

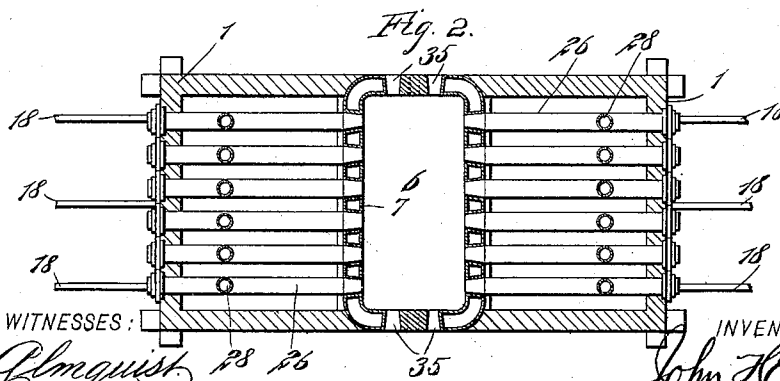
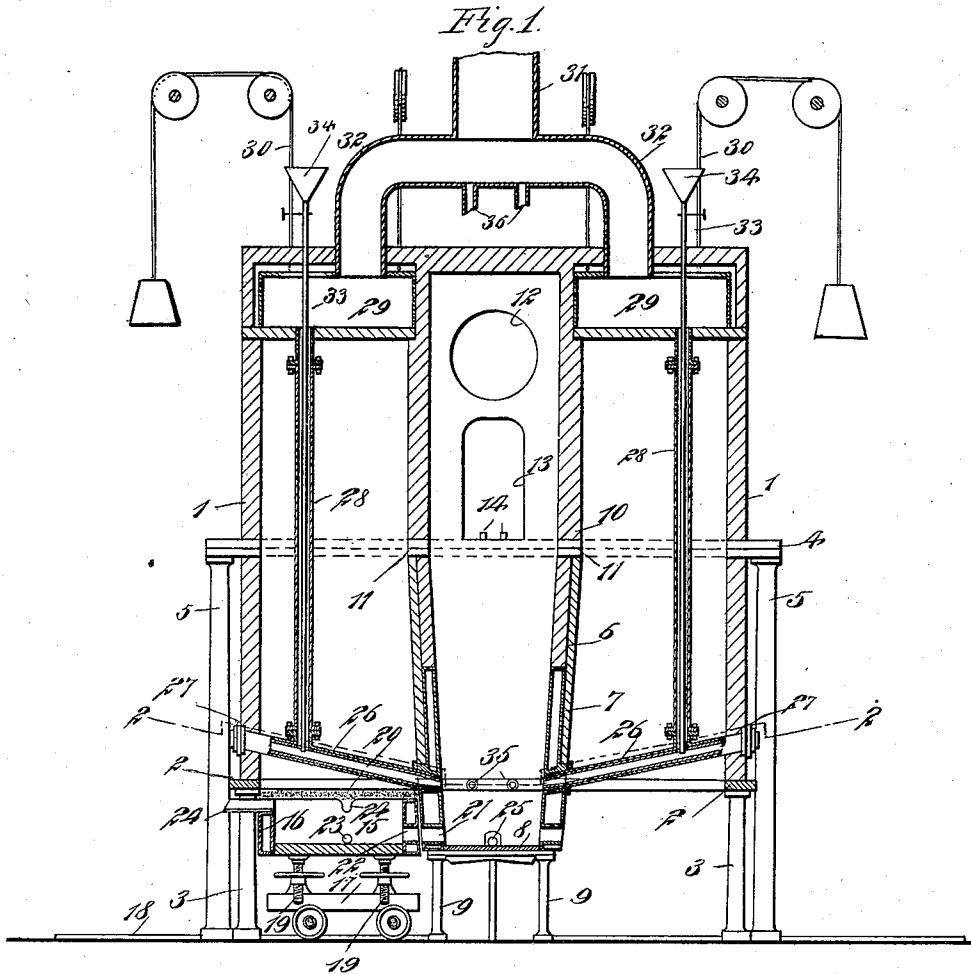
No. 635,652.

Patented Oct. 24, 1899.

J. H. CANAVAN.
SMELTING FURNACE.

(Application filed May 18, 1899.)

(No Model.)



WITNESSES:

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JOHN HENRY CANAVAN, OF KIRKLAND, ARIZONA TERRITORY.

SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 635,652, dated October 24, 1899.

Application filed May 18, 1899. Serial No. 717,323. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY CANAVAN, of Kirkland, in the county of Yavapai and Territory of Arizona, have invented a new and
5 Improved Smelting-Furnace, of which the following is a full, clear, and exact description.

This invention relates to improvements in furnaces for smelting pyrites or metallic ores; and the object is to provide a furnace of comparatively simple construction in which a hot-air blast is employed and in which carbonaceous fuel is not required after the fire is once started, thus resulting in a great saving in the cost of fuel.

15 I will describe a smelting-furnace embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical section of a smelting-furnace embodying my invention; and Fig. 2 is a section substantially on the line 2 2 of
25 Fig. 1, the twyers being shown in plan.

The furnace comprises outer walls 1, which are supported on plates 2, mounted on uprights 3, and by a metal frame 4, mounted on uprights 5. Arranged within the casing is the furnace or cupola 6, which has a water-jacket 7 and is supported upon a base-plate 8, mounted on standards 9. The upper end of the furnace or cupola 6 communicates with a chimney 10, which is supported on cross-bars 11, attached to the frame 4. Communicating
35 with the chimney 10 is a downtake 12 for carrying off the soot or other products of combustion, and the chimney is also provided with a doorway 13, through which the material
40 to be treated is to be passed. The material may be carried to this door by a suitable truck mounted to move on tracks 14.

The space between the furnace or cupola and the outer walls or shell 1 and also between the chimney 10 and said outer walls or casing 1 forms hot-air chambers which are open at the bottom and are designed to receive underneath them forehearth 15, one of which I have shown in the drawings, and
50 these forehearth 15 are provided with water-jackets 16 and are mounted on trucks 17, movable on tracks 18.

It is designed that there shall be a tight connection between the upper edges of the hearths 15 and the bottom of the walls forming the 55 air-chambers. I therefore connect the hearths to the trucks by means of jack-screws 19, so that by manipulating these screws the hearths may be moved upward, and to insure a tight joint I place clay 20 on the upper edge of the 60 box-like forehearth.

The forehearth 15 are made removable in case of chill of the slag or metal in them and so that in such event another forehearth may be substituted. 65

At its lower portion the cupola 6 has openings 21, adapted to register with openings 22, formed through the wall of the forehearth 15, and the cupola 6 is also provided with a discharge-opening 25. Each forehearth is provided with a discharge-opening 23 for the discharge of slag during the preliminary heating, and it is also provided with spouts or outlets 24 for the discharge of slag into buckets or into running water. A number of twyers 75 26 extend into the cupola at each side, the twyers being inclined downward and inward, and their outer portions are extended through the walls 1 and are secured to plates 27, so that the several twyers may be drawn outward with the plates when repairs are to be made. 80

Communicating with each twyer is an air-blast pipe 28, and these air-blast pipes at their upper ends communicate with air-boxes 29, 85 arranged above the hot-air chambers and resting upon the walls of the furnace. The air-boxes are shown as having cables 30 connected to them, and the cables are designed to pass over pulleys and to have suitable counterweights at their free ends, as shown in the drawings. The weights and cables are designed to support the air-boxes should the walls of the furnace be broken. An inlet-pipe 31 has branch connections 32 with the 95 air-boxes 29.

A valve-controlled feed-pipe 33 extends downward through each air-blast pipe 28, and at the upper end of each pipe 33 is a hopper 34, in which flue-dust or fine concentrates may 100 be fed through the opening 13 and may reach their proper position in the lower portion of the cupola or blast. This fine material will pass downward through the pipes 33 and will

be carried by the air-blast through the twyers and discharged into the cupola at the reducing-zone, where such material will be slagged and mingled with the original charge of material. Twyers 35 are arranged in each end of the cupola, and these twyers 35 are connected to the pipe 32 by means of flexible or other tubes leading from the twyers to tubes 36, connecting with the pipe 32. Only two tubes 36 are shown, but there is to be one for each twyer 35.

In operation after placing the ore in the furnace the furnace is to be charged with sufficient coke to melt the charge of ore, and after the furnace is in good working order—say from six to twelve hours—the coke is taken off, and if there is sufficient sulfur and iron and silica in the charge there will be generated heat enough to reduce the charge to a high-grade matte without the use of carbon in any form. When the furnace is started and is making slag, the forehearth is to be run in and raised with the jack-screws to their proper place and fastened. When in this position, a portion of the matte will run into the forehearth and discharge through the tap-holes 23. This should be allowed to continue for a sufficient time to heat the air in the hot-air chambers, so that this heated air may impart a quantity of its heat to the atmospheric air passing through the pipes 28 and the twyers 26. After this air shall have been sufficiently heated the openings 23 are to be plugged, and then the molten metal, passing through the openings 21 22, will rise to the top of the hearths and discharge through the spouts 24 into suitable buckets or into running water.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A smelting-furnace, comprising a casing or outer shell, a cupola arranged within the outer shell, the said outer walls or shell and the cupola - walls forming walls of hot-air chambers open at the bottom, forehearth mounted on trucks, means for elevating the forehearth relatively to the trucks while underneath the hot-air chambers, twyers discharging into the cupola, air-blast pipes in the hot-air chambers and communicating with the twyers, and means for conducting air to said air-blast pipes, substantially as specified.

2. A smelting-furnace, comprising an outer shell or casing, a cupola arranged therein and having a water-jacket, a chimney at the up-

per end of the cupola, the outer shell or jacket and the walls of the cupola and chimney forming walls of hot-air chambers open at the bottom, forehearth movable underneath the hot-air chambers, water-jackets surrounding the forehearth, trucks on which the forehearth are mounted, means for vertically moving the hearths, twyers extended into the cupola at opposite sides, air-blast pipes in the hot-air chambers and communicating with the twyers, air-boxes with which the upper ends of said pipes communicate, and a pipe for discharging air into said air-boxes, substantially as specified.

3. A smelting-furnace, comprising a cupola, a chimney on said cupola having a down-take, a shell or casing surrounding the cupola and chimney and forming the outer walls of hot-air chambers, a water-jacket surrounding the cupola, twyers extended through opposite walls of the cupola, air-blast pipes in the hot-air chambers and communicating with the twyers, valve-controlled pipes passing through the air-blast pipes, hoppers on the upper ends of said valve-controlled pipes and forehearth movable underneath the hot-air chambers, substantially as specified.

4. A smelting-furnace, comprising a casing or outer shell, a cupola arranged within the outer shell, the said outer walls or shell and the cupola - walls forming walls of hot-air chambers open at the bottom, forehearth adjustably mounted underneath the hot-air chambers, twyers discharging into the cupola, air-blast pipes in the hot-air chambers and communicating with the twyers, and means for conducting air to said air-blast pipes, substantially as specified.

5. A smelting-furnace, comprising a cupola, a chimney on said cupola, an outer shell or casing forming the outer walls of hot-air chambers, the inner walls being formed by the cupola and chimney, a water-jacket surrounding the cupola, twyers leading into the cupola, air-blast pipes in the hot-air chambers communicating at their lower ends with the twyers, a movable air-box with which the upper ends of the blast-pipes communicate, and means for directing atmospheric air to said box, substantially as specified.

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Witnesses:

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