

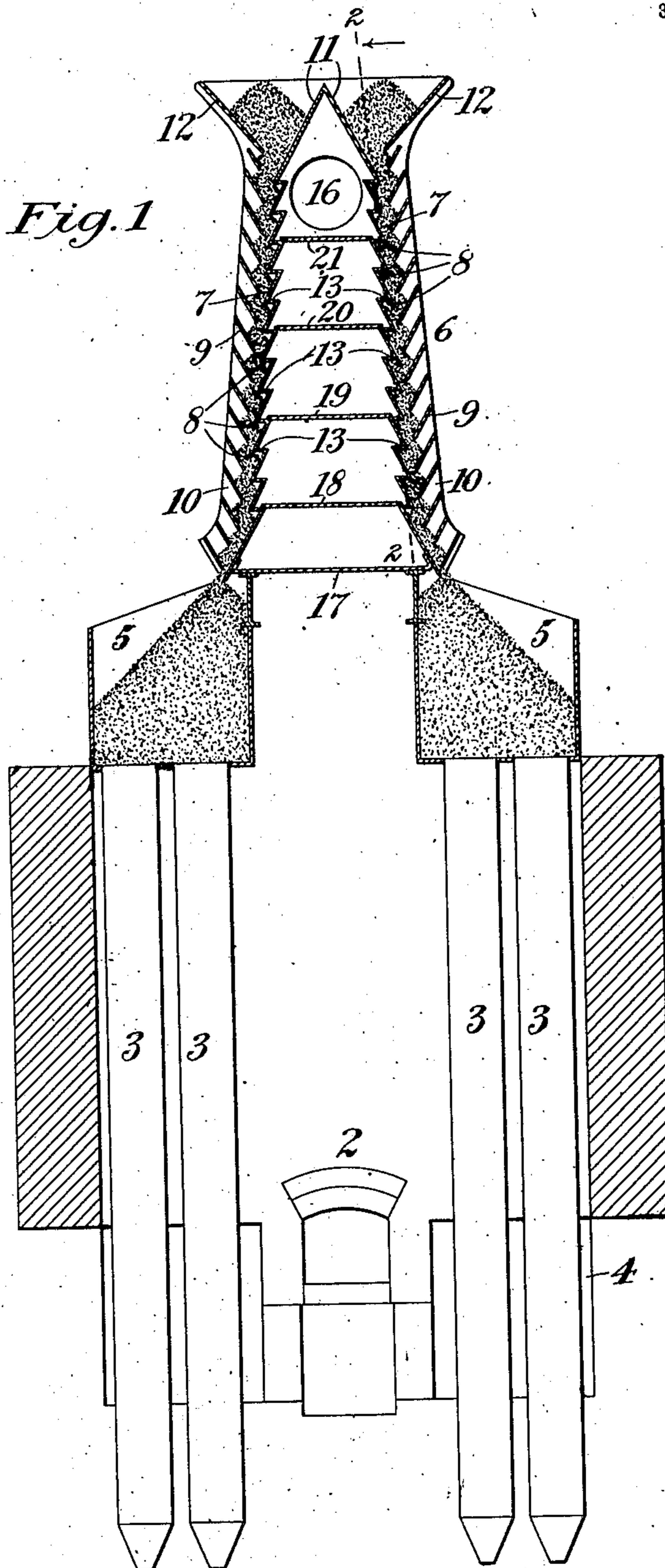
No. 871,705.

PATENTED NOV. 19, 1907.

R. S. KENT.  
APPARATUS FOR DRYING CHARCOAL.

APPLICATION FILED FEB. 4, 1907.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2

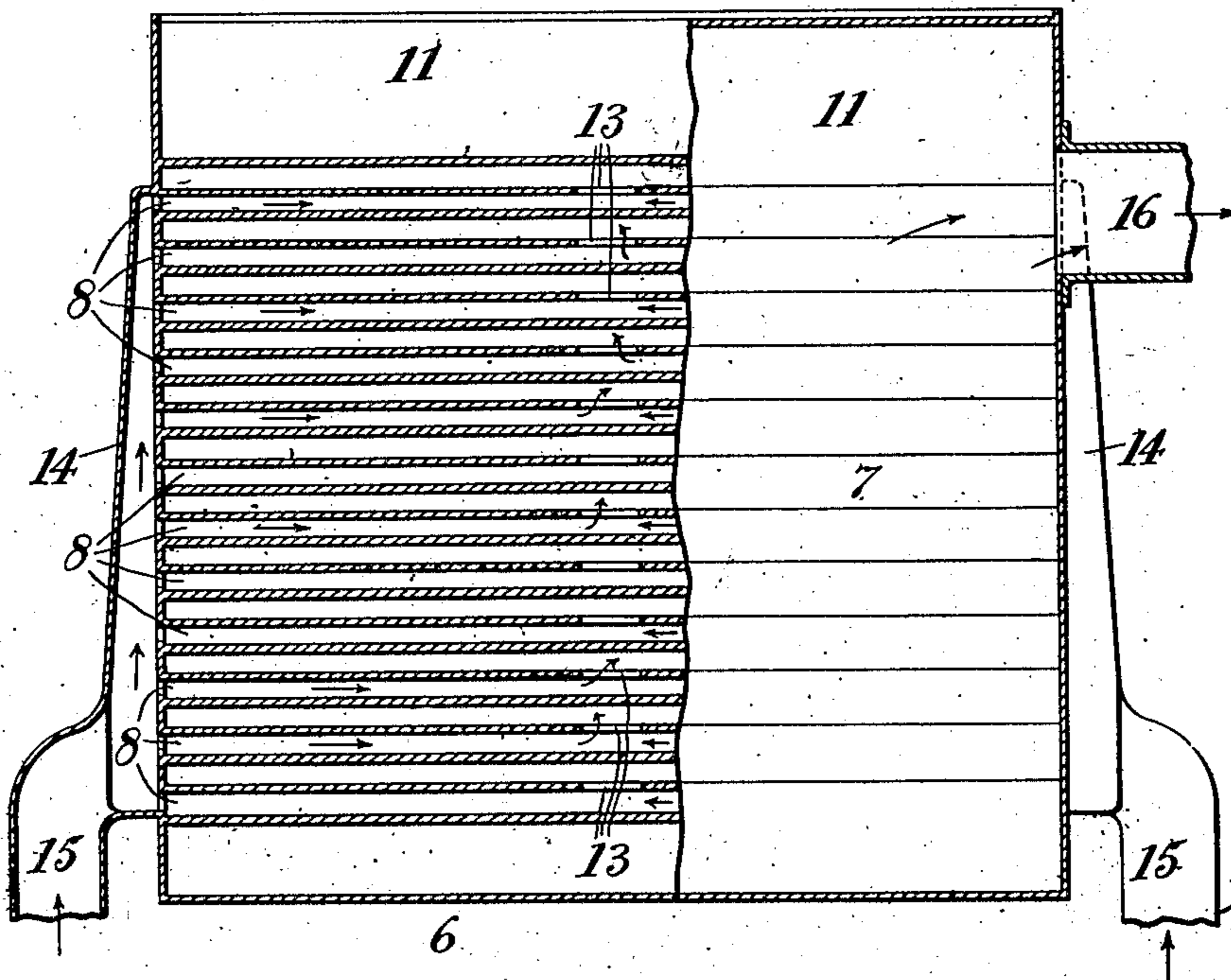
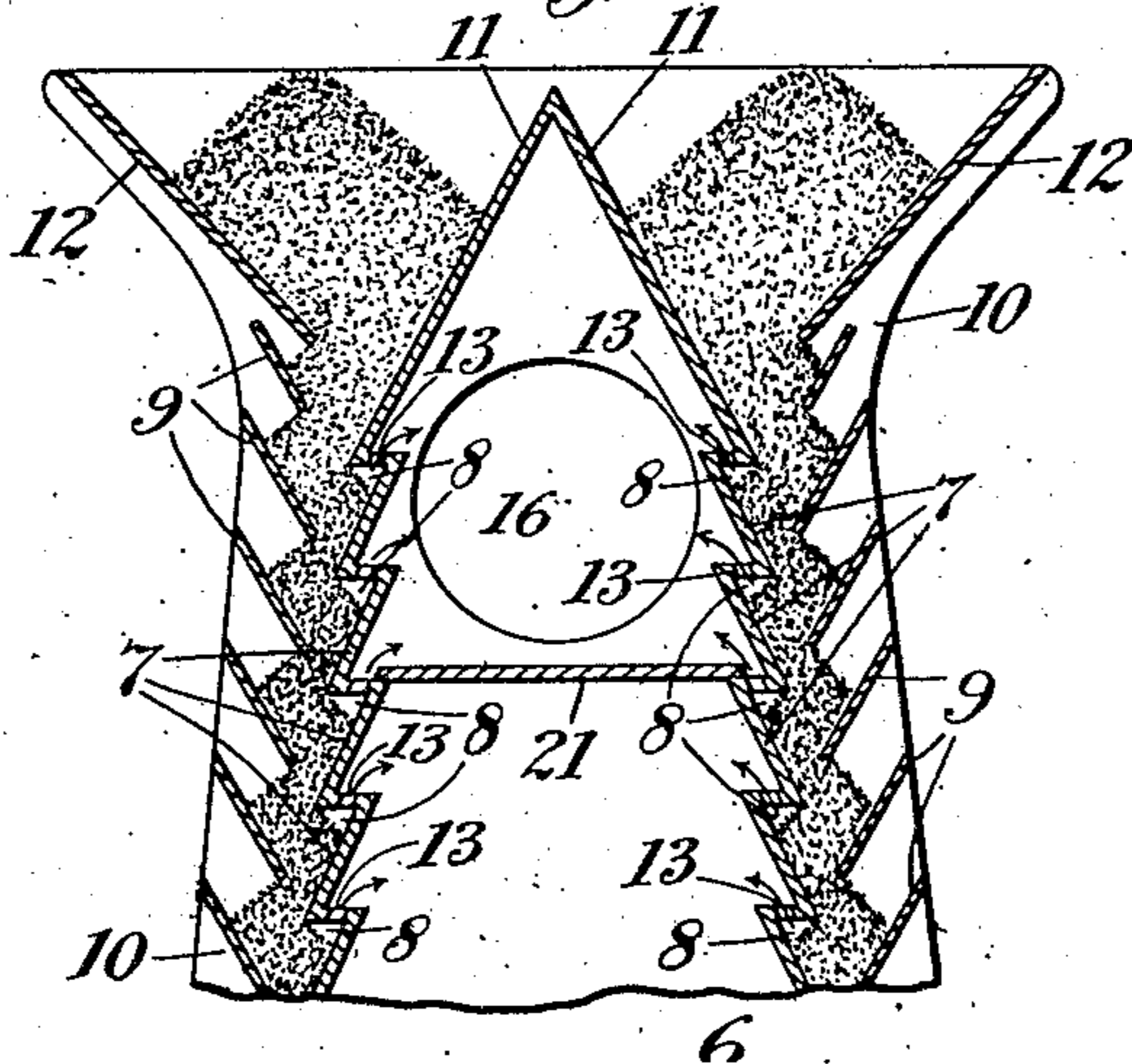


Fig. 3



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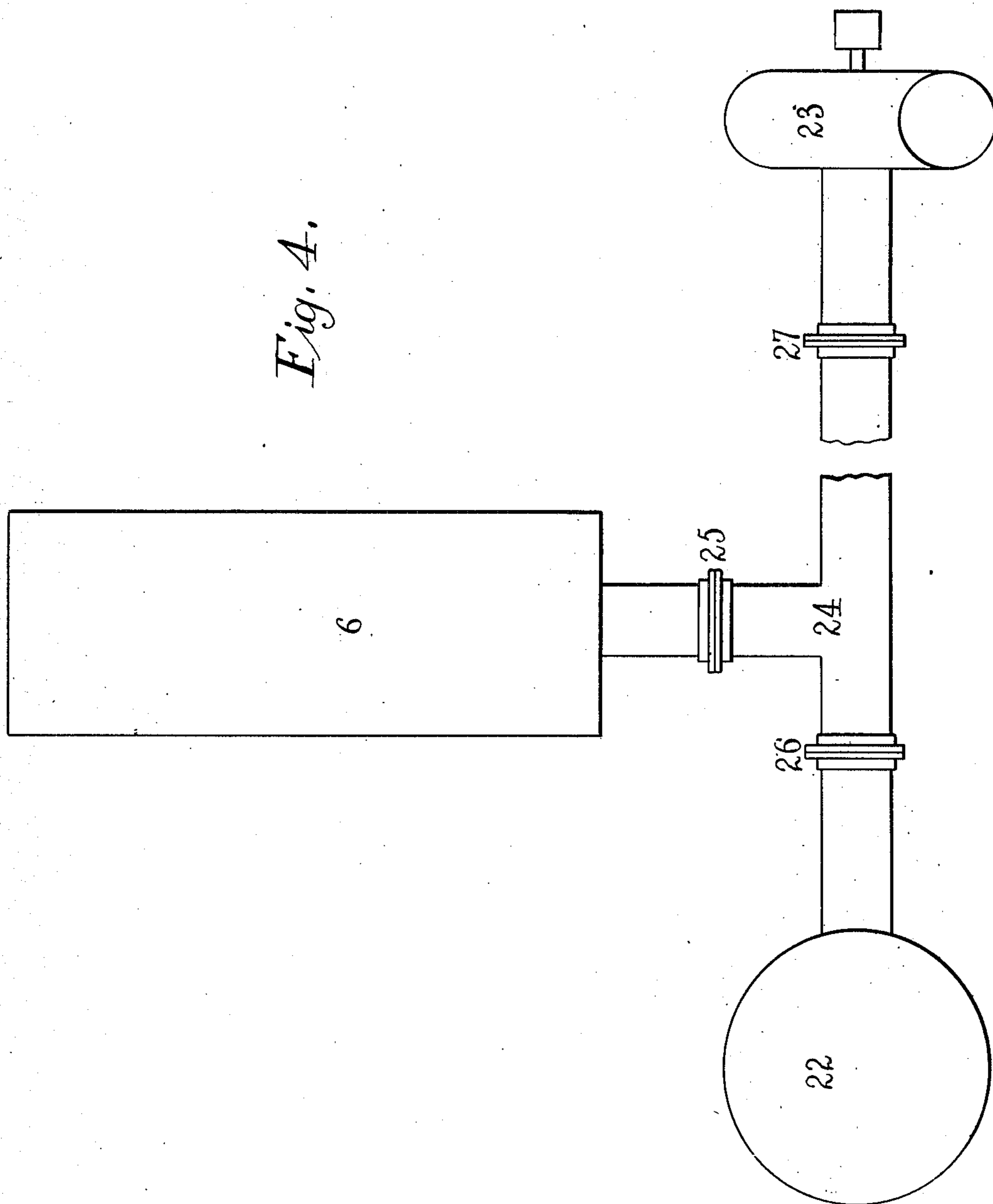
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3 SHEETS—SHEET 3.

Fig. 4.



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# UNITED STATES PATENT OFFICE.

ROBERT S. KENT, OF BROOKLYN, NEW YORK.

## APPARATUS FOR DRYING CHARCOAL.

No. 871,705.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed February 4, 1907. Serial No. 355,600.

*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 Apparatus for Drying Charcoal, of which the following is a specification.

This invention relates to an apparatus for drying charcoal, and particularly to an apparatus for drying the animal charcoal or bone-black known as "char" and used as a decolorizing agent, particularly in the process of refining sugar.

The principal object of this invention is to thoroughly dry wet char as it flows down a horizontally-corrugated wall or walls of a char-drier and forms with the walls of the reëtrant angles of such corrugations ventilating passages, the desired result being attained by me by providing ventilating outlets in the walls of said reëtrant angles and by providing also suitable means for circulating a gaseous drying medium through the ventilating passages from one or both ends thereof, over the surface of the wet char, and out through the ventilating outlets, instead of circulating such a medium through such ventilating passages from one end to the other thereof, as has heretofore usually been done, or through the wet char as has heretofore been frequently but unsuccessfully attempted.

In the drawings accompanying this specification I have illustrated an apparatus embodying the main feature of my invention just stated, and also certain subordinate features which will be hereinafter described in detail and which are fully set forth in the appended claims.

In said drawings, Figure 1 is a vertical section and elevation of an apparatus for drying char embodying my present invention. Fig. 2 is an enlarged vertical section of the upper portion of the apparatus or char-drier proper, the right-hand side of the view being a central vertical section and the left-hand side being a section in the line 2—2, Fig. 1. Fig. 3 is an enlarged section similar to Fig. 1, of the upper portion of the char-drier. Fig. 4 is an enlarged diagrammatic view illustrating a char-drier and means for drawing off vapors, etc. from the wet char in the drier.

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

In carrying into effect my invention I will or may make use of the well-known elements of a char-drying apparatus. Among these are a kiln, such as 2, of any suitable type, located under the char-drier proper and so constructed as to contain and heat a series of retorts, such as 3, which are also, as shown, of well-known construction. Around the lower portions of the retorts 3 is another main element of such an apparatus, to wit, a cooling chamber, such as 4, formed in any well-known manner. Near the top of the kiln may also be located, as is usual, chambers such as 5 for the reception of the dried char until it is passed into the retorts 3 to be revived by reburning in said retorts.

The char-drier proper preferably constitutes an upper extension of the outlet for waste products of combustion from the kiln and is best constructed as a casing through which such products of combustion may circulate back and forth endwise of the drier in a zigzag path from the bottom to the top of the same. This char-drier is designated generally by 6. It is in the construction shown a relatively high substantially vertical casing decreasing in cross-sectional area from the bottom to the top of the apparatus, and of considerable width endwise of the side-walls but relatively narrow between such side-walls. At least one and preferably both of these side-walls of the casing is horizontally corrugated to form a wall which is zigzag in vertical section and has reëtrant angles adapted to form ventilating passages. These features of construction are well understood. The casing of the char-drier shown here has two opposing side-walls 7 having such horizontal corrugations forming reëtrant angles. The wet char shown in the drawings (see particularly Fig. 3) in descending a side-wall of this zigzag type forms with the reëtrant portions of the casing horizontal passages, such as 8, the area of which is determined by the angles of the side-walls of the corrugation and by the flow-line of the wet or partially dried char. I combine with such a side-wall or side-walls as illustrated at 7, suitable means for forming with said zigzag side-wall or side-walls one or more passages for permitting the descent of a zigzag stream of char. These parts are so formed and disposed that the stream of char descending between the cooperating surfaces is a comparatively thin one, though of great width. The means employed for forming such a zigzag stream or

streams of descending char are or may be the same as heretofore used, that is, they may be one or more series of plates, such as 9, secured to suitable supports 10, at the upper ends of which may be formed the usual hopper or hoppers for receiving in bulk the moist char. In the drawings two hoppers are shown as formed by diverging upper portions 11 of the side-walls of the drier and by plates, such as 12, secured to the supports 10.

The principal feature which distinguishes the construction of the side-walls of the drier from the side-walls of other apparatus for drying char is openings in the walls of the ventilating passages, these openings constituting ventilating outlets. These ventilating outlets through the walls of the reentrant angles of one or more side-walls of the drier are preferably at the centers of the ventilating passages and are of considerable area, they being of sufficient size to permit the free exit of the ventilating medium therethrough. These ventilating outlets are preferably formed as shown in Figs. 2 and 3, in the upper or horizontal wall of each reentrant angle, the outlet being of considerable length though relatively narrow. The ventilating passages 8 are open at both ends of the drier and are preferably covered by end-casings, which may be of any suitable type. Here I have shown two end-casings each of which covers all of the ventilating passages at its end of the drier. These end-casings are designated generally by 14. Through these end-casings the gaseous drying medium may be circulated through the ventilating passages from both ends of the drier and out through the ventilating outlets 13. For this purpose heated air will be taken from some suitable part of the apparatus, preferably from the usual point, to wit, from the cooling chamber 4, and pass through suitable pipes 15 into the end-casings 14. This heated air may be drawn through the ventilating passages in any one or more of various well-known ways, as for example, by natural draft through a stack indicated diagrammatically at 22, or by forced draft through a suction fan, indicated diagrammatically at 23, or in both of these ways, or in any other manner. Preferably the streams of air are circulated through these ventilating passages and have their outlet through the openings 13, are delivered directly into the interior of the casing constituting the main element of the drier, as indicated by the arrows in Fig. 3, and therefore pass, mingled with the waste products of combustion, through the interior of the casing to the usual outlet, such as 16, for such waste products from the kiln, and are exhausted, through a flue, such as 24, either by way of the stack or the fan, or both, as may be desired, and as may be determined by the proper setting of gates or valves, such as 25, 26 and 27.

In order to utilize most effectively the heat of the waste products of combustion I prefer in this, as in previous apparatus of this type, to provide a series of superposed partitions, such as 17, 18, 19, 20 and 21, disposed substantially horizontally in the casing of the char-drier. These partitions have openings (not shown) at their opposite ends alternately for the purpose of prolonging the time occupied by the waste products of combustion in passing over the inner surfaces of the side-walls 7 out of contact with the char, and consequently utilizing the full heating effect of the waste products.

What I claim is:

1. In an apparatus for drying charcoal, the combination with a horizontally corrugated wall forming reentrant angles the walls of which have ventilating outlets therethrough and form with a downwardly flowing body of char horizontal ventilating passages, of means for circulating a gaseous drying medium part way through said ventilating passages and out through said ventilating outlets.
2. In an apparatus for drying charcoal, the combination with a horizontally corrugated wall forming reentrant angles the walls of which have substantially central ventilating outlets therethrough and form with a downwardly flowing body of char horizontal ventilating passages, of means for circulating a gaseous drying medium part way through said ventilating passages and out through said ventilating outlets.
3. In an apparatus for drying charcoal, the combination with a horizontally corrugated wall forming reentrant angles the walls of which have ventilating outlets therethrough and form with a downwardly flowing body of char horizontal ventilating passages, of means for circulating a gaseous drying medium part way through said ventilating passages from both ends thereof and out through said ventilating outlets.
4. In an apparatus for drying charcoal, the combination with a horizontally corrugated wall forming reentrant angles the walls of which have substantially central ventilating outlets therethrough and form with a downwardly flowing body of char horizontal ventilating passages, of means for circulating a gaseous drying medium part way through said ventilating passages from both ends thereof and out through said ventilating outlets.
5. In an apparatus for drying charcoal, the combination with a pair of opposed horizontally corrugated walls each forming reentrant angles the walls of which have ventilating outlets therethrough and form with two downwardly flowing streams of char two series of horizontal ventilating passages, of means for circulating a gaseous drying medium part way through said ventilating pas-

sages of both series and out through said ventilating outlets.

5 6. In an apparatus for drying charcoal, the combination with a pair of opposed horizontally corrugated walls each forming reëntrant angles the walls of which have ventilating outlets therethrough and form with two downwardly flowing streams of char two series of horizontal ventilating passages, of  
10 means for circulating a gaseous drying medium part way through said ventilating passages of both series from both ends of said passages and out through said ventilating outlets.

15 7. In an apparatus for drying charcoal, the combination with a casing having a horizontally corrugated wall forming reëntrant angles the walls of which have ventilating outlets therethrough and form with a downwardly flowing body of char horizontal ventilating passages, of means for circulating a  
20 gaseous drying medium through said casing

out of contact with said char and also part way through said ventilating passages in contact with the char and thence out through  
25 said ventilating outlets.

8. In an apparatus for drying charcoal, the combination with a horizontally corrugated wall forming reëntrant angles the walls of which have ventilating outlets therethrough  
30 and form with a downwardly flowing body of char horizontal ventilating passages, of a pair of end-casings inclosing the open ends of said ventilating passages, and means for circulating a gaseous drying medium from said  
35 end-casings through said ventilating passages and outlets.

Signed at city of New York, in the county of New York and State of New York, this 2d day of February, A. D. 1907.

ROBERT S. KENT.

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C. S. CHAMPION.