

Dec. 9, 1930.

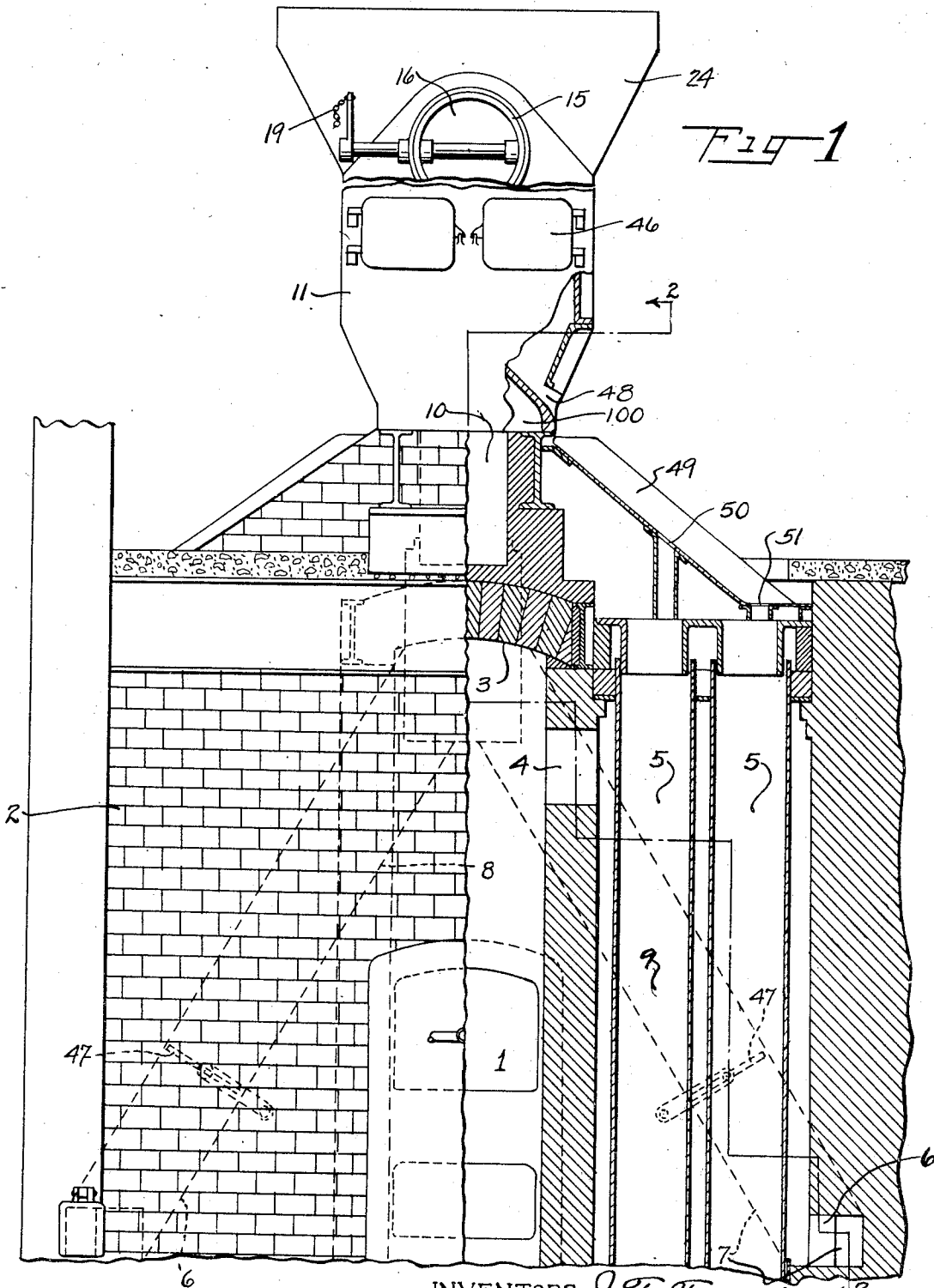
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1,784,626

BONE CHAR DRYING APPARATUS

Filed June 25, 1925

4 Sheets-Sheet 1



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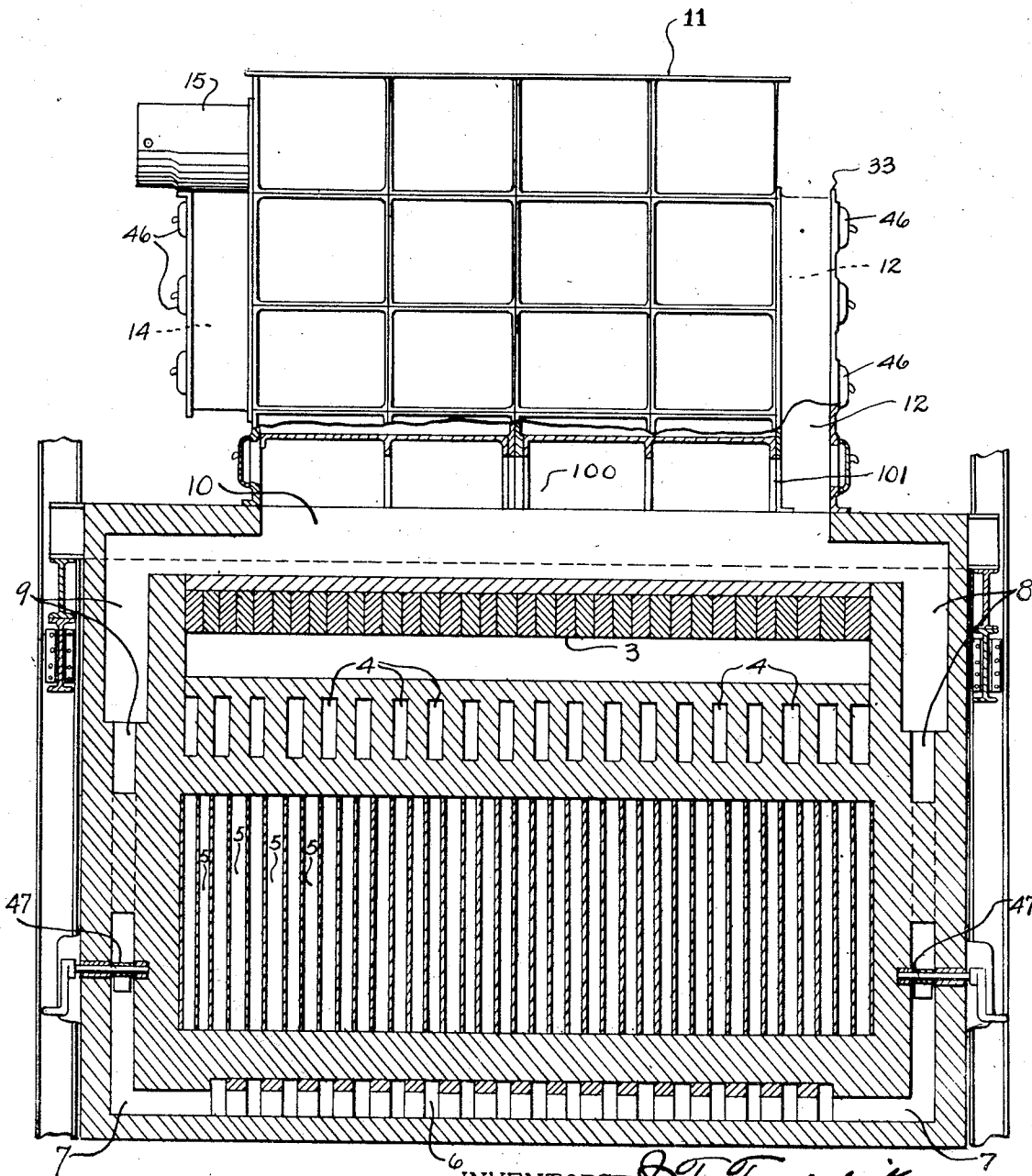


Fig 2

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FIG 3

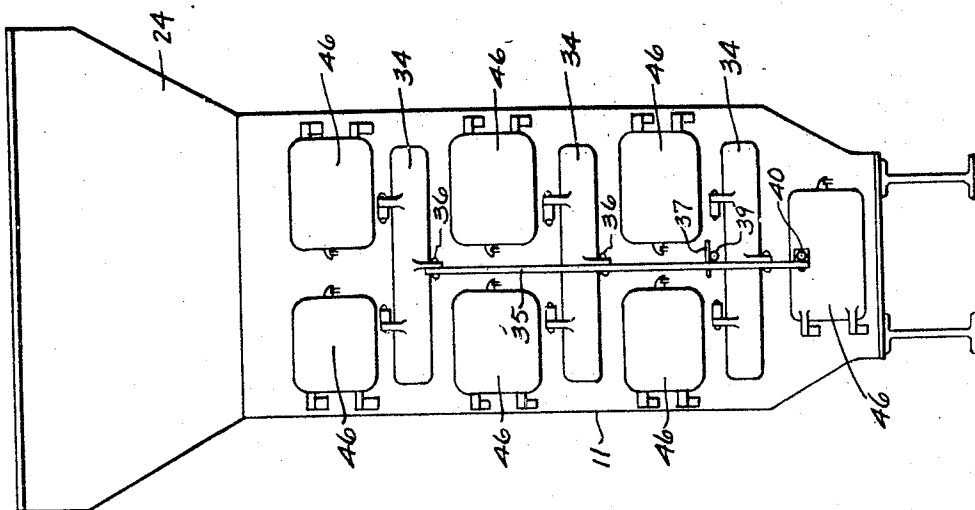
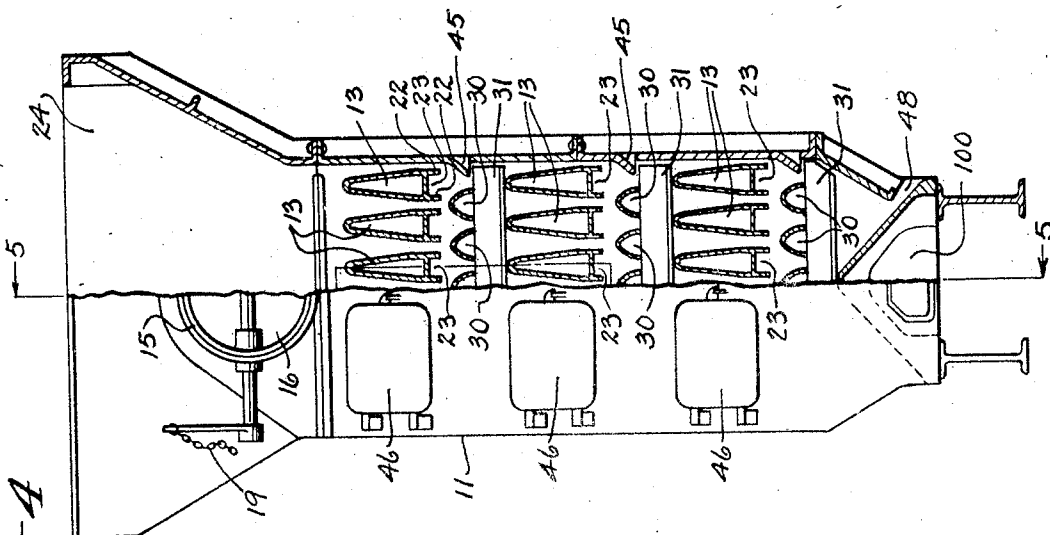


FIG 4



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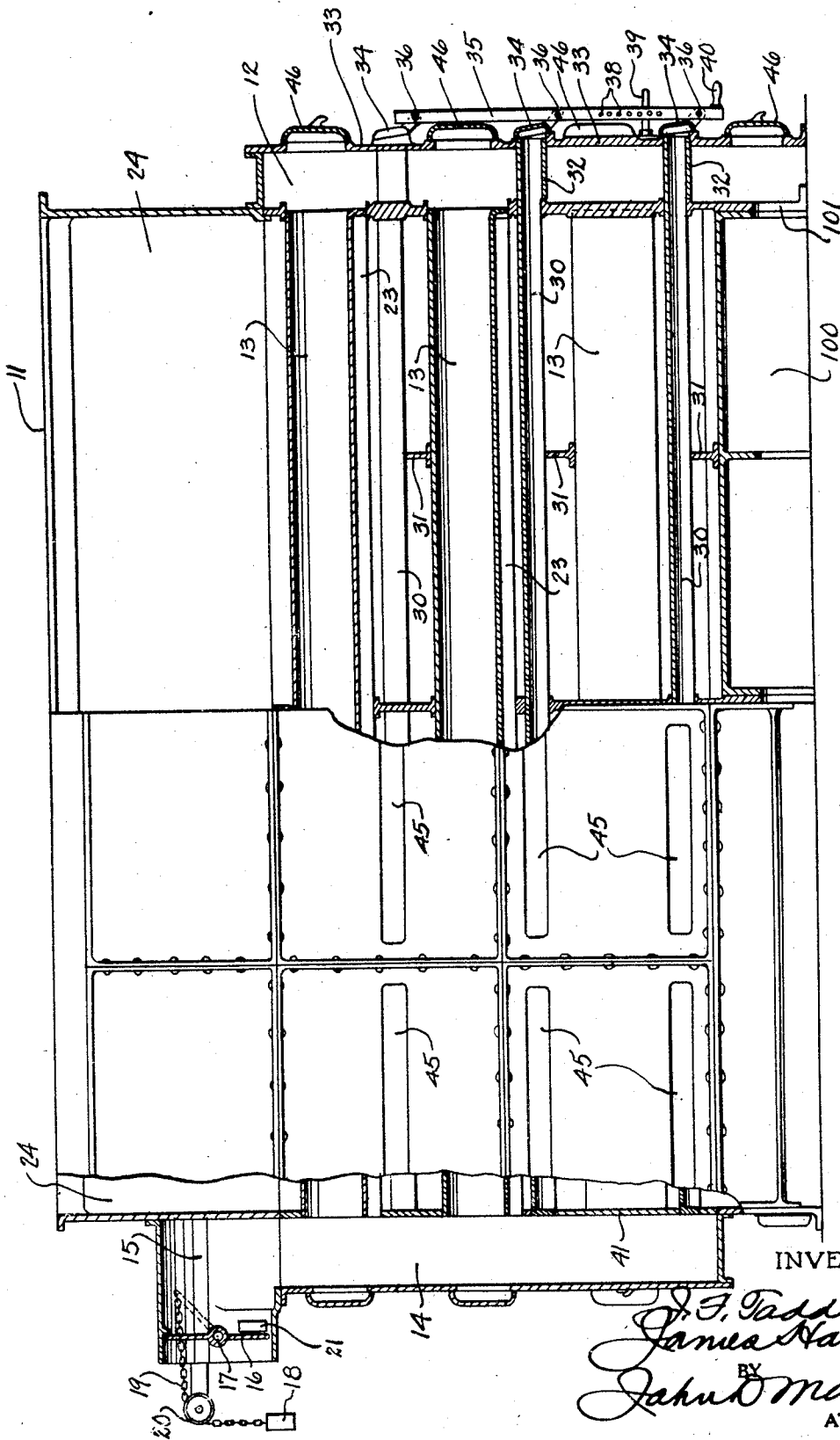


FIG. 5

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BONE-CHAR-DRYING APPARATUS

Application filed June 25, 1925. Serial No. 39,445.

Our invention relates to a novel process and apparatus for revivifying char, used in sugar refining for removing coloring and other matter from sugar liquors, preparatory to again using the char.

Our invention relates more particularly to drying wet char, before it is fed into a char kiln where the char is subjected to a higher temperature than in the dryer. In the char kiln the last trace of moisture and organic impurities are driven off and the revivifying of the char is completed.

Our invention further relates to drawing external air, or a similar medium, into and out of the body of the drying char, using such external air or other medium as a vehicle to remove the vapors of evaporation, thereby preventing condensation of the evaporated moisture back in other and cooler portions of the char. At the same time we control the rate of flow of the external air, which may or may not be heated as desired, to insure maximum removal of the vapors.

Our invention further relates to removing the vapors of evaporation from different zones or levels of the drying char, either with, or without the aid of external air.

Our invention further relates to heating the char dryer by the spent products of combustion from the char kiln.

Other objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, process, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is an elevation partly in vertical section of our combined char dryer and char kiln;

Fig. 2 is a vertical section on the staggered section line 2—2 of Fig. 1;

Fig. 3 is a front elevation of the char dryer;

Fig. 4 is a rear elevation partly in vertical section;

Fig. 5 is a vertical section on the line 5—5 of Fig. 4.

In our invention we take the wet char and give it a preliminary drying to remove substantially all the moisture before passing it into the char kiln where it is subjected to a higher temperature, and in which the complete revivifying process is effected by removing the last trace of moisture and all organic impurities. During the drying of the char in the dryer, which in our invention is connected to, but separate from, the char kiln, we withdraw the vapors of evaporation at different points, stages or zones of the drying char, and permit such vapors to escape to the stack or chimney without passing them through other and cooler portions of the drying char where they would be condensed. This materially assists the drying of the wet char and speeds up the process of revivifying it, thereby reducing the cost.

We also preferably, though not necessarily, pass another medium, such as external dry air, through the body of drying char so that this air, or other similar medium, passing through the drying char will carry off the vapors of evaporation and further assist in removing such vapors to the chimney or stack without permitting them to pass through the cooler portions of the drying char where such vapors would be condensed. The passage of this external air, or other medium, is controlled in any suitable way to give the desired rate of flow; the rate of flow is sufficient to most expeditiously remove from the body of the drying char the vapors of evaporation and permit them to pass independently to the stack. Ordinarily the draft of the stack will be sufficient though if desired a forced draft may be employed.

In the particular embodiment of our invention, illustrated in the drawings, coal, gas or other fuel is burnt in the central combustion chamber 1 of the char kiln 2, Fig. 1. The products of combustion are deflected down by

the crown plate 3 and pass through the ports 4, 4 and thence around the retorts 5, 5. They are then withdrawn through the different flues 6, 7, 8 and 9 and pass into the flue 10 connected with the flue chamber 100 of the char dryer 11 which is mounted above the char kiln 2. The products of combustion then pass through the port 101 into the vertical flue 12 of the char dryer 11 (Fig. 2), and thence through one or more flue pipes 13, 13 (Fig. 5) to the rear of the dryer 11 where they are each connected with the smoke box 14, which in turn is connected with the chimney opening 15 controlled by the damper 16 pivoted on the pivot 17 and actuated by weight 18 on the chain 19 passing over the pulley 20, the weight normally holding the damper against the stop 21.

On the bottom of the flue pipes 13 we cast flue pipe fins 22, 22 (Fig. 4). Each pair of these fins form an air passage 23 which connects with the smoke box 14 (Fig. 5).

The wet char is thrown into the hopper 24 (Fig. 4) of the char dryer 11 and falls by gravity between the different flue pipes 13, 13 which separates and at the same time heats it, changing its moisture into vapors. These vapors are withdrawn at different zones or levels of the drying char by passing into the air passages 23, 23 which are connected at different levels with the smoke box 14, so that the draft of the stack or chimney will evacuate these air passages 23, 23 and remove the vapors, thereby preventing them passing up through cooler portions of the drying char which would condense them. The angle of repose of the slowly moving char, after passing the flue pipe fins 22, 22 will, of course, form V shape openings in the char which will supplement and add to the area of the air passages 23, 23.

In addition to the means just described of withdrawing the vapors through the air passages 23, 23 formed by the flue pipe fins 22, 22 we preferably, though not necessarily, admit external dry air into the body of the drying char, preferably at different levels, or zones, so that the dry air may work through different portions of the zones of the drying char and be removed, after taking up the vapors driven off in the act of drying. This external air being then passed, in any suitable manner, to the smoke box without passing upward through the mass of drying char, where the cooler sections, portions or zones would condense the moisture or vapor. This may be done in various ways. This external air may be heated or not as desired. If desired, it may be heated by waste heat from the char coolers.

In the drawings we have shown a plurality of pipes 30 resting upon supports 31, 31. These pipes 30, 30 for most of their length are slotted or open at the bottom. One end 32, however, is closed where it passes through the vertical flue 12 (Fig. 5) and

through the face plate 33. These ends 32, 32 are open to the atmosphere and are closed by pivoted doors 34, 34 (Figs. 3 and 5) which are preferably connected together by a rod 35 pivoted to each door at 36 so that the movement of the rod will open and close all the control doors 34, 34. This rod may be held in any desired position by pin 37 (Fig. 3) mounted in any one of the holes 38, 38 (Fig. 5) so as to cooperate with the lug 39 on the face plate 33 (Figs. 3 and 5).

It is obvious that by grasping the handle 40 of the rod 35 and raising and lowering it the different doors 34, 34 will be operated simultaneously and that they will be held in any desired adjusted position by placing the adjustable pin 37 into a particular hole 38 of the rod 35 to control the rate of flow of the external dry air through the pipes 30, 30. Of course, any other suitable manner of adjusting the doors may be employed. The other end of these pipes 30, 30 are supported by the plate 41 (Fig. 5) of the dryer 11, but they do not connect with the smoke box 14.

It will, therefore, be clear that by operating the handle 40 of the rod 35 more or less external dry air will be permitted to flow into different levels or zones of the drying char in the dryer 11, the air passing out through the open bottom of the pipes 30, 30 thence through a portion of the drying char and into one of the adjacent air passages 23, and through such passage 23 to the smoke box 14, and thence to the chimney opening 15 and the stack.

As this external dry air passes through the different zones of the drying char it will absorb more or less of the vapors given off by the char, and, of course, in varying degrees dependent on the rate of flow and the particular zone. Ordinarily the draft of the chimney will be sufficient to insure a positive circulation of the external air through these pipes 30, 30 and thence to the smoke box 14 and the chimney opening 15 through the air passages 23, 23 in the manner previously described. However, a forced draft may be used if desired.

To permit additional external air to be drawn through the charge of the drying char, we may use one or more louvres 45 arranged along the sides of the dryer box in addition to the open pipe 30 to permit additional external air to be admitted to the char along the outside of the dryer.

After the wet char has passed through our char dryer 11, it is substantially dry and free of moisture. It then passes by gravity through the openings 48 (Fig. 1) onto the inclined chute 49 where it will fall through the openings 50 and 51 into the different retorts 5, 5 where it is subjected to a higher temperature than in the dryer to remove the last trace of moisture and organic impurities so that when it emerges from these retorts 5, 5 the

char is completely revived and ready to be again used in the manufacture of sugar.

The dryer is provided with a plurality of cleaning doors 46, 46. In the char kiln 2 we preferably mount dampers 47, 47 in the flues 6 and 7.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What we claim is:—

1. A predrier for a char revivifying apparatus including in combination a chamber, means for feeding char downwardly there-through, a plurality of spaced apart heating flues adapted to divide the downwardly travelling char into a plurality of thin streams, fins extending from said heating flues to define passages for air currents, and means for passing external air through the chamber in intimate contact with the char for the purpose of removing the evaporated moisture and gaseous impurities.

2. A predrier for a char revivifying apparatus including in combination a chamber, a chimney communicating with the heating means at the rear of the chamber, air channels between the levels of heating means communicating with the chimney, means at the front of the chamber for admitting atmospheric air into each channel whereby currents of fresh air pass through the chamber in direct contact with the char at each level to carry away the vapors and prevent their movement to different levels and additional air openings along the sides of the chamber communicating with said air channels.

In testimony whereof, we have signed our names to this specification.

JAMES HAMILL.

JOHN FREDRICK TADDIKEN.