No. 702,004. Patented June 10, 1902.

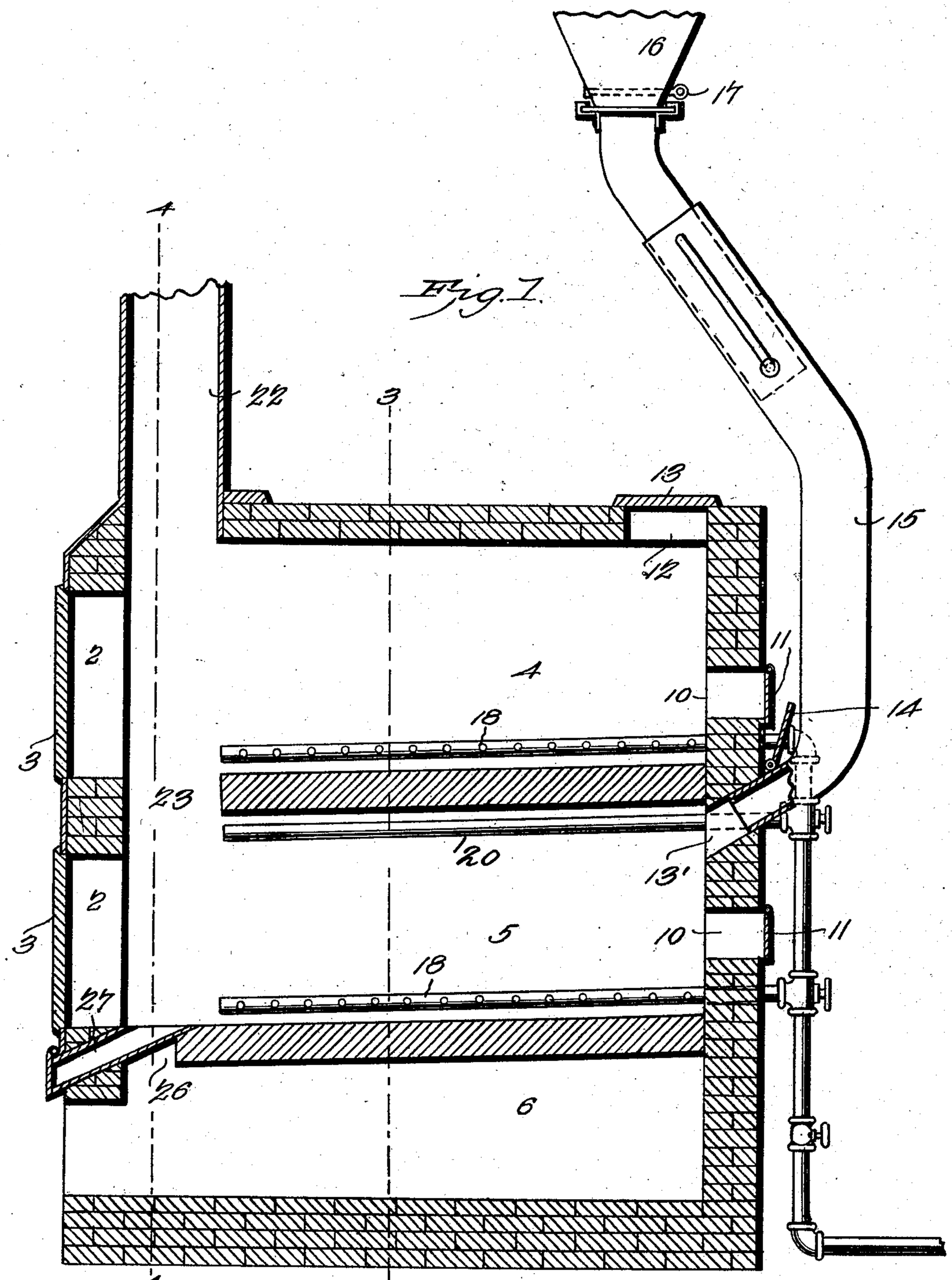
J. L. HOPPER.

ORE ROASTER.

(Application filed Dec. 26, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

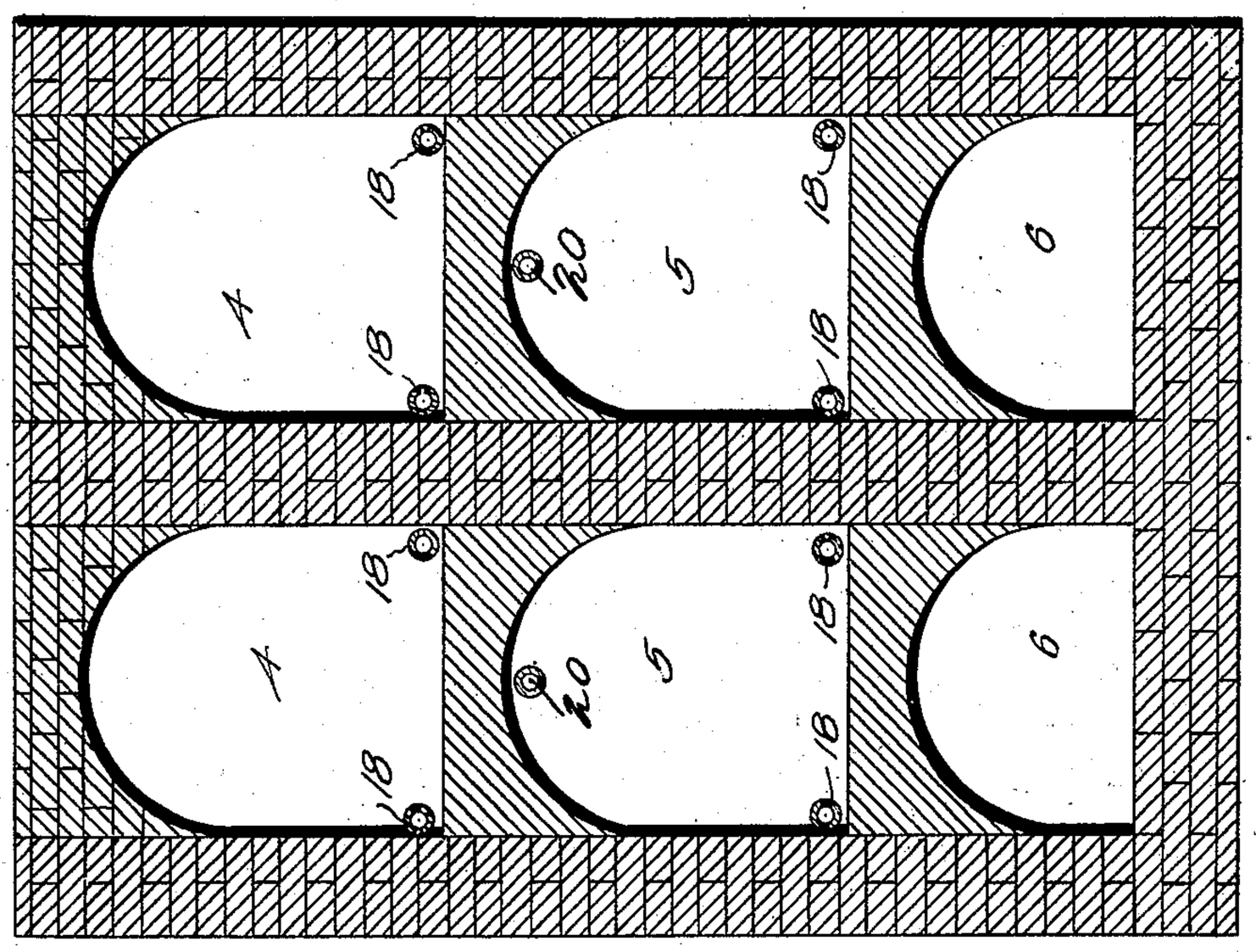

Fig. 3.

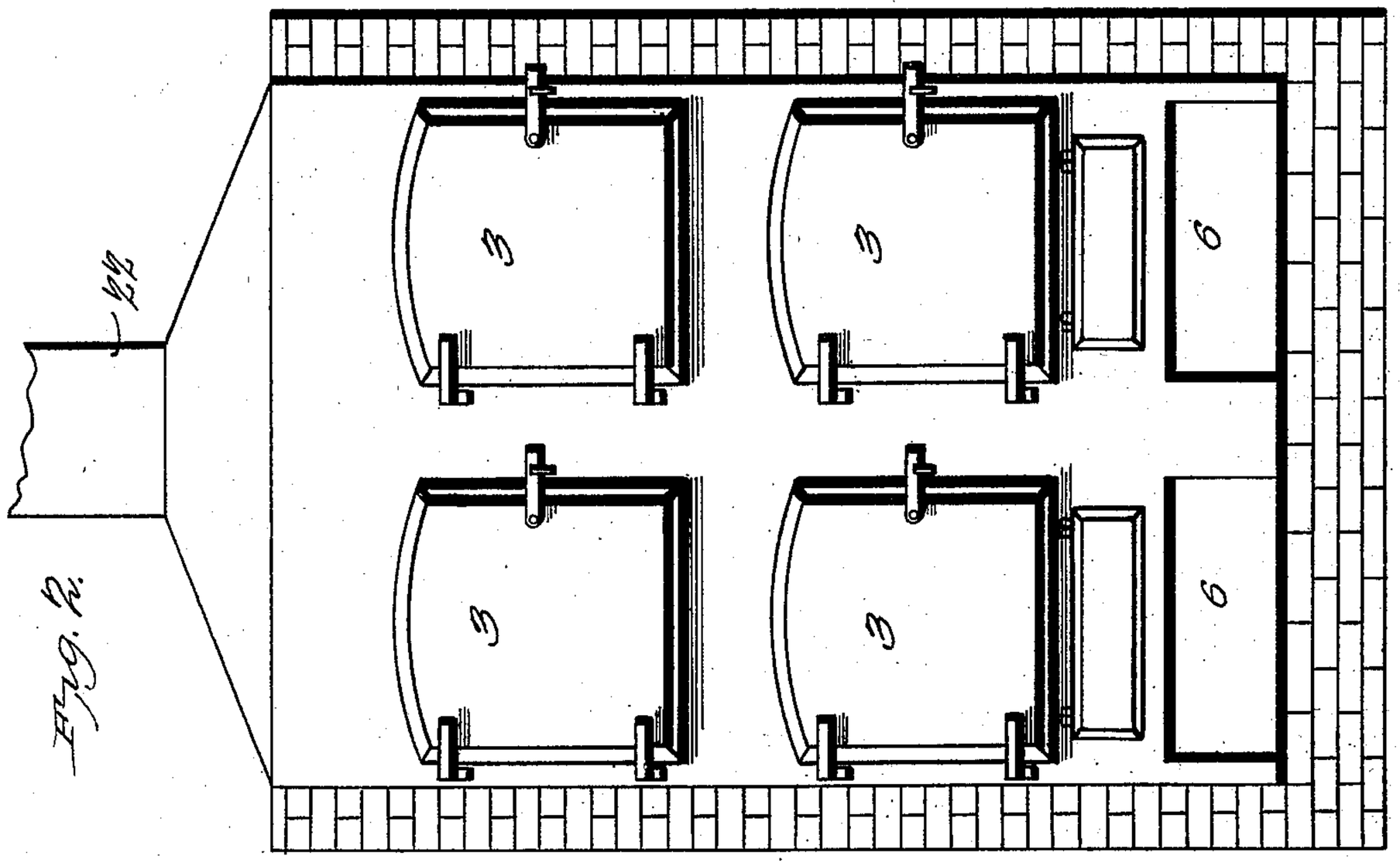

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

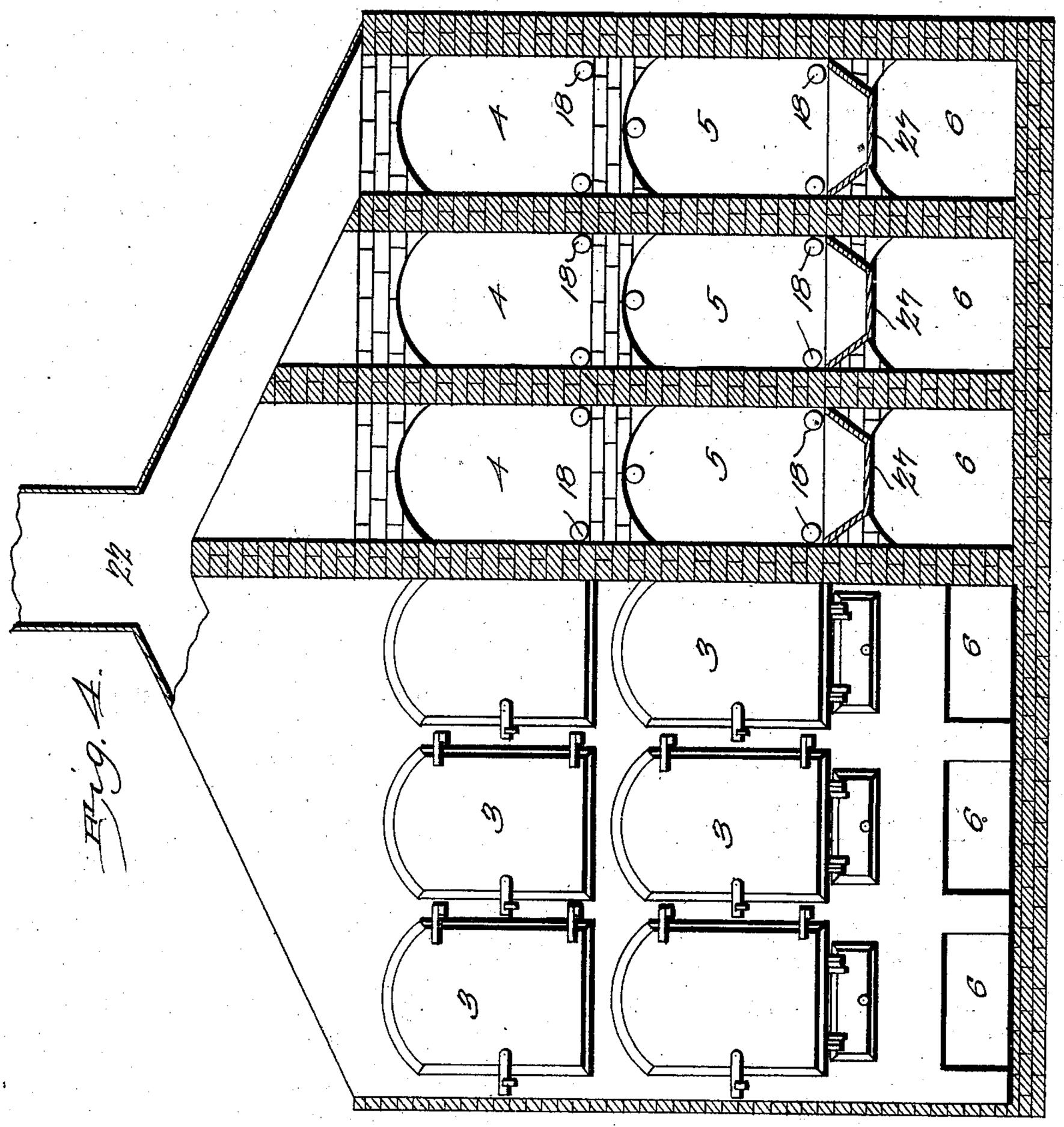

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN L. HOPPER, OF KIRKSVILLE, MISSOURI.

ORE-ROASTER.

SPECIFICATION forming part of Letters Patent No. 702,004, dated June 10, 1902.

Application filed December 26, 1901. Serial No. 87,317. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. HOPPER, a citizen of the United States, residing at Kirksville, in the county of Adair and State of Missouri, have invented a new and useful Ore-Roaster, of which the following is a specification.

My invention relates to certain improvements in ore-roasters of the character forming the subject of Letters Patent granted to me on November 10, 1891, under No. 462,767, and comprises an improved furnace having a longitudinal arched top and provided with a fire-clay roasting-bed on which to roast ore to desulfurize it, the better to prepare the ore for separation either by smelting, amalgamation, or otherwise, as desired.

An object of the invention is to provide an improved form of furnace in which the heat will at all times be under the control of the attendant and may be adjusted from time to time, as the quality or quantity of the ore may require.

A further object of the invention is to provide a roasting-furnace in which hydrocarbon oil or gas may be employed as a fuel, dispensing with the customary combustion-chambers, and thus effecting a considerable reduction in the initial cost of the furnace, as well as reducing the subsequent expense of operation.

Further objects and advantages of the invention will be apparent from a reading of the following description.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of an ore-roaster constructed and arranged in accordance with my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a transverse sectional elevation of the furnace on the line 3 3 of Fig. 1. Fig. 4 is a view, partly in front elevation and partly in section, on the line 4 4, Fig. 1, illustrating the preferred arrangement of a group of furnaces.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The walls and top of the furnace are built of masonry, and in the front wall are openings 2 2, through which suitable tools may be passed to stir the ore during the roasting operation and which may also serve as discharge-openings for the roasted ore. The openings are closed by metallic doors 3, of ordinary construction.

The interior of the furnace is divided into a series of roasting-ovens 4 5, each of which has an arched roof, and at a point below the lower ovens 5 are arranged chambers 6, in which the roasted ore may be placed to gradually cool.

The floor of each of the roasting-ovens is formed of fire-clay and inclined from front to rear for convenience in discharging the ore and to permit of the flow of molten metal from the rear to the front of the furnace.

In the rear wall of the furnace are formed a series of openings 10, covered by suitable doors 11 and permitting the entrance of air necessary to support combustion in the several chambers. The upper portion of each of the ovens is also supplied with a feed-opening, through which the ore to be roasted is passed. In the upper tier of ovens the openings 12 are formed directly in the top of the furnace and are covered by suitable lids or doors 13, while in the lower tier the openings 13′ are formed through the rear wall of the furnace and are covered by suitable doors 14.

The ore is fed through all of the openings 13′ by means of an adjustable spout 15, connected to an upper feed-hopper 16 in such manner as to permit its turning and adjustment to any one of the openings, the pipe being provided with a telescopic section to facilitate adjustment. In the lower portion of the hopper is a suitable gate or valve 17, which may be closed during the adjustment of the chute to different openings or when a sufficient quantity of ore has been supplied to an oven.

On either side of each oven at a point slightly above the floor-level is a pipe 18, having side perforations, through which a jet of gas or oil or a mixture of both may be directed into contact with the ore, all of said pipes being connected to a suitable supply-pipe 19 and provided with valves by which the supply to each oven may be independently governed. In order to supply an additional quantity of heat, I provide in the upper portion of the lower tier of ovens one or more oil-pipes 20, the burning oil serving not only to increase the temperature in the oven in which it is

placed, but also heating the floor of the oven immediately above it.

At the upper front portion of the furnace is a flue 22, through which the gases finally escape, said flue communicating directly with the upper tier of ovens and the front portion of the floors of the upper ovens being provided with flues or passages 23, through which the gases from the lower ovens may pass to the stack. The flue or flues 23 may be so formed as to take up only a portion of the width of the oven-floor, so that the roasted ores from the upper ovens may be drawn out through the front doors leading thereto, or said flues may extend entirely across the front portion of the upper floors, so that the ore and molten metal may fall to the lower front portion of the oven beneath. In each lower oven is formed an opening 26, through which the ore may be directed into the lower chamber 6 and allowed to gradually cool. In this opening may be placed a removable inclined chute 27, extending out through the front wall of the furnace and provided with a suitable door to prevent the entrance of cold air to the furnace. This chute may be inserted in position and employed to remove both the ore and molten metal from both an upper and lower oven, or the chute may be removed and the ore directed through the opening 26 into the lower cooling-chamber.

In operating the furnace the ore is fed through the openings in the upper portions of the ovens and is spread by a suitable tool passed through the front openings 2. Gas or oil is then turned into the pipes 18 and 20 and ignited, the quantity of fuel fed being at all times under the control of the attendant. The ore is stirred as frequently as necessary, and any metal which may be melted will run out through the chute 27.

In building the furnaces heat and space are economized by arranging a group of furnaces in the manner illustrated in Fig. 4, a direct passage being afforded from both the upper and the lower tier of furnaces to an inclined flue or escape-passage, which extends above and connects with the entire series of furnaces.

While the construction herein described, and illustrated in the accompanying drawings, presents the preferred form of the device, it is obvious that changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. An ore-roasting furnace comprising the front and rear walls having feed and discharge openings, floors and partitions arranged within the furnace and dividing the same into upper and lower ovens, and perforated pipes extending within the ovens and connected to a supply of fluid fuel.

2. An oil-burning ore-roasting oven comprising the front and rear walls having feed and discharge openings, the side walls and flooring, and perforated oil-supply pipes arranged directly within the oven at a point near the opposite side walls and comprising the source of fuel-supply to said oven.

3. The combination in an ore-roaster, of the front and rear walls having feed and discharge openings, a flooring dividing the furnace into two or more tiers or ovens, perforated oil-supply pipes arranged along the opposite side walls of each oven at a point near the floor-level, and an auxiliary supply-pipe arranged within the lower oven at a point below the roof thereof.

4. The combination with two superposed ovens, of perforated fuel-supply pipes leading into each oven, the flooring of the upper oven being provided with a passage or flue to permit the escape of gas from the lower oven.

5. The combination of the superposed ovens having inclined floors and provided with a connecting-flue, an escape-flue leading from the upper oven, and a discharge-chute leading from the lowermost point of the flooring of the lower oven, the chute and flues being disposed in vertical alinement thereby to permit the independent discharge of the contents of either oven.

6. The combination in an ore-roaster, of the lower cooling-chamber 6, superposed ovens arranged thereabove and having communicating flues or passages, oil-supply pipes 18 arranged within each oven at a point near the floor-level, an oil-supply pipe 20 arranged in the lower oven at a point near the top of the same, governing-valves on said pipes, and a removable chute 27 arranged at the front end of the floor of the lower oven, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN L. HOPPER.

Witnesses:
J. T. CURRY,
C. L. LEWIS.