

(No Model.)

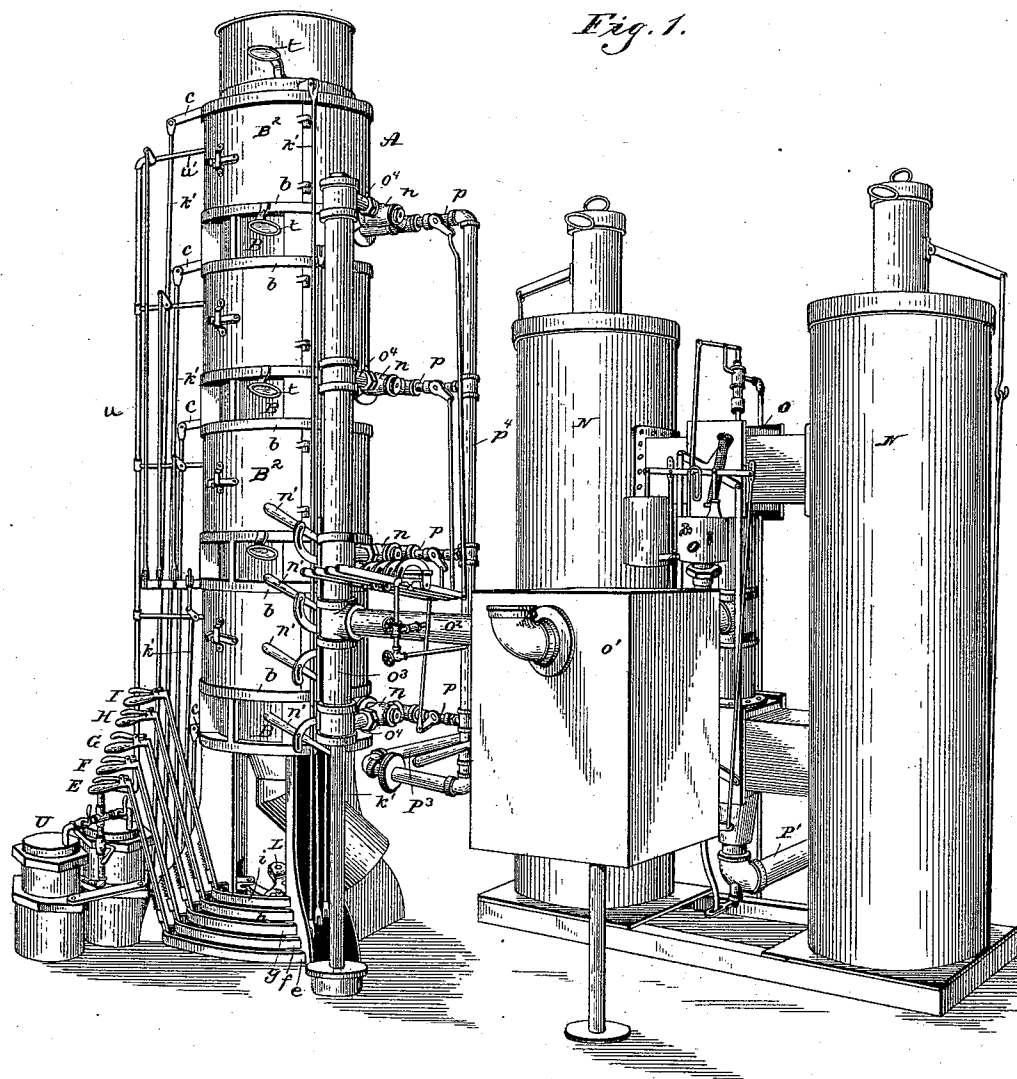
3 Sheets—Sheet 1.

J. LEEDE.

APPARATUS FOR TREATING REFRACTORY ORES.

No. 471,672.

Patented Mar. 29, 1892.



WITNESSES:

Edwin L. Bradford
Venon W. Dorsey

INVENTOR

Julius Leede

BY V.D. Stockbridge & Son
his ATTORNEYS.

(No Model.)

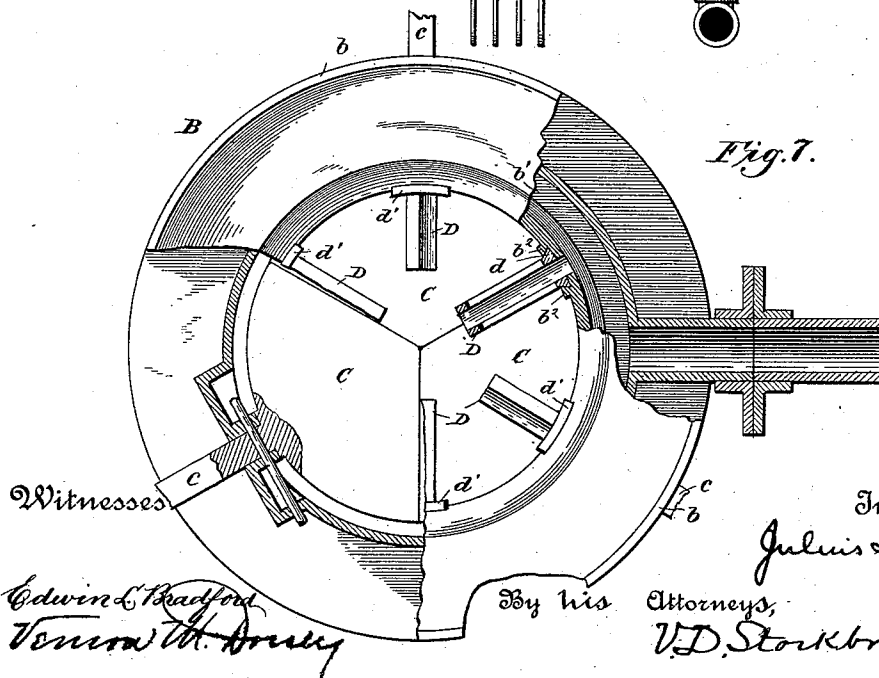
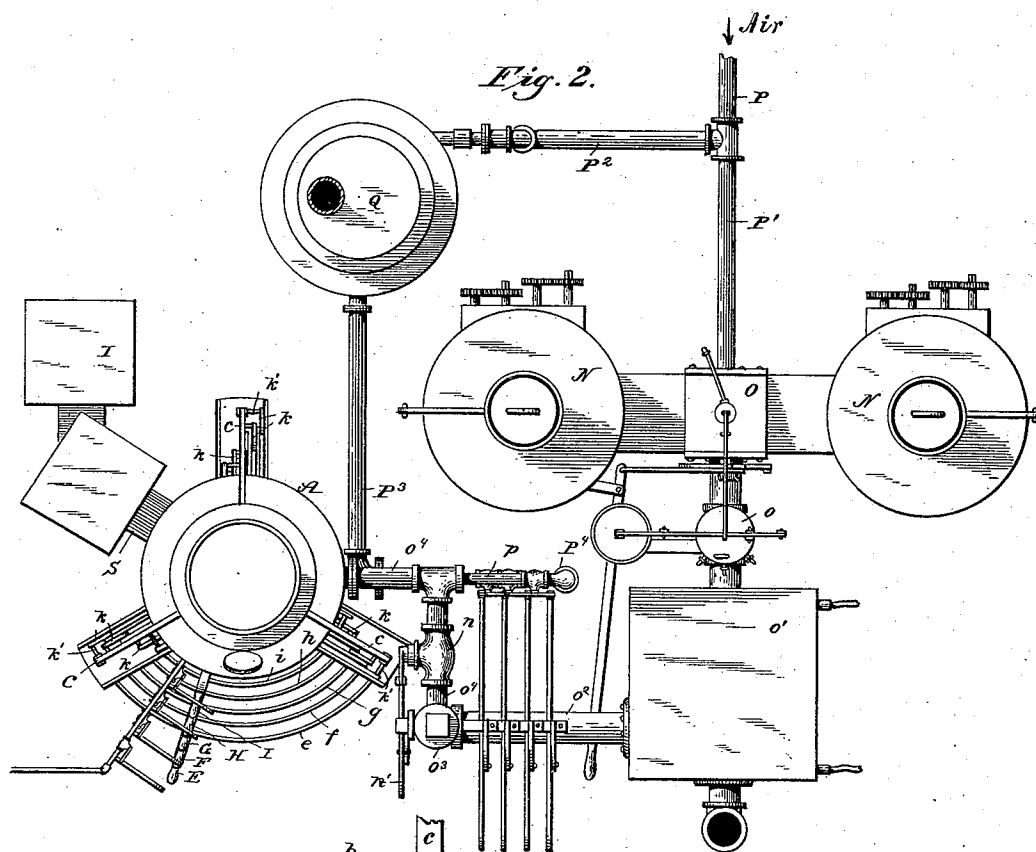
3 Sheets—Sheet 2.

J. LEEDE.

APPARATUS FOR TREATING REFRACTORY ORES.

No. 471,672.

Patented Mar. 29, 1892.



(No Model.)

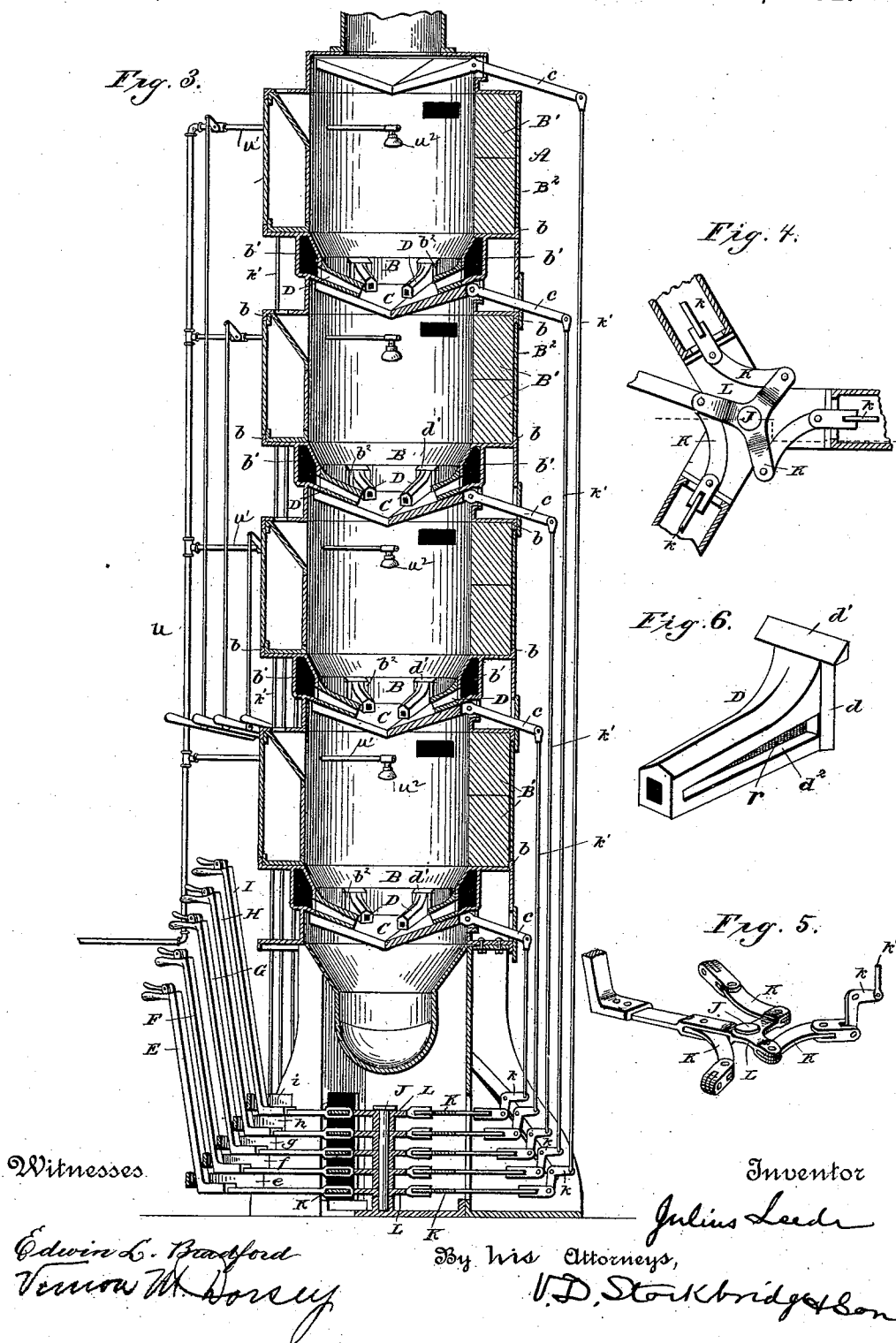
3 Sheets—Sheet 3.

J. LEEDS.

APPARATUS FOR TREATING REFRACTORY ORES.

No. 471,672.

Patented Mar. 29, 1892.



UNITED STATES PATENT OFFICE.

JULIUS LEEDE, OF MINNEAPOLIS, MINNESOTA.

APPARATUS FOR TREATING REFRACTORY ORES.

SPECIFICATION forming part of Letters Patent No. 471,672, dated March 29, 1892.

Application filed May 10, 1890. Renewed September 5, 1891. Serial No. 404,858. (No model.)

To all whom it may concern:

Be it known that I, JULIUS LEEDE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Treating Refractory Ores; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in apparatus for treating refractory ores, and is especially an improvement on the apparatus described in my application serially numbered 327,890, filed October 23, 1889.

The invention consists in the combination, in a roasting-furnace, of a chambered or hollow annular casting forming a section of the walls of an upright furnace, gas and air supply pipes communicating with the chamber, and a series of burners leading from the inside of the casting and chamber to and partially across the combustion-chamber.

It also consists in the combination of pivoted dumping-hearth sections and means for releasing said sections and causing them to drop and dump the ore and for returning the sections to closed position and locking the same in place.

The invention also consists in certain other combinations hereinafter described, and particularly pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a perspective of a complete apparatus or plant for treating refractory ores. Fig. 2 is a diagram or ground plan showing a convenient relative arrangement of the principal parts composing a complete plant. Fig. 3 is a vertical section through the furnace part, showing the tilting-hearth sections and the chambered annular castings in section and the operating-levers, toggles, and connecting-rods in elevation. Fig. 4 is a detail of a three-part connection through which and its attachments all the sections of one dumping-hearth may be operated simultaneously through the medium of a single lever. Fig. 5 is a perspective of the three-part connection and attachments shown

in Fig. 4. Fig. 6 is a detail of one of the detachable burners, showing its flanges for interlocking with the annular casting; and Fig. 7 is a plan, partly in section, of one of the hollow annular castings, showing an air and gas inlet and burners communicating with the chamber in the casting.

A is a main column embracing a group of furnaces, one above another. This column is built upon a suitable base or support and is made up of chambered or hollow annular castings B B and fire-brick B' B'. Each of the chambered castings B forms the base of a separate furnace or combustion-chamber. They are provided with upwardly and downwardly projecting flanges *b b* for embracing the brick, annular chambers *b'*, and catches or dovetails *b²* for holding the burners, and with apertures for the introduction and discharge of gas, or gas and air, to and from the chambers. Mounted in these castings are the dumping-sections C C, which form the hearth or bottom of each fire or combustion chamber. The annular walls of each fire-chamber are built up of fire-brick B', the annular rings B serving as foundations for the brick to rest on and as a cap to bind them together at the top, as clearly shown in the drawings. The brick are held against internal pressure by bands or casing, as B². The dumping-hearth sections are triangular in form, are hinged or pivoted in the annular casting, and have arms *c c*, through which they are tilted by the connections hereinafter described. The plates incline downward toward the center of the furnace-chamber and give a general conical form to the hearth, which prevents binding from expansion by heat.

Each of the annular chambered castings B B is provided with an opening from the outside for the admission of gas from a producer and air from an air-blast and with a series of openings leading to the combustion-chamber through burners D D. In the drawings I have shown six burners in each chamber, three alternate ones projecting nearly to the center of the combustion-chamber and the other three not so far, this construction being for the purpose of distributing the flame and heat over the entire area of the combustion-

chamber. The burners D are provided with dovetailed projections or flanges *d* and the casting B with corresponding dovetailed grooves *b*², by means of which the burners are detachably secured to said casting, the part *d'* serving as a stop or gage for fixing the position of the burner. As the gas and air for supporting combustion are mixed in the annular chamber in the casting, the burners must be provided with fine perforations or wire-gauze *r* to prevent explosions, as shown in Fig. 6. The form and relation of opening preferred is shown in Fig. 6, wherein lateral slits *d*² are formed to be covered or protected by wire-gauze.

It should be observed that in addition to the heat of the gas direct from the producer and of the air from the auxiliary furnace the mixture becomes further heated in the annular chamber before ignition in the furnace-chamber.

E, F, G, H, and I are bent or angular levers by means of which and suitable connections the dumping-hearth sections C C are tilted and returned and locked in closed position. These levers are arranged, as shown, in different planes and are made of increasing lengths backward or toward the furnace, in order that the levers and their handles may pass each other freely. They are also provided with the usual spring-catches for interlocking with the segmental guides or supports *e f g h i*.

The construction and arrangement of levers shown is to afford convenience to the operator in manipulating the dumping-hearth sections. Each of the levers is connected with an elongated arm of spider L (shown in Fig. 4) through the medium of a socket and rivet or pin or in any suitable manner. The spiders L L are loosely mounted on a pivot-rod J, suitably supported in a frame, and are coupled by means of links K K K with bell-cranks *k k*, arranged in vertical planes, and these bell-cranks are operatively connected with the arms *c* of the dumping-hearth sections by connecting-rods *k' k' k'*. By this line of connections between the levers and the hearth-sections said sections are operated to dump the ore from the hopper at the top or from a roasting-chamber to a compartment next below it, and they are returned and locked in position. The spiders have as many arms as there are sections in each hearth, so that all the sections of a given hearth are simultaneously operated, and there are as many levers and intermediate connections as there are dumping-hearths, each operating in the same manner as all the others.

Chemical and steam or liquid supply connections are shown only in Fig. 1, and may be of the same character as those described in my previous application before referred to.

U U are chambers in which chemicals are placed and through which water or other fluid is forced and conducted by pipe *u* and

branches *u'* to the furnace-chamber, where the fluid is discharged in the form of spray through the rose-nozzle *u*². I preferably attach to the front side of the stack mirrors, as shown at *t t*, for convenience of inspecting the interior of the furnace-chambers.

I have shown in connection with my improved roasting-furnace or apparatus for treating ores a pair of gas-producing furnaces and other appendages connected with the furnace for making a complete plant for treating refractory ores; but the same is embraced in another application, Serial No. 351,300, filed of even date herewith, and therefore no claim to it is made herein.

N N are gas-producers of any approved character.

O is a valve-chamber communicating with the furnaces.

o is a governor communicating with the valve-chamber and with a washer *o'* for regulating the volume of gas produced, and *o*² is a gas-pipe leading from washer to the vertical pipe *o*³, from which the gas is distributed to any one or all of the furnace-chambers through branches *o*⁴ *o*⁴ *o*⁴, &c. The branch pipes are provided with cocks or valves *n n*, so as to admit or cut off the gas from any or all of the furnace-chambers, and these cocks are operated by means of levers *n' n' n'*, arranged one above another in a vertical plane, as shown.

P is a pipe leading from a suitable blower for supplying air to the gas-producers through branch P' and for supplying air for combustion through branch P².

By preference the air for mixing with the gas and supporting combustion is heated, and for this purpose an auxiliary furnace or heater Q is provided. The air is conducted through a suitable coil in said auxiliary furnace, and thence through P³ to vertical pipe P⁴, from which it is distributed through branches *p* to the branch gas-pipes *o*⁴, &c.

The flues S and dust-chambers I, as well as the chemical-chamber U, with its connections, may be of any suitable or of the same character as described in my previous application hereinbefore referred to.

Having now described my invention, what I claim is—

1. In an apparatus for treating refractory ores, the combination of a furnace-wall, an annular chambered casting connected with said wall, separate gas and air conduits, each leading from a source of supply under pressure to said annular chamber, and gas-burners connected with the casting and leading from the chamber to and partially across the bottom of the furnace-chamber, substantially as described.

2. The combination of roasting-chambers having dumping-hearth sections, operating-levers, and intermediate connections consisting of spider-links, bell-cranks, and rods connected to the hearth-sections and bell-cranks,

whereby all the sections of the dumping-hearth are simultaneously and conveniently operated, substantially as described.

and a roasting-chamber having dumping-hearth sections, as specified. 10

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

JULIUS LEEDE.

Witnesses:

EDWIN L. BRADFORD,
H. H. BERGMANN.

5 3. The combination of a horizontally - arranged segment support and guide, a bent or angular operating - lever, intermediate connections for operatively coupling the hearth-sections and lever, substantially as described,