

No. 680,790.

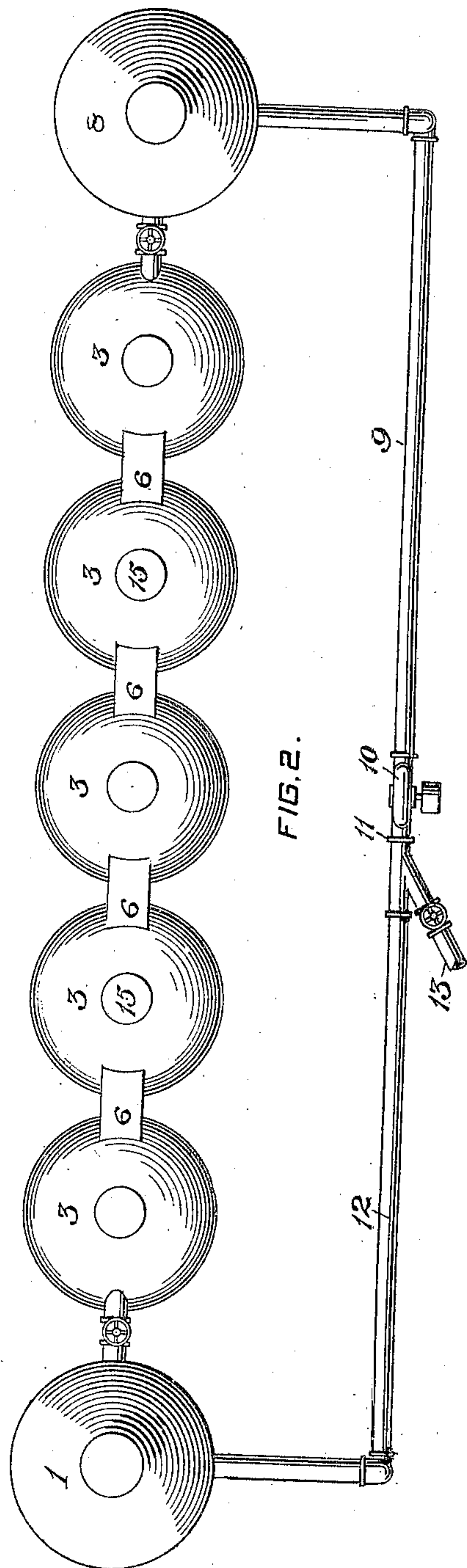
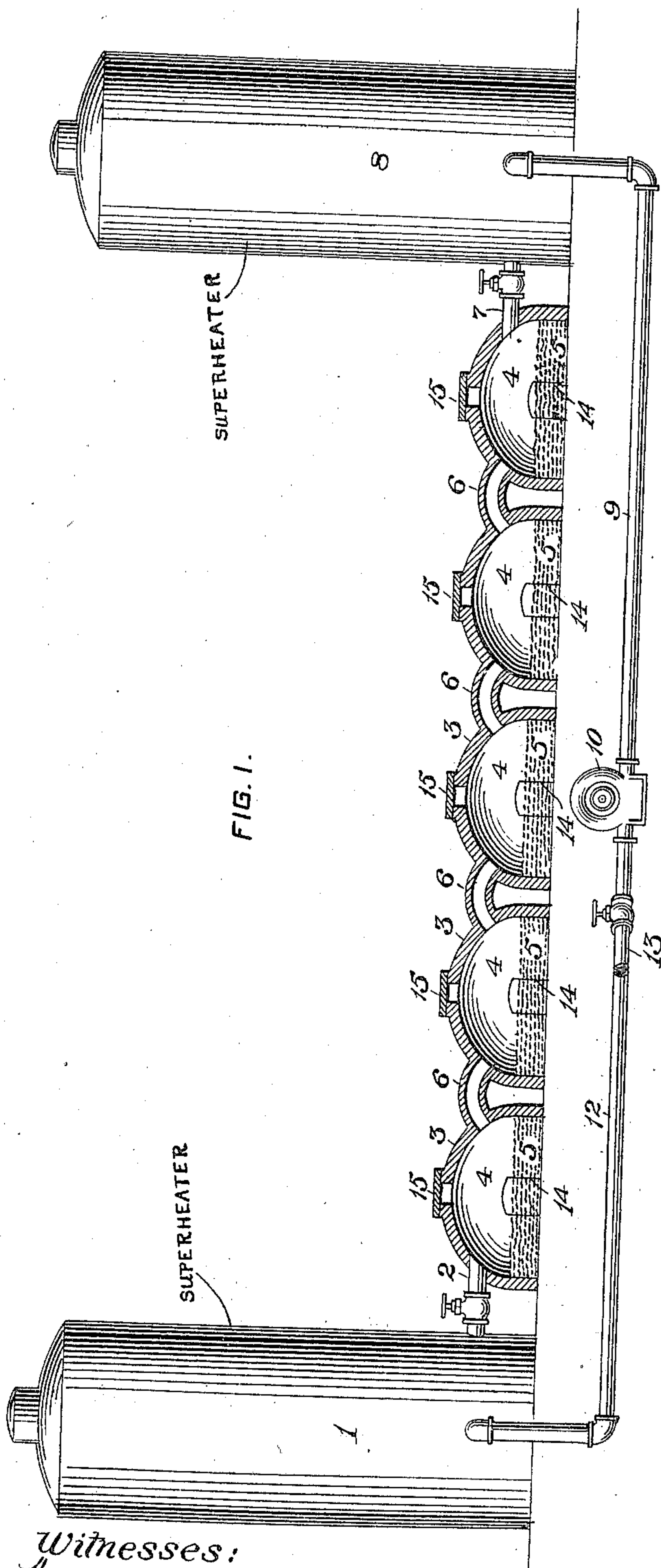
Patented Aug. 20, 1901.

W. J. KNOX.

APPARATUS FOR THE MANUFACTURE OF COKE.

(Application filed Feb. 16, 1900. Renewed Nov. 14, 1900.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM JOHN KNOX, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO
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APPARATUS FOR THE MANUFACTURE OF COKE.

SPECIFICATION forming part of Letters Patent No. 680,790, dated August 20, 1901.

Application filed February 16, 1900. Renewed November 14, 1900. Serial No. 36,515. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JOHN KNOX, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for the Manufacture of Coke, of which the following is a specification.

The object of my invention is to provide an improvement in the manufacture of coke; and to this end it consists in a new and improved process of manufacturing coke by supplying heat to the interior of a coke-oven above the bed of fuel by means of a fluid heat-carrier, such as the evolved bituminous gas, and saving the volatile by-products, which are ordinarily permitted to go to waste.

In the accompanying drawings, Figure 1 is a view, partly in side elevation and partly in section, of a construction adapted to illustrate my invention; and Fig. 2, a plan view of the construction shown in Fig. 1.

My invention provides a new and improved process of making coke for metallurgical purposes by introducing a heated gas into the interior of a coke-oven above the body of fuel and liberating heat from the gas within the oven by direct radiation by contact with the coal or coke and with the walls and arch of the oven and then by radiation from the walls and arch of the oven. The coking action resembles in some respects what is known as the "beehive" process in supplying the heat from above and acting downward on a comparatively thin broad layer of coking-coal, which is free to expand, and the oven may be of the same general form as the beehive-oven or the Welsh or Thomas oven. It differs from the beehive process, however, in not supplying air for the combustion of the fuel within the oven, the doors or openings 14 and the charging-openings 15 being completely closed during the process, the charge of coal being converted into coke by baking from above by the action of heat carried into the oven from the outside by the fluid carrier.

As shown in the drawings, a superheater 1 for heating the gas supplied to the coking oven or ovens is connected by means of a pipe or passage 2 with one of the ovens 3, so

as to deliver the heated gas into the space 4, above the level of the body of the fuel 5, and each oven is connected with the next by means of the passage or flue 6, so that the spaces 4 and flues 6 form a continuous passage for the hot gas. The last oven in the series may be connected by a pipe or passage 7 with a superheater 8, into which the gases from the ovens may be discharged and sufficiently heated to fix the hydrocarbons, after which they may be discharged through a pipe 9, connected with the inlet to a fan or blower 10, from which they are discharged through the outlet 11 into the pipes 12 and 13. Through the pipe 12 a quantity of gas sufficient to form a carrier for the heat required in the ovens is delivered to the superheater 1, from which it passes through the pipe 2 to the ovens. The pipe 13 may lead to a holder or to any connection from which the gas may be distributed for any purpose. The passages 15 are for charging purposes only and the passages 14 for withdrawing the coke, and both of these passages in each of the ovens are kept closed, so as to exclude air and prevent the ordinary process of combustion which occurs in beehive-ovens as heretofore employed.

Since no air is admitted to the oven and all of the heat for coking is introduced by means of the hot gas into the closed interior of the oven, there will be no combustion of the volatile hydrocarbons, and they may be saved as valuable by-products, and an excellent quality and a relatively large quantity of coke will be produced.

By means of my invention the heat necessary to the coking process is employed in the most efficient manner by being carried in by means of the fluid heat-carrier instead of being supplied from the outside through the thick walls of poor conducting material, as in some by-product ovens.

It will be seen that with my improved process the resulting hydrocarbon or bituminous gases may be drawn off unaltered and may be treated in any desired way for separation of illuminating-gas, tar, ammonia, or other products. For example, they may be passed through hot checker-work in a superheater of the kind already referred to, through a ves-

sel containing incandescent coke, through an atmospheric-pipe condenser, or through a scrubber in which the gases may be washed by water.

5 The original supply of gas may be derived from an external source of gas or a separate producer or by first heating the superheaters in any convenient manner and then circulating the contents of the system, which in the
10 first instance would contain air, the oxygen would be burned, and a gas produced. This circulation can be continued until a good quality of illuminating and heat-carrying gas is obtained.

15 The heated gas as it passes above the coal in the coking-chamber cokes the upper surfaces, and in doing so the coke itself becomes highly heated and gradually transmits the heat downward to the lower layers, and as
20 the depth of the coke increases the depth to which sufficient heat to carry on the distillation penetrates will increase, so that gradually the whole charge of coal will be destructively distilled or coked.

25 It has heretofore been proposed to transmit heated gases through the body of coal either upward or downward; but such processes result in a porous form of coke, whereas my process produces a solid hard coke especially desirable for metallurgical and smelting purposes.
30

The gas as it comes from the last coking-oven of the series passes, as already described, to the superheater and then is carried forward, a portion being drawn off and the remainder reheated and caused to repeat its circuit. The fixing-chamber serves to remove the condensable hydrocarbons, so that

the gas drawn off will be in a condition to be delivered through pipes and also the portion
40 which is circulated again to the superheater will not deposit tar at the cold end of the superheater.

In another application filed by me on October 5, 1900, Serial No. 32,116, claims are
45 made upon the process described herein.

I claim as my invention and desire to secure by Letters Patent—

1. The combination of a superheater, one or more coking-chambers, an inlet and an outlet to each chamber at its upper part, a fixing-chamber connected with the outlet of the coking chamber or chambers and means for continuously circulating gas through the heating-chamber, the coking chamber or chambers in contact with the coal and coke and
55 through the fixing-chamber.

2. The combination of a superheater, one or more coking-chambers, an inlet or outlet to each chamber at its upper part, a fixing-chamber connected with the outlet of the coking chamber or chambers, means for continuously circulating gas through the heating-chamber and the coking chamber or chambers in contact with the coal and coke and
60 through the fixing-chamber, and means for withdrawing and utilizing a regulable amount of the gas.
65

Signed at Pittsburg, in the county of Allegheny and State of Pennsylvania, this 8th day
70 of February, A. D. 1900.

WILLIAM JOHN KNOX.

Witnesses:

A. M. GOW,
CHAS. F. MILLER.