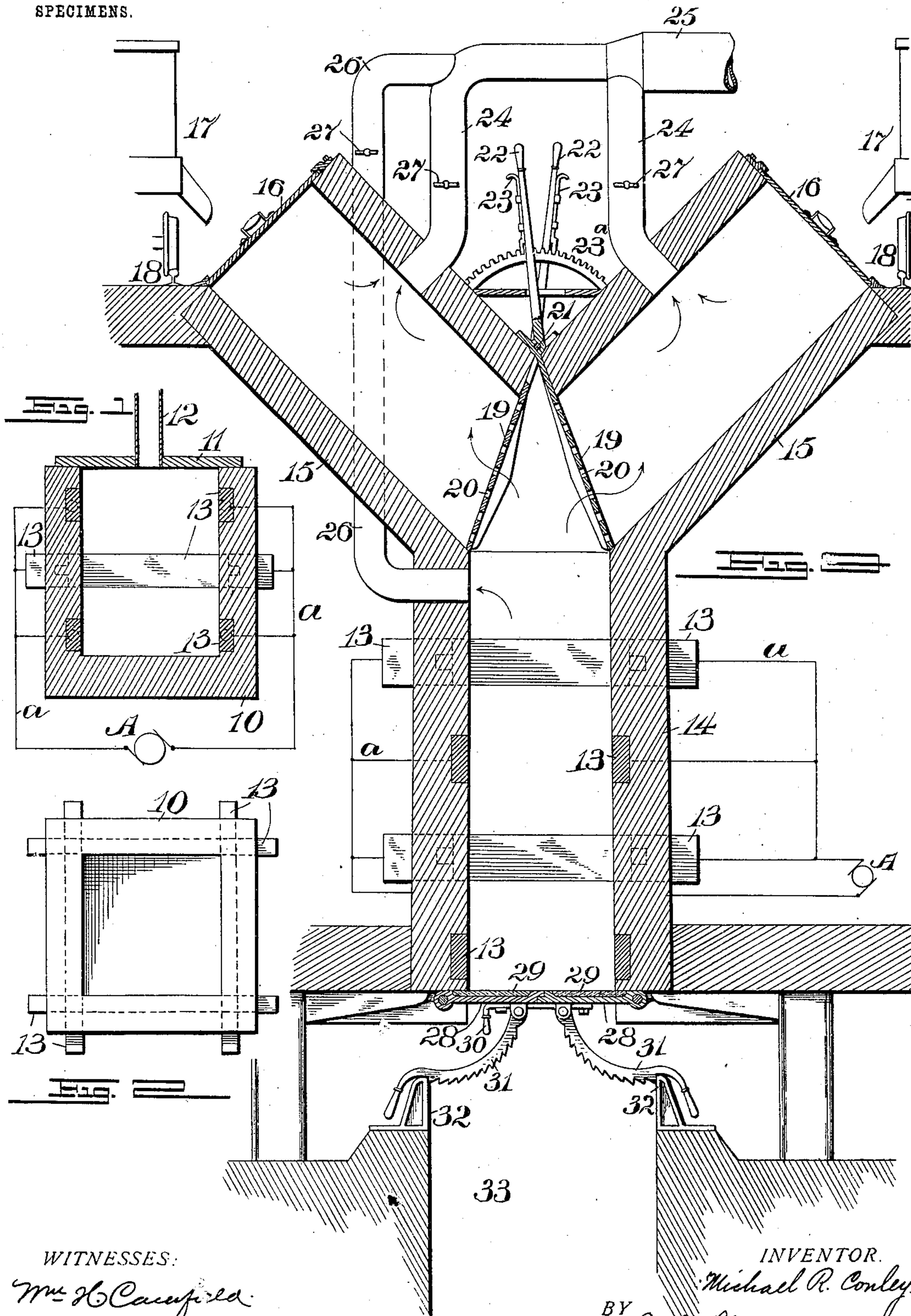


No. 763,369.

PATENTED JUNE 28, 1904.

M. R. CONLEY.
PROCESS OF MAKING COKE.
APPLICATION FILED SEPT. 8, 1903.

SPECIMENS.



WITNESSES:

Wm. H. Caspfield
J. C. Banta

INVENTOR.

Michael R. Conley

BY
W. B. Hutchinson

ATTORNEY.

UNITED STATES PATENT OFFICE.

MICHAEL R. CONLEY, OF NEW YORK, N. Y.

PROCESS OF MAKING COKE.

SPECIFICATION forming part of Letters Patent No. 763,369, dated June 28, 1904.

Application filed September 8, 1903. Serial No. 172,212. (Specimens.)

To all whom it may concern:

Be it known that I, MICHAEL R. CONLEY, of New York, in the county of Kings and State of New York, have invented a new and Improved
5 Process of Making Coke, of which the following is a full, clear, and exact description.

My invention relates to an improved process of making coke.

The usual practice in the manufacture of
10 coke is to apply external heat to the oven containing the coke and maintaining the necessary temperature for a long time, so that the gases are driven from the coal, leaving the carbon in the form of coke. This process is
15 usually a long one, requiring twenty-four hours or more for its accomplishment. Moreover, there are difficulties in the way of handling the coke and coal, keeping the ovens clean, and other things incidental to the process.

20 The prime object of my improvement is to cheapen the cost of coke.

Another object is to make the coke denser and better than can be done by the usual means.

25 I accomplish these objects in the main by providing means for supplying heat direct to the coal that is on the inner walls of the oven, so that the process is very much shortened, and practically no heat is wasted. I also provide
30 means for partially gasifying the coke before it is admitted to the main oven or furnace, and do this by the gases escaping from the said main oven or furnace. In this way I gain a great deal of time and utilize what would
35 otherwise be waste heat.

As a means of applying the heat directly to the coal and of forcing the heat through the mass I use plates of low electrical conductivity, which come in contact with the coal to be coked
40 and which when heated by the passage of an electrical current through them become incandescent, thus radiating heat into the mass.

I am aware that the general opinion has heretofore been that a long time was required
45 to properly gasify coal so as to form coke; but in actual practice by my improved process I have made perfect coke in less than three hours' time.

From what I have already said it will be
50 seen that the necessary thing is to provide a

furnace or oven to contain the coal, from which oven the air can be excluded, and to provide incandescing surfaces in the oven which shall come into contact with the coal. To illustrate the process, I have shown these incandescing surfaces in the form of bars or plates;
55 but in practice such surfaces may be made to extend over any sufficient part of the inner wall of the furnace or oven, or may in any convenient way be brought into contact with
60 the coal without departing from the principle of my invention.

With the above ends in view my invention consists of an improved process of producing coke by applying heat in the form of electrically-heated surfaces direct to the mass, which
65 process will be hereinafter fully described and then claimed.

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

Figure 1 is a vertical section of a simple form of oven serving to illustrate the principle of my invention. Fig. 2 is a plan view of
75 an oven such as shown in Fig. 1; and Fig 3 is an enlarged sectional view more in detail, showing a practical means for carrying the process into effect and for conveniently handling both the coal and the produced coke.
80

Referring to Figs. 1 and 2, the simple form of oven 10 is made of resisting non-conducting material, such as fire-clay, and is provided at the top with a cover 11, having a gas-outlet 12. At intervals are plates or bars 13, which
85 are let into the furnace or oven walls, so that the inner faces of the bars shall be flush with the said oven-walls, and the ends of the bars project to provide conveniently for connecting the bars with the wires *a*, so that the bars
90 shall form a part of the circuit from the generator A. As there is no oxygen in contact with the bars 13, it will be seen that they will not be rapidly consumed, and convenient means can be provided for inserting new bars
95 when the original ones are consumed or worn out. These bars 13 are of low electrical conductivity and may conveniently be made from a composition of carbon and fire-clay, there being preferably fifteen or twenty per cent.
100

carbon to eighty-five or eighty per cent. of fire-clay. This composition permits the passage of a current through it, but offers sufficient resistance to create a great heat, so that the material becomes white-hot, and the heat will therefore be radiated to the coal in the oven, the radiation being greater because the non-conducting fire-clay which backs the bars serves to prevent external radiation to a great extent.

In Fig. 3 I have shown a practical means of carrying out this process commercially, although I do not limit the invention to any precise apparatus. As herein shown, the main furnace or oven 14 is in the form of a vertical stack, rectangular in cross-section, and it is preferably a little larger at the bottom than at the top, so that the coke can be readily dropped. In the wall of the furnace or oven 14 are the heating-plates 13, like those already described, and these likewise are included in the electric circuit *a*.

I preferably provide at the top of the furnace or oven 14 a plurality of inclined retorts or reservoirs 15, two being shown, which are adapted to deliver into the main furnace 14, and each of which holds a charge for the main furnace or oven. Each retort 15 is provided with a suitable closure 16 at the top, which prevents air from entering the retort, and each retort is adapted to be filled from a car 17, running on a track 18. The lower end of each retort 15 is closed by a plate 19, which has numerous perforations 20 to permit the passage of gas and which at the top of the furnace is hinged at 21 and operated by a lever 22, this being provided with a common form of catch 23, which engages the toothed quadrant 23^a, by which means the lever 22 and its connected closure-plate 19 can be fastened in a desired position. The retorts 15 are provided with vent-pipes 24, through which the gases can pass to the main pipe 25, and a pipe 26 also leads from the upper part of the main furnace and discharges indirectly into the pipe 25. The several gas-pipes 24 and 26 are provided with dampers 27, so that the flow of gas through either pipe can be checked if desired.

The bottom of the furnace or oven 14 is formed by the two swinging lids 28, which overlap, and are provided with internal protective coatings 29. A slide-bolt 30 on the under side of the lids secures them in closed position, and they are further secured and operated by the bent levers 31, which have teeth on the under side to engage the abutments 32, and so lock the levers and lids 29 in position.

The process embodying my invention can be very advantageously carried out with an apparatus such as shown in Fig. 3. In doing this, the first charge is allowed to run down into and fill the furnace or oven 14. The retorts 15 are then each filled. The heat is then

applied to the oven by turning on the electricity, which passes through the several plates 13, heating them to incandescence and heating the coal mass as already described. The rising heat and gases pass through the perforations 20 and through the coal in the retorts 15, the gas finally passing off through the pipes 24. It will thus be seen that while the heat is being applied directly to the coal in the oven or furnace 14 the coal in the retorts 15 will meanwhile be heated and partly gasified. During this process the damper in the pipe 26 can be closed; but if for any reason the pipes 24 are inadequate or it is desired to have part of the gas escape by the pipe 26 the damper in the latter pipe is opened. When the coal in the main furnace has been turned to coke, it will shrink slightly from the furnace-wall, and if then the lids 29 are permitted to swing down the coke will drop from the furnace into the pit 33 below, or instead of this pit any suitable receptacle can be substituted. The first charge being disposed of as described, a charge is then permitted to pass from one retort 15 into the main oven 14 by properly manipulating the plate 19, and the retort just emptied is filled with fresh coal. When this second charge is coked and dropped from the oven, the latter is again filled from the second retort, the coal in which has by this time become partially coked. In this way the main oven is filled alternately from the retorts with partly-gasified coal, and the latter is quickly turned to coke by the heat in the main oven.

The foregoing description sets forth clearly my process; but, as showing the practicability of carrying it out in an economical manner, it will be seen that the gas generated by the production of coke and which will pass off through the pipe 25 is in such quantity that, say, one-half of it will be sufficient to operate a gas-engine which will generate the electricity to supply current to the plates 13, and the remaining portion of the gas can be used for other purposes. It will also be understood, of course, that gas can be treated in any usual way to refine it or to save some of the by-products which it carries.

From the foregoing description it will be clearly seen that I thus provide a continuous process of making coke, that the oven can be very easily charged and discharged, and, further, that the heating-surfaces may be of various degrees of resistance and may be applied in any convenient way to bring them into contact with the coal to be coked, and I wish to emphasize still further the fact that the great importance of the invention lies in applying this heat internally of the oven and directly against the material to be treated. The arrangement I have shown for heating is particularly good, however, because heat is applied at different heights in zones or belts, and consequently the heat thrown inward rises

through the mass, thoroughly heating and gasifying it. The heat which I generate in this way is sufficient to obtain a higher temperature than that applied by usual methods; 5 but I find that the quality of the coke is as good as can be made by the longer processes and by the usual ways.

Having thus fully described my invention, I claim as new and desire to secure by Letters 10 Patent—

1. The herein-described process of making coke, which consists in inclosing the coal in an essentially air-tight oven of non-conducting material and raising the inner wall of the

oven by means of electrical resistances included in the wall to a temperature higher than 15 that obtained in the ordinary coke-oven.

2. The herein-described process of making coke, which consists in inclosing the coal in an essentially air-tight oven and heating the 20 oven from the interior by raising the inner walls to incandescence by means of electrical resistances held in the said inner walls.

MICHAEL R. CONLEY.

Witnesses:

WARREN B. HUTCHINSON,
WILLIAM H. CAMFIELD.