

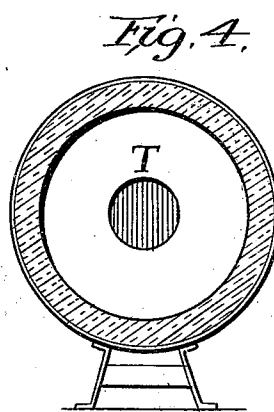
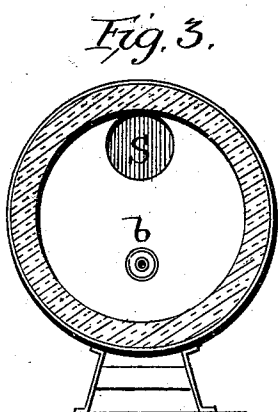
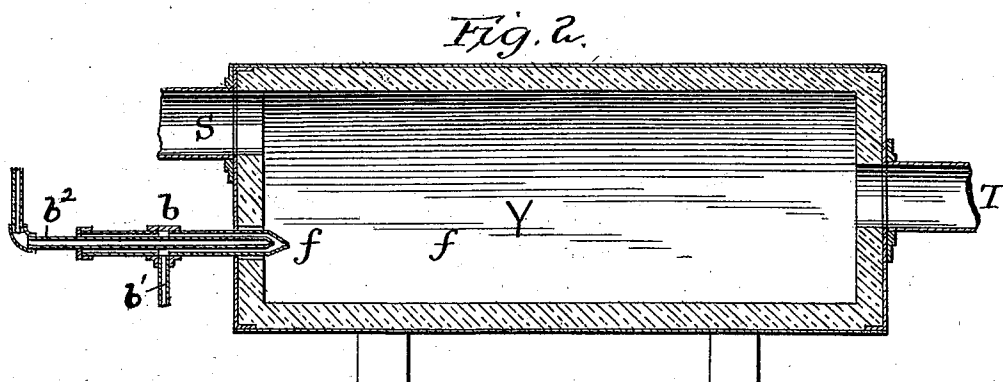
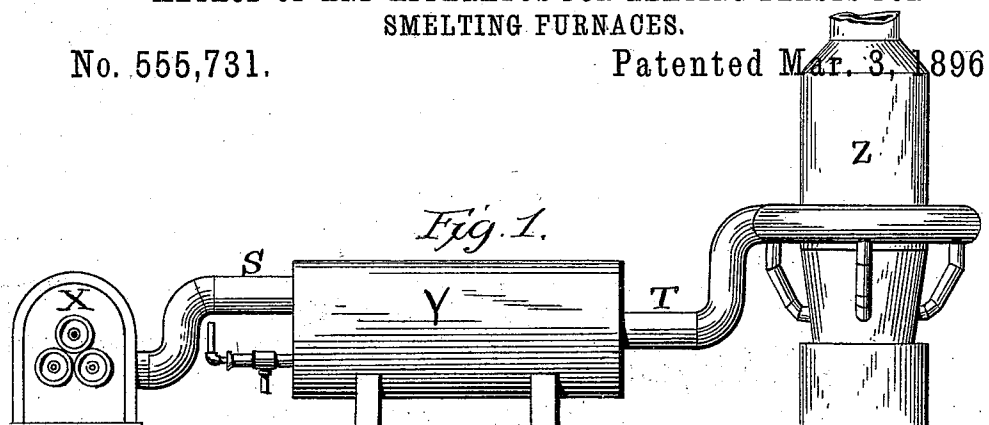
(No Model.)

J. W. NESMITH.

METHOD OF AND APPARATUS FOR HEATING BLASTS FOR
SMELTING FURNACES.

No. 555,731.

Patented Mar. 3, 1896.



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JOHN W. NESMITH, OF DENVER, COLORADO, ASSIGNOR TO THE COLORADO
IRON WORKS, OF SAME PLACE.

METHOD OF AND APPARATUS FOR HEATING BLASTS FOR SMELTING-FURNACES.

SPECIFICATION forming part of Letters Patent No. 555,731, dated March 3, 1896.

Application filed April 13, 1895. Serial No. 545,647. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. NESMITH, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Methods of and Apparatus for Heating Blast for Smelting-Furnaces, of which the following is a specification, reference being therein to the accompanying drawings.

My invention lies mainly in the method of improvement in the art, but also includes an apparatus which I have devised for the practical operation of the said method.

My invention is designed especially for pyritic and silver-lead smelting, but is not necessarily confined to these particular uses. In the smelting of such ores very little heat is evolved by the gases escaping from the furnace, so that the mode of utilizing heat otherwise wasted, used in iron-smelting, is not available in the smelting of the pyritic and silver-lead ores. Further, in some localities coke suitable for such smelting is unusually expensive, while other kinds of fuel are cheap. It is desirable, therefore, to reduce the amount of coke in the furnace, and for this purpose I have sought, in this my invention, economically and effectually to heat the blast before it enters the furnace, without resorting to the more expensive method of passing the air through pipes externally heated.

To this end I have devised my improved method, which consists in passing a blast of air to the furnace through a chamber in which is maintained an open fire. I have herein after explained the particular method, and the apparatus designed by me for the practice of the method, which apparatus is illustrated in the drawings hereunto attached, in which drawings—

Figure 1 represents the apparatus in side elevation. Fig. 2 shows the intermediate heating-chamber in longitudinal section. Figs. 3 and 4 are cross-sections of the chamber, showing the ends.

In the drawings, Z represents any suitable smelting-furnace, which may be of well-known form, such as are in use for smelting pyritic or silver-lead ores, or any other ores. A blast-pipe T leads from the intermediate

chamber Y to the tuyeres which supply air to the furnace. A pipe S leading from a blower X forces the air into and through the intermediate chamber and to the pipe T.

The intermediate chamber is preferably built of plate-iron in cylindrical form like a boiler-shell, and is lined with fire-brick, and serves as a stove. An oil or gas burner connected with a suitable or well-known form of supply by a pipe *b'* projects into the interior of the stove, as shown at *b*. Oil, gas or pulverized fuel may be used and projected into the stove by any suitable means, such as a pipe *b''* for supplying air under pressure. In order that the gas or other fuel supplied through the pipe *b* may be forced into the stove when the blast is on, I provide a forcing or equivalent mechanism connected with the pipe *b* for supplying the fuel and air necessary for its combustion under pressure as great or greater than the pressure of the main air-blast supplied by the forcing mechanism X.

The blast from the blower X enters the stove Y by means of the inlet-pipe at S and passes out of the stove by the outlet-pipe at T on its way to the furnace Z. The interior of the stove, then, is under pressure of the blast, whatever that pressure may be, as applied by the blower X, and as required for the proper operation of the smelting-furnace Z, and the fire at any point, as at *f*, is burning openly in the stove, and hence in the blast-pressure and in immediate contact with the air, and the fire is maintained under such pressure in the stove by means of the oil or gas burner *b*, projecting the liquid or gas fuel into the stove Y, such burner working under pressure as to insure the projection of the fuel and of the oxygen or air necessary to oxidize that fuel in the stove under blower or furnace pressure. In practice it is found that combustion is best maintained by driving the burner either by steam or by air pressure greater than the blast-pressure of the blower X as supplied through the stove Y to the furnace Z. Hence when the burner *b* is driven by air-pressure it may be done by an air pump or compressor or other appliance working under greater pressure than does the blower which supplies the blast through the stove to the furnace. By the op-

eration of this appliance just so much oxygen is used as is necessary to oxidize the carbon projected into the stove by the burner *b*, and such necessary oxygen is best projected into the stove with the carbon by or through the burner. The proportionately great quantity of air from the blower *X* through the stove takes up the heat produced in the stove, as above described, and passes from the stove into the smelting-furnace. For the purpose of heating this air-blast I deliver by pressure the fuel, intimately associated with the air necessary for its combustion, into the fire in the stove, which fire is in the path of the passing air-blast, so that the air-blast is heated; but as it is not drawn upon for oxygen to maintain such fire it passes practically pure to the furnace to promote combustion there. The small percentage of the products of combustion, mixed with the blast and carried to the furnace, is inert and therefore without effect, and is in such comparatively small quantity that it may be disregarded.

I claim—

1. The method hereinbefore described, which consists in forcing a blast of air to a smelting-furnace, through an intermediate chamber, and at the same time maintaining a heating-flame in said chamber, by means of fuel forced into the said chamber under pressure greater than that of the blast.

2. An apparatus for heating the air-blast of furnaces, the same consisting of an air-pipe having suitable forcing mechanism, an intermediate heating-chamber in said air-pipe, and a burner in said heating-chamber having air and fuel supply pipe with separate forcing mechanism therefor, all substantially as described.

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

JOHN W. NESMITH.

Witnesses:

E. E. GOODALE,
W. C. MACDONALD.