

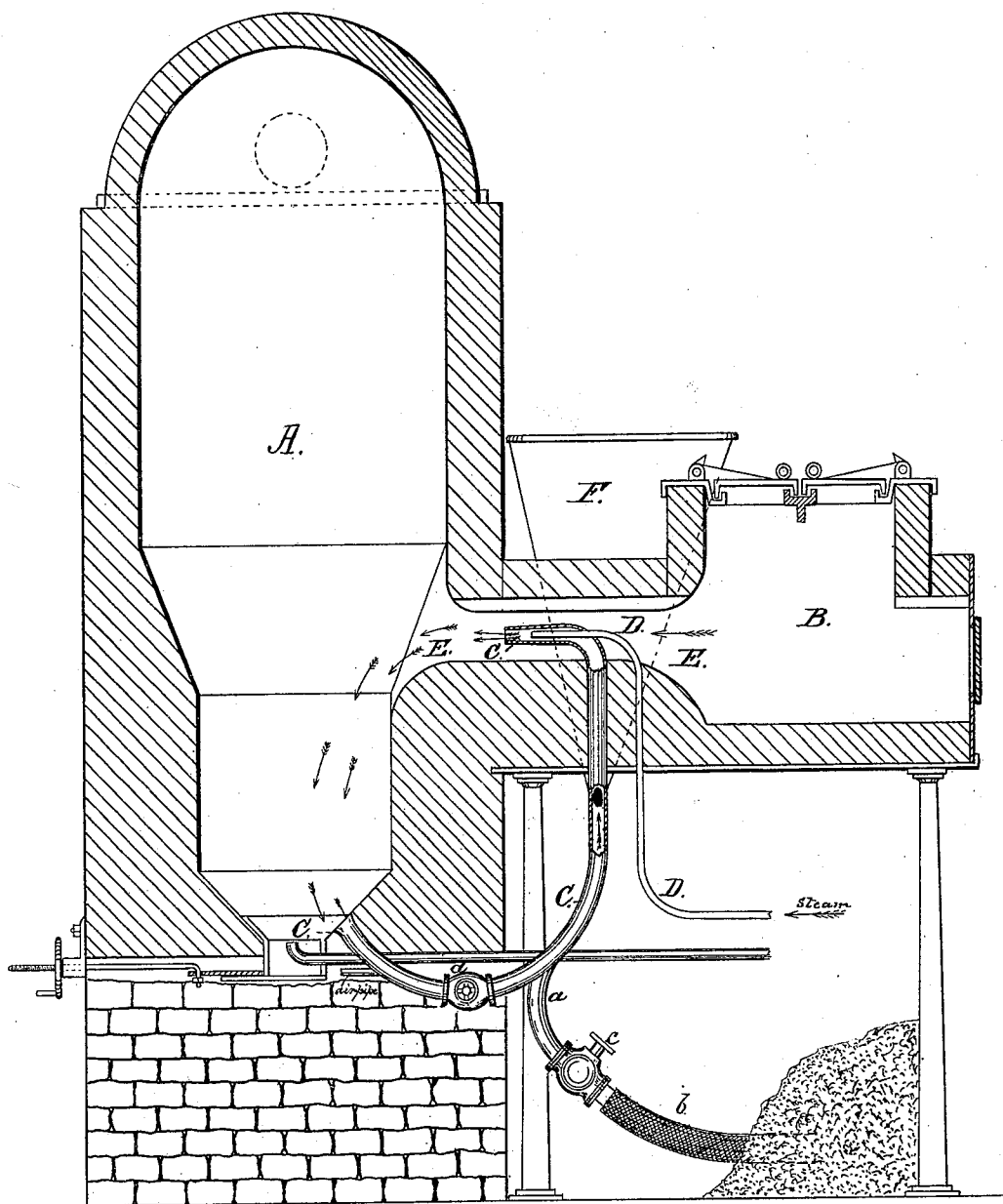
(No Model.)

C. E. ROBINSON.

REDUCING ORES

No. 246,690.

Patented Sept. 6, 1881.



WITNESSES:

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CHARLES E. ROBINSON, OF CHARLOTTE, NORTH CAROLINA.

REDUCING ORES.

SPECIFICATION forming part of Letters Patent No. 246,690, dated September 6, 1881.

Application filed September 3, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ROBINSON, of Charlotte, in the county of Mecklenburg and State of North Carolina, have invented a new and useful Improvement in Reducing Ores; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to an improved process and furnace for volatilizing and oxidizing ores, especially such as contain a large proportion of gold and silver. It is more particularly an improvement in the class of furnaces in which the ore, when broken up or in a comminuted state, is held in suspension or kept in constant circulation by means of a jet of air, gas, or steam while being acted on by heat, as illustrated in Patent No. 212,508, granted to me February 2, 1879. In the present case I effect by an air or gas jet an induced feed of the pulverized ore into the reducing-chamber, and also an induced draft of air into the fuel-chamber, and an induced blast or current of heated air and the products of combustion from the fuel-chamber into the reducing-chamber, the ore being mingled with and powerfully acted upon by the flame and heated products of combustion while on its way into the said chamber, and the ore and products of combustion being forced out of the chamber and again into the tube, so that they make a continuous round through a continuous passage.

In some cases I propose to dispense with the furnace proper and employ the tube alone, giving it a circular or other suitable form and arranging it over a grate or within a fire-chamber, so that heat may be applied to it externally; but, preferably, I induce a blast of the products of combustion directly from the fire-chamber and force them through the tube mingled with the pulverized ore. In either way the volatilization and oxidation of the baser elements—such as sulphur, arsenic, antimony, and iron—and their preparation for separation from the valuable metals, gold and silver, are effected very quickly and thoroughly.

In the accompanying drawing I illustrate an apparatus for carrying out my process; but it may be modified in various ways and still involve the principles of my invention. The view given is a sectional elevation, and repre-

sents a furnace, through the base of which steam or air may be injected, when desired, for the purpose of treating the ore, as described in my aforesaid patent.

A indicates the reducing-chamber of a furnace; B, the fuel-chamber; and C, the tube through which the ore, in a state of more or less minute division, is carried into the chamber A or else circulated through the latter in continuous round, as hereinafter described. D is the smaller tube, through which air, steam, or other gas is forced to induce a current or circulation of ore. The ore-chamber A may be constructed of fire-brick and have any desired capacity. The fuel-chamber B is connected with the reducing-chamber by a narrow funnel-shaped throat or passage, E, whose mouth or widest end opens into the fuel-chamber. The nozzle or discharge end of tube C is located in the passage E and directed toward the reduction-chamber A. The nozzle of pipe D enters the nozzle of tube C, and is arranged in the same manner—i. e., directed toward the reducing-chamber. The other end of the pipe D is connected with a steam-generator, air-blower, or pump, or other suitable foreign apparatus. (Not shown.) The jet or current of steam or air proceeding from the pipe D will induce a current of ore through tube C. It will also induce a current of products of combustion and air from and through the fuel-chamber B. The flame and heated products of combustion will impinge on the particles of ore entering passage D from pipe C, and together they will enter the chamber A, wherein the volatilization and oxidation begun in the passage D will be continued and perfected.

I may introduce the crushed or pulverized ore into tube C through a hopper, F, as shown, or any other preferred medium.

I connect the lower end of tube C with the base of chamber A, as shown, thus forming a continuous passage; or I may simply employ the tube alone, giving it a circular or other form, and arranging it in a furnace or over a grate, and directing the ore and blast into the same in a suitable manner, and providing, also, for discharge of the metal. For many purposes I prefer this latter method and arrangement as involving certain advantages, more

particularly in respect to compactness and economy of construction of the furnace as a whole, and to economy in working the same. In either case the air to support combustion and produce oxidation is induced or drawn into the fuel-chamber, and the products of combustion and ore mingled therewith are also induced and forced into the reducing-chamber by one and the same means, and the result effected is complete and thorough volatilization and oxidation of the baser elements and preparation of the same for elimination from the more valuable metal or metals in a very short time with the least expenditure of fuel and labor. The diffused condition of the ore and the mode of applying the blast insure the action of the heat and air on each individual particle, and prevent the particles melting or caking together, so that the largest yield of the valuable metals is obtained at minimum cost.

In addition to the features before described, I show in the drawing a pipe, *a*, branching from tube *C*, and having a flexible extension, *b*. This attachment is used for the purpose of feeding ore into the furnace from a heap or other body of the same. The cock *c* in pipe *a* is opened and cock *d* in tube *C* closed when ore is to be fed in this manner.

What I claim is—

1. The process of reducing and oxidizing ores, consisting in subjecting ore, when in a pulverized or comminuted state, to the action of a fire-blast, and driving or producing a continuous circulation through a continuous passage until the desired effect has been produced, as set forth.

2. The combination, with an ore-reducing chamber and furnace-chamber, of an ore-conducting pipe, arranged with one of its open ends in communication with the lower portion of the reducing-chambers and the other in the mouth of the fire-chamber, and a steam, air, or gas injecting pipe which is connected with the ore-pipe, substantially as shown and described, whereby the steam or gas jet or current produces an induced fire-blast and creates and maintains a circulation of the pulverized ore through a continuous passage, as set forth.

The above specification of my invention signed by me this 28th day of August, 1880.

CHAS. E. ROBINSON.

Witnesses:

CHAS. A. PETTIT,
SOLON C. KEMON,
AMOS W. HART.