

(No Model.)

M. V. SMITH.

APPARATUS FOR AND PROCESS OF REDUCING ZINC ORES.

No. 500,436.

Patented June 27, 1893.

Fig. 1.

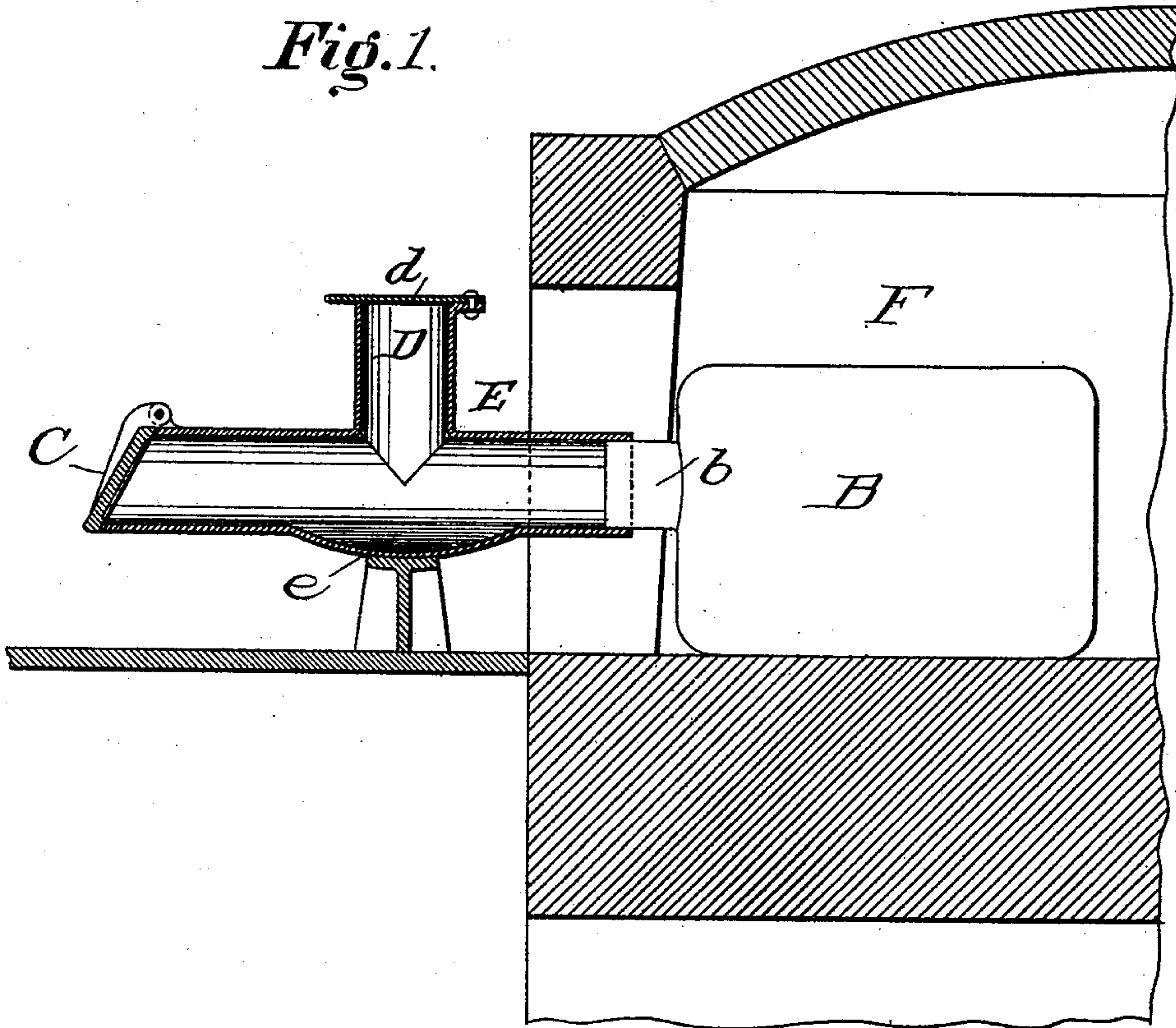
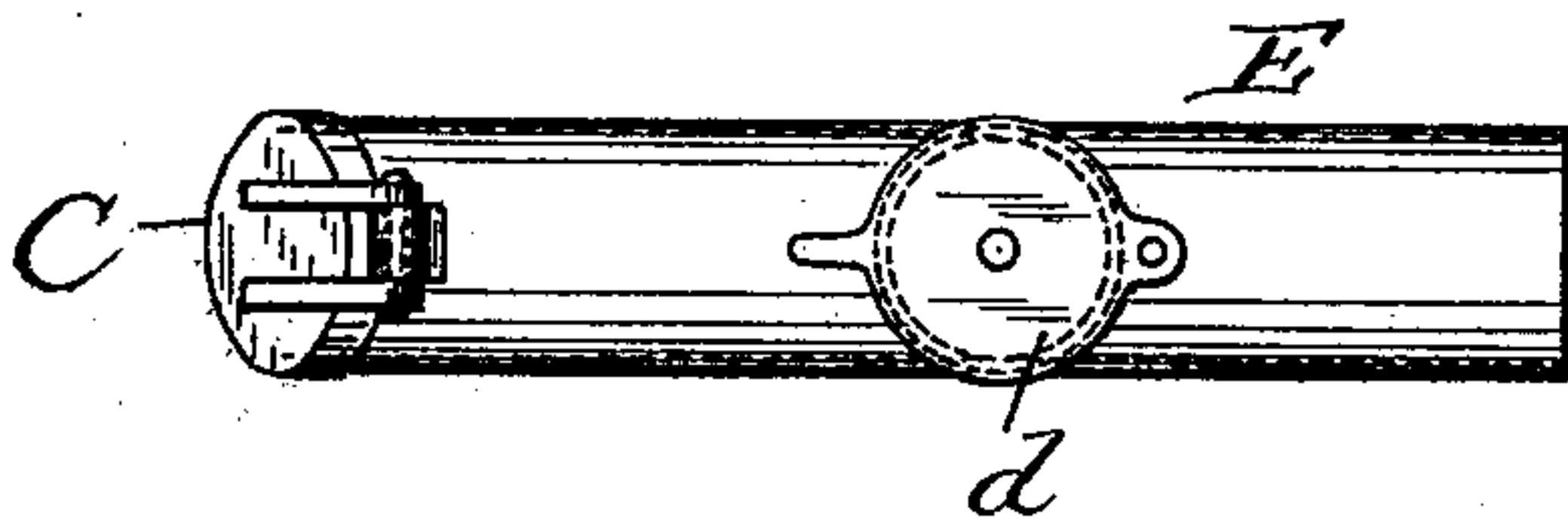


Fig. 2.



WITNESSES:

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APPARATUS FOR AND PROCESS OF REDUCING ZINC ORES.

SPECIFICATION forming part of Letters Patent No. 500,436, dated June 27, 1893.

Application filed December 27, 1892. Serial No. 456,356. (No model.)

To all whom it may concern:

Be it known that I, MARTIN V. SMITH, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for and Processes of Reducing Zinc Ores, of which the following is a specification.

My invention is an improved apparatus and process for reducing zinc ores.

The objects sought are, first, to utilize the heat of the outgoing zinc fumes, and second, to strain out and retain any oxide of zinc formed by contact of the fumes with carbonic acid gas mixed therewith.

The apparatus above referred to is illustrated in the accompanying drawings, in which—

Figure 1, represents a vertical longitudinal section, and Fig. 2, a top or plan view of the condenser.

In the drawings F, indicates a furnace, which may be similar to those used in melting glass. Within this is placed a closed pot or retort B, which is made of refractory material, such, for example as that used in making glass pots. The pot has a neck *b*, the mouth of which projects outward in the door or other opening of the furnace. In connection with this is a condenser E, made to join upon the neck of the retort in the same plane therewith and afford a continuous passage from the retort to the condenser. On the upper part of the condenser is a vertical extension D, having a movable lid *d*. The front extension of the condenser is provided also with a door C, which covers the mouth of the same. The condenser may be, as shown, in the form of a hollow cylinder, excepting that it has, preferably, a pocket or cavity in the bottom, about midway of its length as shown at *e*.

The process or method of operating is as follows: The pot or retort being placed in the furnace, and the furnace brought up to a temperature of about 3,000° the pot or crucible is then filled with a mixture of zinc oxide and coke, after which the condenser is connected to the pot mouth, substantially as

shown above. After this operation has been performed the lid *d*, is shoved aside and the condenser filled with the same kind of mixture of oxide and coke as that previously placed in the pot. The heat imparted to the charge in the pot causes a reaction to take place; the oxygen in the oxide of zinc combines with the carbon of the coke, forming carbonic oxide gas. This liberates the zinc which, at the temperature required for decomposition, is given off in the form of zinc fumes. These fumes, together with the carbonic oxide gas, are, by their own expansion, forced out of the pot through the condenser, in which the zinc fumes become cooled and deposit liquid metallic zinc. In the reaction just described a large per cent. of carbonic acid is sometimes formed, which when present with zinc fumes has a tendency to oxidize said zinc, forming a white powder or oxide of zinc. By my invention this white powder is strained off by the ore and coke in the condenser, and while passing through the condenser, and thereby is retained. I have found that the largest per cent. of carbonic acid is formed while the temperature is increasing from the cold material up to the point at which the oxide of zinc decomposes. I also utilize the heat carried out of the pot, by the out going zinc fumes and carbonic oxide which are imparted to that portion of the batch placed in the condenser and which acts as a strainer to retain the white powder. In recharging the vessel the door at C, is opened and the now red hot batch in the condenser shoved back into the pot, carrying with it the white powder and the heat units imparted to the batch by the outgoing fumes. At this point of the operation the metallic zinc which has accumulated in the cavity in the bottom of the condenser is taken out and a fresh charge or batch placed in the condenser, and so on indefinitely, this forming a continuous process and one of great economy.

I claim—

1. In combination the pot having a contracted mouth extending from one side, a condenser connected with said mouth having a pocket in its bottom, a vertical extension hav-

ing a feed lid located above said pocket, and
a door located at the outer end of the con-
denser for permitting access to the condenser
to shove back the heated batch and remove
5 the metallic zinc from the pocket, substan-
tially as described.

2. The hereinbefore described method of
reducing zinc ores, the same consisting in
passing the fumes thereof over batches of ore

in a separate condenser, substantially as de- 10
scribed.

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

MARTIN V. SMITH.

Witnesses:

C. C. MORROW,
R. FROIDE VEAUX.