

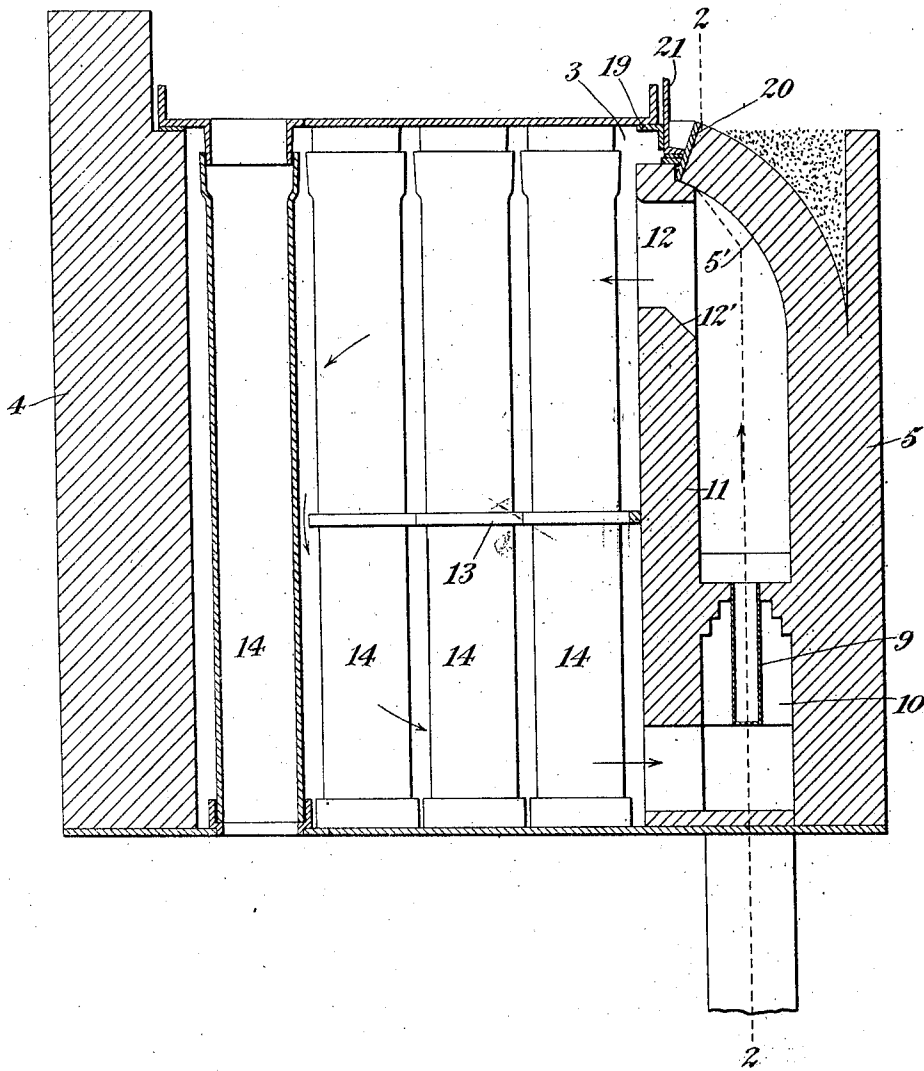
R. S. KENT.
KILN FOR DRYING CHAR.
APPLICATION FILED APR. 27, 1912.

1,058,369

Patented Apr. 8, 1913.

2 SHEETS-SHEET 1.

Fig. 1



Witnesses:

Row Eismittadt
John C. Jones

Inventor:

Robert S. Kent

by

[Signature]
Attorney.

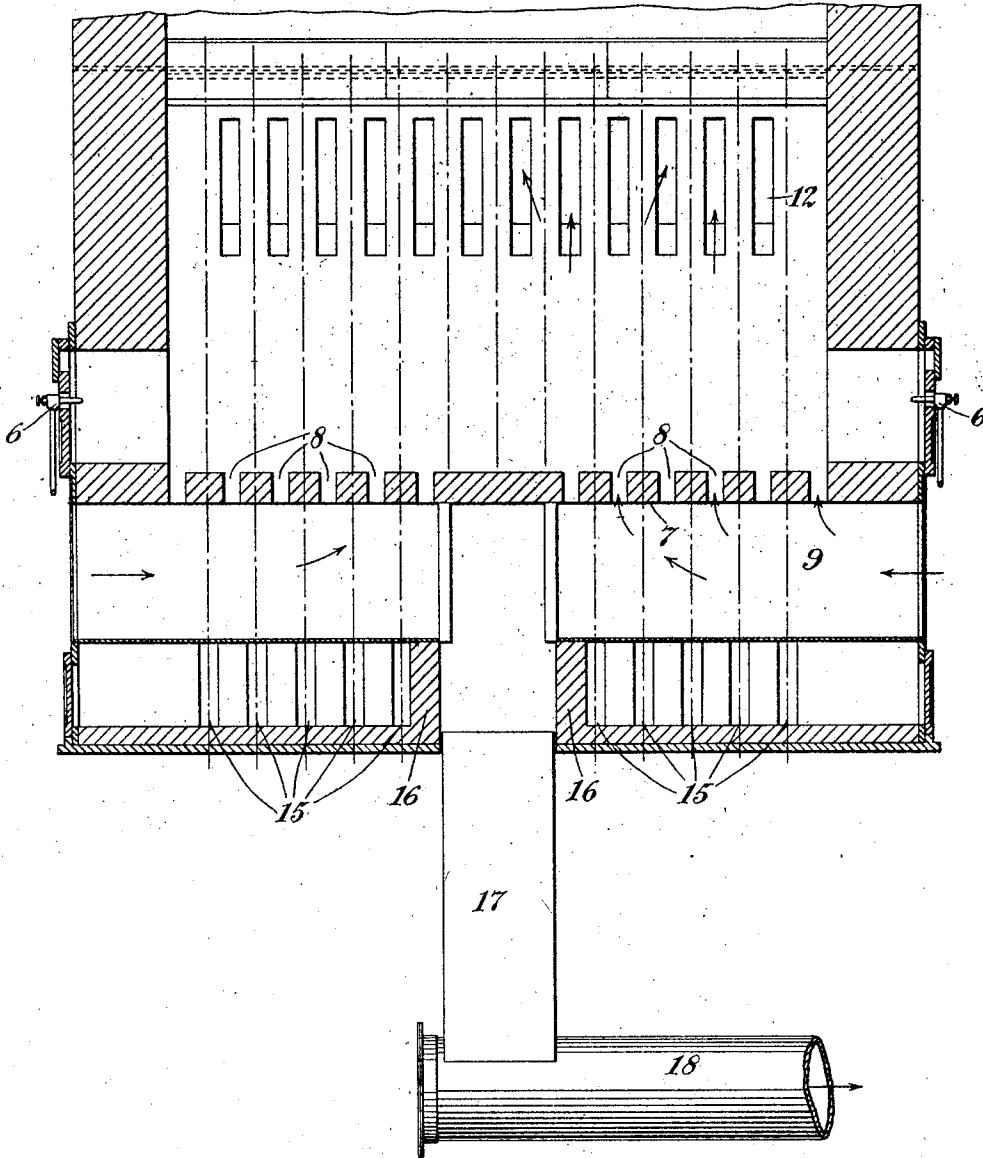
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2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

ROBERT S. KENT, OF BROOKLYN, NEW YORK.

KILN FOR DRYING CHAR.

1,058,369.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed April 27, 1912. Serial No. 693,728.

To all whom it may concern:

Be it known that I, ROBERT S. KENT, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Kilns for Drying Char, of which the following is a specification.

This invention relates to kilns for drying char and is an improvement upon the inventions disclosed in my prior Patents No. 972,002, granted Oct. 4, 1910, and No. 1,004,176, granted Sept. 26, 1911.

In my aforesaid prior patents the products of combustion from a fire-box were distributed out over the tops of a pair of baffle-walls from the center of the kiln toward opposite sides thereof and traveled downward from the upper toward the lower ends of the retorts, coming into contact first with the upper ends of the pipes. It has been found in practice that this results in a somewhat uneven distribution of the products of combustion to the two sets of retorts located at opposite sides of these baffle-walls.

One of the principal objects of my present invention is to avoid this uneven distribution of the products of combustion from the fire-box, an even distribution being effected by delivering said products from a fire-box located at one side of the kiln to a single set of retorts located at the other side of the kiln and having a baffle-wall between them and the fire-box. In order that the upper parts of the retorts may not be heated excessively I provide also for delivering these hot products in such a manner that they do not strike directly against the nearest points of the pipes adjacent to the baffle-wall, but pass directly into the spaces between the pipes and circulate around the pipes and through said spaces substantially horizontally toward the opposite wall of the kiln, and downward toward the lower ends of the retorts and a suitable outlet or outlets. The outlet from the kiln for the spent products of combustion is preferably through the baffle-wall, and this is preferably provided with open-

ings corresponding in number to the adjacent retorts and so located as to be in line with the individual retorts of the row nearest the baffle-wall, the object of this being to assure the utilization of as much as possible of the heat of these gaseous products at the lower ends of the retort pipes.

Other features of the invention not hereinbefore referred to will be hereinafter described and claimed and are illustrated in the accompanying drawing, in which,

Figure 1 is a transverse section of a kiln embodying my present improvements, and Fig. 2 is a longitudinal section of the same through the combustion chamber of the kiln.

Similar characters designate like parts in all the figures of the drawings.

Most of the parts constituting the kiln are or may be of any well-known or suitable construction. In these kilns all of the walls are usually of brick and this is the construction shown herein, the rear wall of the kiln being designated by 3, and the side walls by 4 and 5. Between the walls 4 and 5 a fire-box and a set of retort-pipes are located as in my prior patents. In the present case, however, the fire-box is not located at the center of the kiln but at one side thereof, and the retort-pipes occupy substantially the remainder of the space in the kiln, except for that necessary for a baffle-wall between the fire-box and the retorts. Any suitable type of heating means may be employed in connection with the other features of this kiln, but whatever type is used will be located at one side of the kiln close to the wall 5. The heating means illustrated embodies a pair of oil inlet devices, 6-6, at opposite sides of the kiln, which devices may be of any approved type. The floor of the fire-box or combustion chamber proper is here illustrated as formed by brickwork, 7, having substantially equidistant openings, 8, therein, through which air may be supplied to the two jets of oil entering through the devices 6. A large air chamber or fresh air box is shown at 9 through which air is constantly supplied to the openings 8 just described. This fresh air box extends through the kiln from front to

back thereof, but, as shown in Fig. 1, is of relatively small width. It is disposed in position to have the entering fresh air heated thoroughly by the hot gases circulating
5 around the fresh air box in the space 10.

The retorts employed extend, as is usual, from the top to the bottom of the kiln and receive their supplies at their upper ends in the usual manner, and deliver the purified
10 char from their lower ends into cooler tubes (not shown) located below the floor of the kiln, also as usual. These retorts are ordinarily arranged in a set made up of a plurality of rows which are usually equi-
15 distant from one another and in each of which rows the tubes are also equidistant and similarly located; so that the tubes are in alinement in rows both lengthwise and crosswise of the kiln. The retort-pipes
20 themselves may be of any usual or suitable type, they being illustrated herein as of elliptical cross-section, with the ends or points of the ellipses facing toward the respective walls 4 and 5 of the kiln.

25 As in my prior patents, the hottest products of combustion are intended to come into contact first with the upper ends of the retort-pipes and then travel downward around said pipes toward the lower ends
30 thereof, the heat being gradually abstracted in the travel of the gases. For the purpose of obtaining this result I employ, as in my former patents, a baffle-wall for directing these hot products up toward the
35 top of the kiln and toward the upper ends of the retorts; but instead of locating this baffle-wall near the center of the kiln as in my former patents it is located quite near one of the side walls, here the wall 5, only
40 sufficient space being left between said baffle-wall and this side wall for the fire-box and coöperative parts. As in my prior patents, this baffle-wall serves as a curtain wall between the fire-box and the retorts in the
45 retort-chamber to screen the greater portion of the length of each retort from the greatest heat of the fire-box and assure the delivery of these hot products into contact with the retorts only after the gases have
50 reached the upper portion of the kiln. A baffle-wall suitable for the purpose is illustrated at 11. It preferably has a series of openings near its upper end for the purpose of delivering the hot products of com-
55 bustion into the zone of the retorts; but in order that the action of these very hot gases may take place as gradually as possible said openings are preferably located in positions to register with the corresponding spaces
60 between the pipes of the first row. This will be clear by referring particularly to Fig. 2 in which these openings are shown at 12, and are in line with the openings between the retort-pipes, the center line of
65 said retort-pipes being indicated and being

midway between the centers of the openings 12. Thus the hot products issuing from the outlets 12 do not strike directly against the broad surfaces of the pipes but pass through
70 spaces between adjoining pipes, preferably of elliptical cross-section and having their major transverse axes in the line of flow of the gases.

It will be noticed that the hot products issuing through these outlets 12 near the top
75 of the kiln are intended to take a substantially horizontal course across the kiln to the opposite wall 4 thereof and thus travel all the way from one side to the other of the kiln. They are also intended to travel
80 downward from the tops to the bottoms of all the retorts of the set. In order that this action may be assured provision may be made for positively circulating said products across the kiln from one side to the
85 other and then back again. A convenient means for bringing about this result is flanges, such as 13, projecting from each of the retort-pipes, which pipes are designated
90 respectively by 14. These flanges are preferably substantially rectangular—in this case oblong—in cross-section and of such area that when the pipes are in place the
95 edges of the flanges of different pipes will come in contact with one another and form a practically continuous partition across the kiln in the retort area thereof. Thus positive
100 provision is made for accomplishing in a kiln of this type, that is, a kiln having its fire-box at one side instead of in the center of the kiln, the same result which it was one of the principal objects of the inventions disclosed in my aforesaid prior
105 patents to obtain, to wit: to provide for subjecting the descending char in each retort-pipe to the greatest heat at its upper end and less heat at its intermediate and lower portions in order to drive out as much
110 as possible of the contained water, etc., at an early stage in the descent of the char, and thus avoid as much as possible the necessity of having to drive out a large percentage of moisture from the char at the lower
115 ends of the retorts by forcing such moisture up through the descending column. In other words, I retain the advantage disclosed in the aforesaid patents of driving out the maximum amount of moisture initially by
120 applying as much heat as possible to the upper ends of the retorts so that the descending columns of char will be as free from moisture as possible at the lower ends of the retorts, and the remaining moisture can be driven off most readily through the
125 upper portions of the descending mass.

In order to assure the extraction of as large a number of heat units as possible from the circulating products of combustion, these will preferably not only have
130 their outlets at the lower part of the kiln

near the bottom thereof, but the outlets therefor will preferably be so disposed as partially to retard the efflux of these products into the flue. For this reason I have shown a plurality of outlets, 15, near the bottom of the baffle-wall 11, which outlets instead of registering with the spaces between the pipes 14 are staggered with respect to said spaces and disposed in alignment with the major transverse axes of said pipes, as will be clear by referring to Fig. 2. This disposition of the outlets 15 serves, as will be evident, to retard the escape of the products of combustion sufficiently to assure the extraction of the maximum number of heat units therefrom while providing for proper circulation.

The partially spent products of combustion are utilized to heat the fresh air passing through the fresh air box 9, vertical walls, 16, preferably of fire-brick, being shown herein for directing the flow of these products through the openings 15, up around the fresh air box 9, and out through the chamber 10 into the outlet pipes, 17 and 18, leading to the flue.

It will be noted that the wall 5 of the kiln is arched inward at its upper end and unites with the baffle-wall 11 at the upper end of the latter to form a complete fire-brick structure and also direct the products of combustion from the fire-box across the kiln in a substantially horizontal path. Each of the openings 12 in the baffle-wall at the upper end thereof is also shown as beveled at its lower end at 12' to conform approximately to the curved wall 5' and to facilitate the flow of the products of combustion. At their point of junction the two walls 5 and 11 are connected and braced and secured to the upper parts of the apparatus (not shown) by suitable angle and channel irons, such as 19, 20, and 21. The manner in which these are combined and cooperate with the walls to tie the parts together and brace them will be obvious. The space between the two upper portions of the wall 5 may be filled with sand or other suitable heat resisting material as shown.

What I claim is:

1. In a kiln for revivifying char, the combination with a fire-box located at one side only of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and means including a free passage of considerable length from the zone of combustion of the fire-box to the upper ends of the retort-pipes for circulating products of combustion from the fire-box in contact with said retort-pipes and from one side to the other of said retort-chamber.

2. In a kiln for revivifying char, the combination with a fire-box located at one side

of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and means including a free passage of considerable length from the zone of combustion of the fire-box to the upper ends of the retort-pipes for circulating the major portion of the products of combustion from said fire-box through the retort-chamber in contact with the retort-pipes and from the upper toward the lower end of said chamber and from one side to the other thereof.

3. In a kiln for revivifying char, the combination with a fire-box, of a row of spaced retort-pipes of substantially elliptical cross-section contained in a retort-chamber located at one side of the fire-box and disposed with the major axes of their cross-sections crosswise of the kiln, which retort-chamber is closed at the side farthest from the fire-box, an outlet near the bottom of the retort-chamber for the products of combustion, and a baffle-wall disposed lengthwise of the kiln between the fire-box and said set of retort-pipes and of sufficient height to direct the hottest products of combustion up to the upper portions of the retort-pipes and cause said products of combustion to circulate downward from said point and out through said outlet, said baffle-wall having a row of outlets to the zone of the retort-pipes which outlets register respectively with the spaces between the retort-pipes of said row.

4. In a kiln for revivifying char, the combination with a fire-box located at one side of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, an outlet for the products of combustion, and a baffle-wall near one side of the kiln and between the fire-box and said retort-pipes and forming with the walls of the kiln a substantially closed combustion chamber with outlets through the upper portion of the baffle-wall to the zone of the retort-pipes.

5. In a kiln for revivifying char, the combination with a fire-box located at one side of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and a baffle-wall near one side of the kiln between the fire-box and said retort-pipes and forming with the walls of the kiln a substantially closed combustion chamber with outlets through the upper portion of the baffle-wall to the zone of the retort-pipes and outlets from the lower portion of said zone to the flue.

6. In a kiln for revivifying char, the combination with a fire-box, of a row of spaced retort-pipes of substantially elliptical cross-section containing a retort-chamber located

at one side of the fire-box and disposed with the major axes of their cross-sections cross-wise of the kiln which retort-chamber is closed at the side farthest from the fire-box, and a baffle-wall near one side of the kiln between the fire-box and said retort-pipes and forming with the walls of the kiln a substantially closed combustion chamber with outlets through the upper portion of the baffle-wall to the zone of the retort-pipes which outlets register with the spaces between said retort-pipes, said baffle-wall also having outlets from the lower portion of said zone to the flue which outlets are substantially in alinement with the afore-said major axes of the retort-pipes.

7. In a kiln for revivifying char, the combination with a fire-box located at one side of the kiln, of a set of retort-pipes containing a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, a side wall inclined inwardly at its upper end, an outlet for the products of combustion, and a baffle-wall adjacent to said side wall and between it and said retort-pipes and forming with said side wall a substantially closed combustion chamber with outlets through the upper portion of the baffle-wall to the zone of the retort-pipes.

8. In a kiln for revivifying char, the combination with a fire-box located at one side of the kiln, of a set of retort-pipes containing a retort chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, a side wall inclined inwardly at its upper end, an outlet for the products of combustion, and a baffle-wall secured directly to the upper end of said inclined side wall near the roof of the kiln and disposed between said wall and the retort-pipes and forming with said side wall a substantially closed combustion chamber with outlets through the upper portion of the baffle-wall to the zone of the retort-pipes.

9. In a kiln for revivifying char, the combination with a fire-box, of a set of retort-pipes, a baffle-wall between said retort-pipes and the fire-box and of sufficient height to direct the hottest products of combustion up to the upper portions of the retort-pipes and cause said products of combustion to circulate downward from said point toward the lower ends of the retort-pipes, said baffle-wall having an outlet at the bottom thereof, a fresh air box cooperative with the fire-box for supplying fresh air to the fuel, and a chamber surrounding said fresh air box and communicating at its opposite ends respectively with said outlet through the baffle-wall and with the flue.

10. In a kiln for revivifying char, the combination with oil-burning means near

the bottom or the kiln, of a set of retort-pipes, and a baffle-wall between said retort-pipes and the oil-burning means and of sufficient height to direct the hottest products of combustion up to the upper portions of the retort-pipes and cause said products of combustion to circulate within the retort chamber downward from said point toward the lower ends of said retort-pipes said baffle-wall forming with other walls of the kiln a free passage for products of combustion from the zone of combustion to the upper portions of said retort-pipes.

11. In a kiln for revivifying char, the combination with oil-burning means located at one side only of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and means including a free passage of considerable length from the zone of combustion to the upper ends of the retort-pipes for circulating products of combustion from said oil-burning means in contact with said retort-pipes and from one side to the other of said retort-chamber.

12. In a kiln for revivifying char, the combination with oil-burning means located at one side of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and means including a free passage of considerable length from the zone of combustion to the upper ends of the retort-pipes for circulating the major portion of the products of combustion from said oil-burning means in contact with the retort-pipes and from the upper to the lower ends thereof and from one side to the other of the retort-chamber.

13. In a kiln for revivifying char, the combination with a fire-box located at one side only of the kiln, of a set of retort-pipes contained in a retort-chamber located at the other side of the kiln which retort-chamber is closed at the side farthest from the fire-box, and means including a free passage of considerable length from the zone of combustion to the upper ends of the retort-pipes for circulating products of combustion from the fire-box in contact with said retort-pipes and from one side to the other of said kiln said means including a substantially horizontal partition extending from the fire-box zone to a point adjacent to the opposite wall of the kiln.

14. In a kiln for revivifying char, the combination with a fire-box located at one side of the kiln, of a set of retort-pipes at the other side of the kiln, and means for circulating products of combustion from the fire-box in contact with said retort-pipes and from one side to the other of said kiln

1,058,369

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said means including a substantially horizontal partition extending from the fire-box zone to a point adjacent to the opposite wall of the kiln and made up of horizontal
5 flanges extending from said retort-pipes and having contacting edges.

Signed at New York in the county of New

York and State of New York this 9th day of April, A. D. 1912.

ROBERT S. KENT.

Witnesses:

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