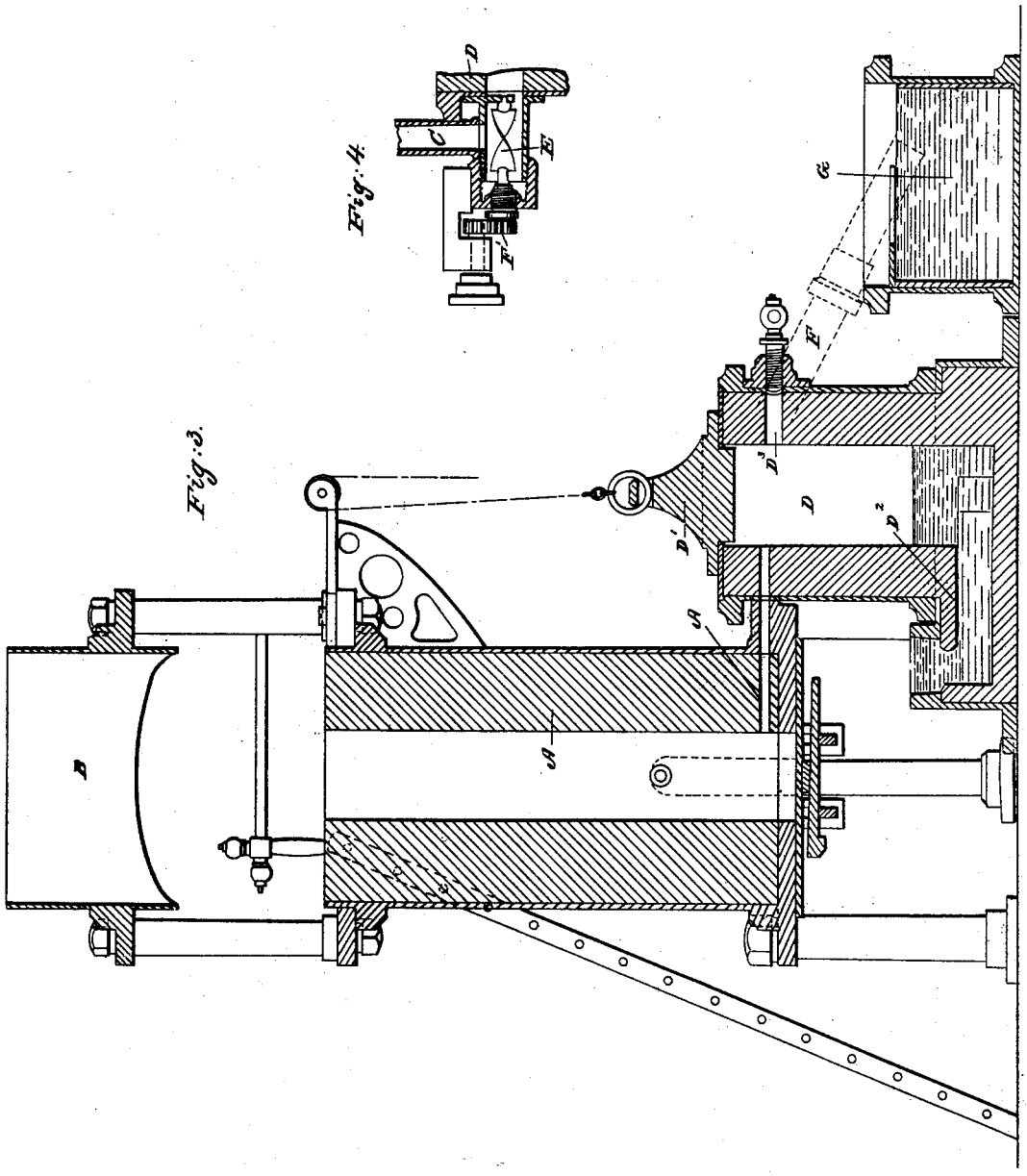
Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES WEBSTER, OF BIRMINGHAM, COUNTY OF WARWICK, ENGLAND.

IMPROVEMENT IN THE MANUFACTURE OF ZINC.

Specification forming part of Letters Patent No. **46,198**, dated January 31, 1865.

To all whom it may concern:

Be it known that I, JAMES WEBSTER, of Birmingham, in the county of Warwick, engineer, a subject of Her Britannic Majesty, have invented Improvements in the Manufacture of Zinc; and I do hereby declare that the following is a full and exact description of my said invention.

My invention of "improvements in the manufacture of zinc" relates to a novel mode of volatilizing metallic zinc or separating it from the ore.

My improved process consists in bringing the zinc ore or oxide of zinc in a finely-divided state into the presence of molten iron or other substance which melts at a temperature superior to the volatilizing-point of zinc.

A convenient mode of carrying out my invention is shown in the accompanying drawings, in which Figure 1 is a front elevation of the apparatus. Fig. 2 is a side elevation, and Fig. 3 is a longitudinal vertical section taken through the center of the apparatus.

A is a cupola or smelting furnace similar in principle of construction to those ordinarily employed for melting or smelting iron. Above this furnace is placed a vessel or chamber, B, containing pulverized zinc ore or other compound containing zinc, which, together with nitrate of soda, also pulverized, is carried down a pipe or channel, C, and supplied in a regular manner to a close chamber, D, into which the molten iron is run from the cupola or smelting furnace, as seen in Fig. 3. A regulated quantity of the zinc ore is supplied from the pipe or channel C by means of a rotating screw, E, which is adapted to the lower end of the pipe or channel C, as shown in the detached sectional view, Fig. 4, and by its continued rotation will force the pulverized ore forward into the molten metal in the vessel or chamber D, where it will become volatilized by the high temperature to which it will be subjected when in contact with the molten metal in the vessel D. The propelling-screw E, with the gear for driving the same, is shown detached in section at Fig. 4. From the close vessel D the vapors of zinc are conducted through a pipe, F, Fig. 2, to a vessel, G, containing water, and on the vapors being allowed to escape below the surface of the water the metallic zinc will be deposited at the bottom of the vessel, and the incondensable gases—such as the carbonic acid and carbonic oxide—will escape into the atmosphere. The vessel D, into which the zinc ore is brought in order to be acted upon by the molten metal, will after a time become charged with slag, which must from time to time be tapped or drawn off, as in cupola-furnaces. The nitrate of soda is used with the zinc ore for the purpose of keeping the slag in the vessel D thin, so that it will run easily. This nitrate of soda is not, however, indispensable for the purposes of my invention, and other chemical agents—such as caustic soda or carbonate of soda—may be employed for effecting the same object. As the action of the zinc on the molten iron is exceedingly beneficial and refines and purifies the metal and improves its quality, it may be found convenient and commercially advantageous and profitable to use for the purposes of my invention the commonest description of pig-iron, which, when it has been used in the manner above described, will be greatly improved in quality and will consequently be more durable than before. As the iron will be continually running from the cupola or melting furnace A down the channel A′, Fig. 3, into the vessel D, it will gradually accumulate in the vessel; and as it will be purified during the operation of volatilizing the zinc, it will pass under the inverted bridge D^2 and run from the open space beyond into any suitable receptacle. The vessel D is provided with a lid or cover, D′, which is suspended from a chain, whereby it may be lifted up when it may be desired to obtain access to the interior of the vessel. This vessel is also provided with another opening, D^3, situate opposite to the inclined channel leading from the cupola or melting furnace A, as seen in Fig. 3. The opening D^3 is closed by a suitable cover or plug, which, however, may be easily removed when access to the channel leading from the melting-furnace is required, as will from time to time be the case in consequence of slag accumulating in and obstructing the channel A′. The bottom of the vessel or chamber B above, containing the zinc ore, being inclined, the pulverized ore and other ingredients will descend of their own weight

into the tube or channel C, and will be pushed forward by the screw E, which is rotated by means of the toothed gearing E′, which is actuated by a band passed round a pulley, I.

I claim as my invention—

Extracting zinc from its ores by causing the latter to be brought into contact with molten iron or other metal in a close vessel.

In witness whereof I, the said JAMES WEBSTER, have hereunto set my hand and seal this 14th day of October, 1864.

JAMES WEBSTER. [L. S.]

Witnesses:

GEORGE AUSTIN WAYTE,
Of 172 Gt. Lister Street, Birmingham.

THOMAS B. LYON,
Of Aston, near Birmingham.