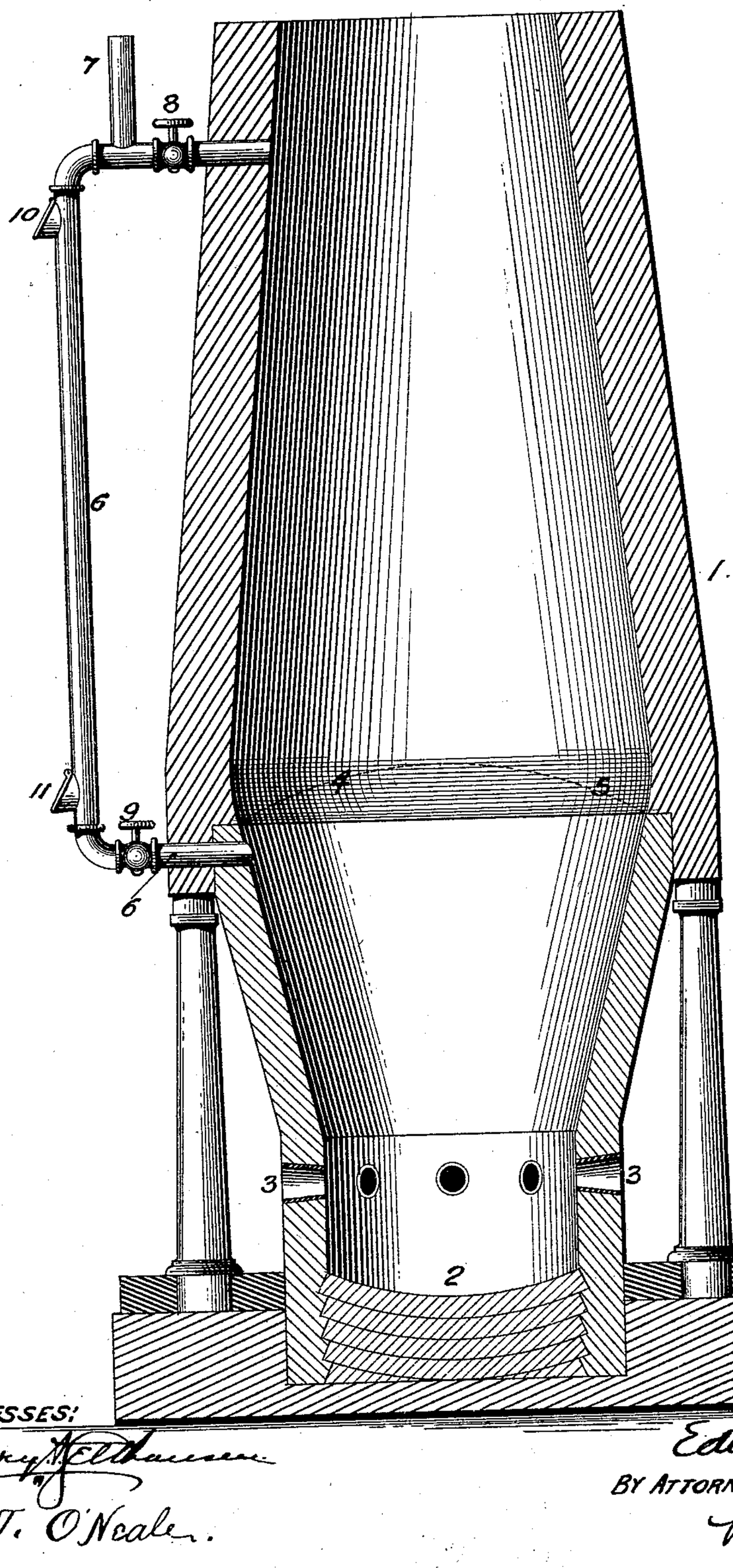
(No Model.)

E. J. BIRD.

LIMEKILN, CUPOLA, OR METALLURGICAL FURNACE.

No. 507,204. Patented Oct. 24, 1893.



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UNITED STATES PATENT OFFICE.

EDWARD JAMES BIRD, OF BIG STONE GAP, VIRGINIA.

LIMEKILN, CUPOLA, OR METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 507,204, dated October 24, 1893.

Application filed February 23, 1893. Serial No. 463,340. (No model.)

To all whom it may concern:

Be it known that I, EDWARD JAMES BIRD, a citizen of the United States, residing at Big Stone Gap, in the county of Wise and State of Virginia, have invented certain new and useful Improvements in Limekilns, Cupola or Metallurgical Furnaces; and I do hereby declare the following to be 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, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in lime kilns, cupola and metallurgical furnaces of that class in which the fuel and materials to be reduced are placed in layers or scaffolds in the furnace, and the combustion is urged by a blast of air introduced into the lower part of the kiln or furnace. In such kilns or furnaces the scaffolds or sections of fuel and lime stone and ore, tend to pack above the zone of reduction and form an impenetrable bridge, which prevents the passage of the products of combustion, upward, through the stack, thus retarding the combustion and reduction below, and materially interfering with the operation of the kiln or furnace.

It is the object of my invention to obviate this difficulty, and this I accomplish by means of an auxiliary draft tube, provided with suitable valves, in connection with the flue or furnace, by which a direct draft from about the zone of reduction may be established, so as to insure a proper reductive temperature when the scaffolds or sections pack and bridge the passage in the stack, until the superincumbent weight of the scaffolds or sections breaks down the obstruction, as the fuel below is consumed and the material reduced.

The above mentioned objects are attained by the means illustrated in the accompanying drawing, in which is represented a vertical sectional view of a lime kiln or cupola furnace showing my invention applied thereto.

Referring to the drawing the numeral 1 indicates a kiln or furnace of the ordinary construction, 2 the hearth thereof and 3 the tuyeres through which the air blast is introduced.

The line 4, 5 indicates the zone of reduction and the numeral 6 a tube leading outward from the kiln or furnace at about the said zone of reduction. The said tube is carried upward and is bent inwardly, entering the stack near its upper end so that the products of combustion may be conducted into the stack. The tube is also provided with a direct uptake 7 by which the products of combustion may be discharged into the open air when desired. Near its upper and lower ends the tube is provided with valves 8 and 9, by which the draft from the furnace may be turned on and off, or directed into the open air at will. The tube is also provided with relief valves 10 and 11, which may be of any suitable construction but which in the present instance consist of hinged plates opening outwardly, so as to blow open and permit the escape of generated gases in case of explosion.

The object of carrying the upper end of the tube, into the stack of the furnace, is to utilize the hot products of combustion for heating the blast, or a steam boiler or boilers as is usual in this class of kilns or furnaces, the kiln or furnace being provided with the usual conduits for conveying such products to the place of use. As such construction is common to this class of kilns and furnaces, it is unnecessary to illustrate or further describe it.

The operation of my invention will be readily understood in connection with the above description and is as follows: When the combustion and the consequent reduction in the kiln or furnace are retarded by the packing of the material in the upper part thereof, the lower valve of the auxiliary draft tube is opened, allowing the products of combustion at the zone of reduction to pass off. By opening or closing the upper valves, the products may be directed into the upper stack, to serve as heating agents as before mentioned, or may be allowed to pass directly into the open air, in case they are not necessary for such purpose.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a lime kiln or furnace, of an auxiliary draft tube leading outward from the zone of reduction and provided with a suitable controlling valve substantially as specified.

2. The combination in a lime kiln or furnace, of an auxiliary draft tube, leading from the zone of reduction to the upper part of the stack and provided with suitable controlling valves substantially as and for the purposes specified.

3. The combination with the auxiliary draft tube leading from the zone of reduction, of the relief valves adapted to be automatically blown open in case of explosion substantially as specified.

4. The combination with the auxiliary draft tube leading from the zone of reduction of the uptake leading to the open air, and the valves, whereby the products of combustion may be directed into the stack or the open air, substantially as set forth.

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

EDWARD JAMES BIRD.

Witnesses:
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