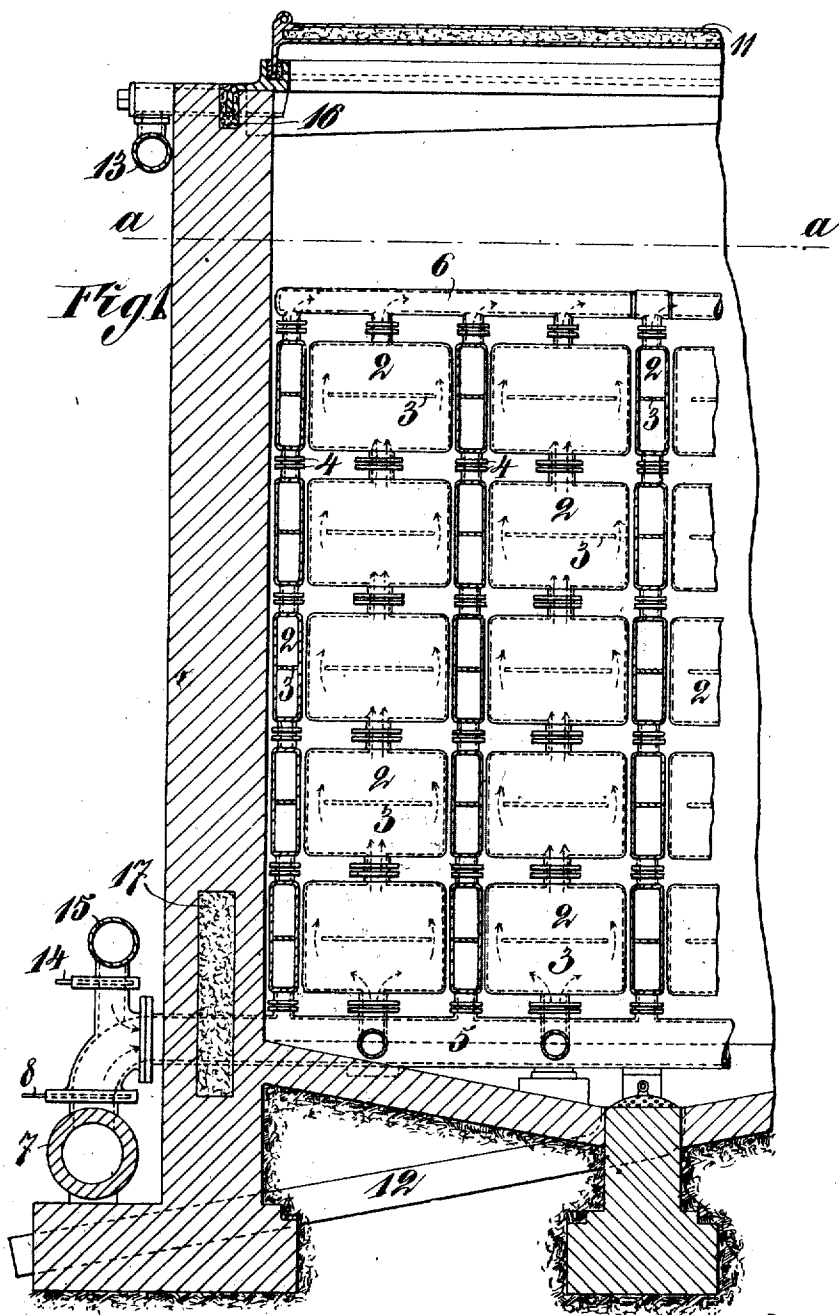


C. J. R. MÜLLER.
FURNACE FOR CHARRING WOOD, PEAT, AND THE LIKE.

APPLICATION FILED FEB. 4, 1906.

4 SHEETS—SHEET 1.

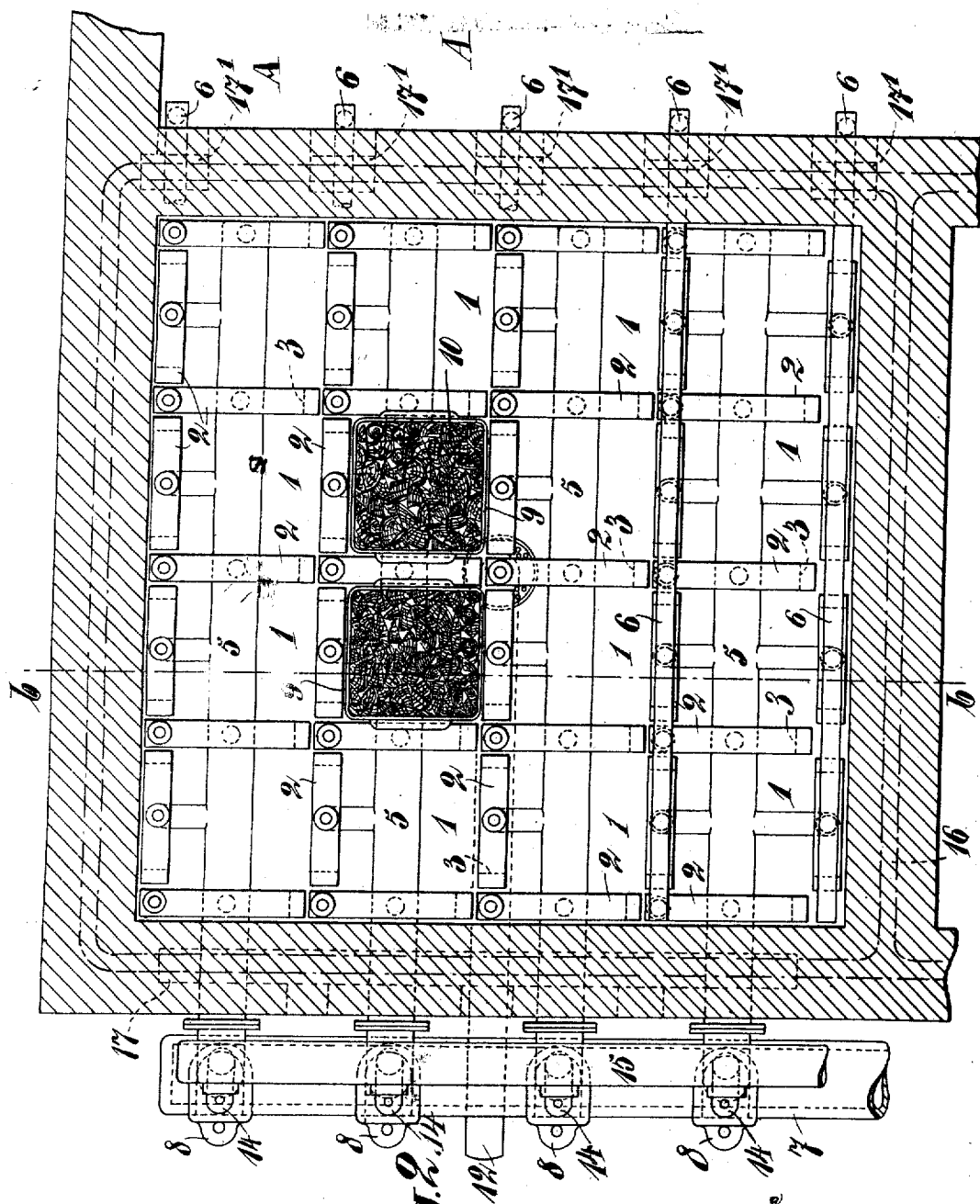


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4 SHEETS—SHEET 2.



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Fig. 2

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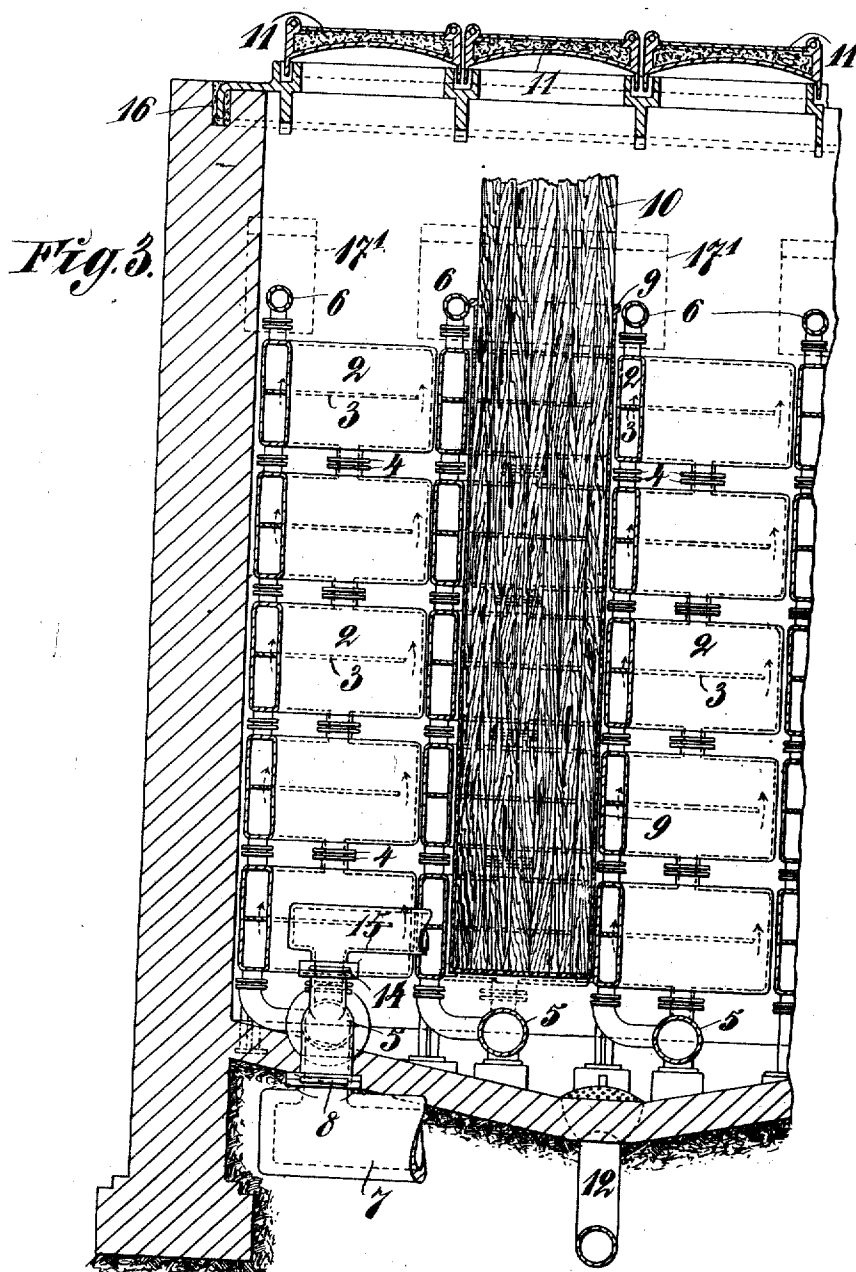
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 5.

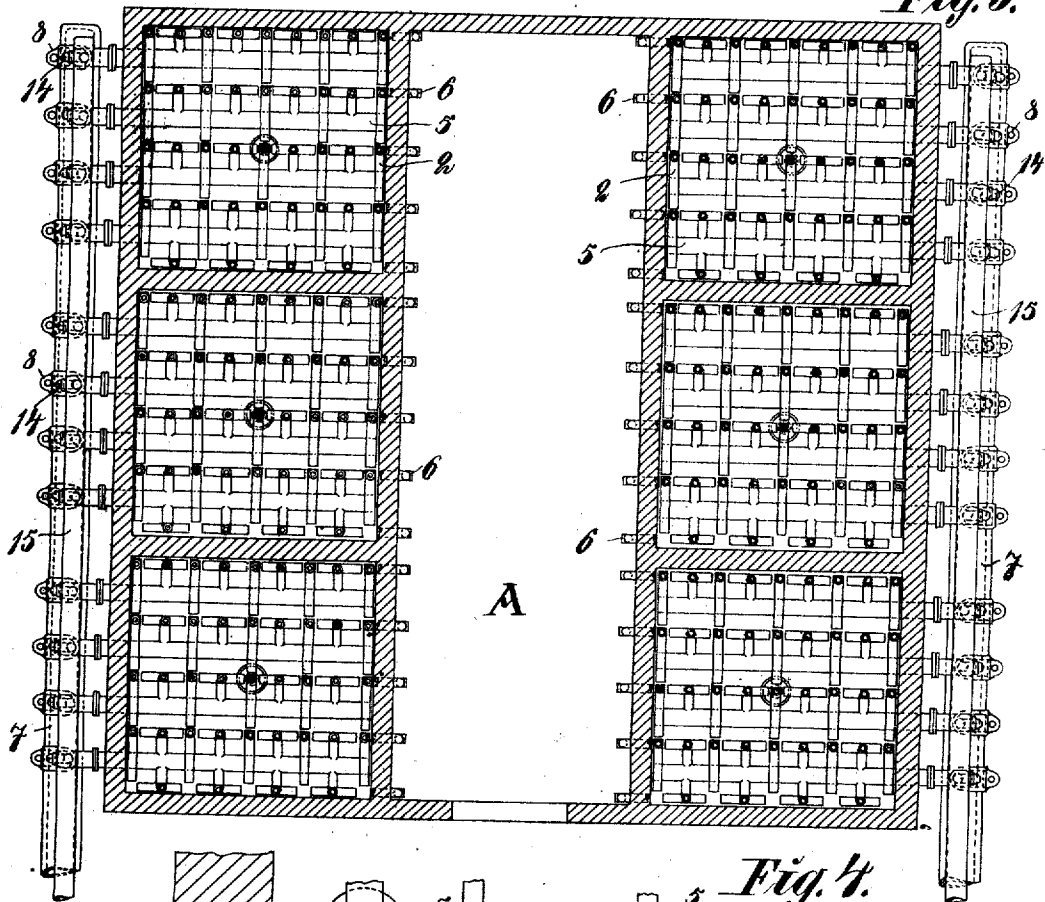
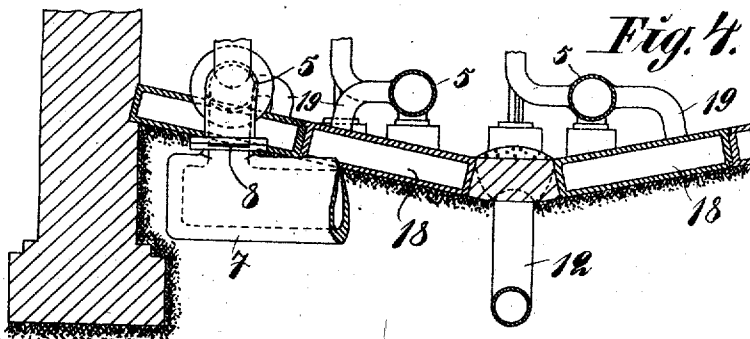


Fig. 4.



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UNITED STATES PATENT OFFICE.

CARL JACOB RUDOLF MÜLLER, OF SUNDBYBERG, SWEDEN.

FURNACE FOR CHARRING WOOD, PEAT, AND THE LIKE.

No. 830,352.

Specification of Letters Patent.

Patented Sept. 4, 1906.

Application filed February 4, 1905. Serial No. 244,130.

To all whom it may concern:

Be it known that I, CARL JACOB RUDOLF MÜLLER, a subject of the German Emperor, and a resident of 9 Rosengatan, Sundbyberg, in the Kingdom of Sweden, have invented certain new and useful Improvements in Furnaces for Charring Wood, Peat, and the like, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its object an improved furnace for charring wood, peat, and similar matters. In the new furnace to be described the material to be charred is kept confined in baskets or receptacles of plaited steel wire, thin perforated sheet metal, or the like, and the charred product can be cooled in the furnace by a suitable cooling medium, so that a subsequent extinguishing of the charcoals in the wet way, which is in many respects inconvenient, need not be performed.

The furnace, which is principally constructed to afford a rapid charring, differs in respect to the types of furnace hitherto employed in the arrangement within the separate charring-chambers of a greater number of compartments, the walls of which consist of a number of heating elements suitably of cast-iron, said elements being connected one with the other to form passages into which the heating medium, suitably hot air under pressure, is led to produce a uniform heating of the compartments and a rapid charring of the material confined therein, said material obviously forming a relatively small quantity in each compartment. By this arrangement a comparatively small charring-chamber can be provided with a great heating-surface, which obviously is of the greatest importance in order to produce a rapid charring. The furnace is further arranged in such a manner that the charred product can be cooled within the furnace by leading a cooling medium into the elements after the supply of the heating medium has been shut off, said elements thus serving during this period of the process as cooling elements.

In the drawings, Figure 1 is a vertical section of one end of a furnace constituting one form of embodiment of the invention. Fig. 2 is a horizontal section on line *a a* of Fig. 1. Fig. 3 is a vertical section on line *b b* of Fig. 2, illustrating a part of the furnace. Fig. 4 is a sectional view showing the hollow sloping bottom adapted to be heated. Fig. 5 is a horizontal section, on a relatively small scale,

of a furnace having six charring-chambers disposed in two parallel rows of three each with a preparatory heating-chamber between the rows.

In the form of embodiment of the invention illustrated the outer brickwork is divided into several charring-chambers, one of which is shown in Fig. 2. In the apparatus illustrated any desired number of equal charring-chambers of this kind are arranged in two rows, between which is formed a preparatory heating-chamber A, the purpose of which is to be described. Every charring-chamber has a bottom leaning toward the middle, said bottom being eventually arranged in such a manner as to allow of being heated to facilitate the running off of the liquid products of distillation—for instance, it may consist of hollow iron plates 18, into which the heating medium is led from the tubes 5 through the tubes 19. Situated above this bottom are the heating-compartments 1, each charring-chamber containing a greater number of such compartments. (Sixteen shown in the drawings.) The walls of these compartments are formed of a suitable number of superposed heating elements 2, consisting, in the form of embodiment illustrated, of rectangular narrow hollow bodies, suitably of cast-iron, the walls of which can be even or corrugated, as desired, and are provided interiorly with a partition 3, having openings at the ends. The heating elements are provided at their lower and upper sides with supply and outlet pipes for the heating medium, said pipes being connected together by flanges or in any other suitable way. As stated, four-by-four walls of this kind placed in the form of a square form a compartment. The lowermost heating element of each wall is connected with distributing-tubes 5, extending from a supply-conduit 7 for the heating medium produced in a suitable generator. From the latter the heating medium thus passes through the conduit 7 and is distributed into the several distributing-tubes 5, from which it enters into the different heating elements 2 and passes same in the directions indicated by the arrows. When the heating medium has passed through all the elements of each wall, and thereby given off the greater part of its heat, it is led through tubes 6 to the preparatory heating-chamber. Placed in the connecting-tubes between the distributing-tubes 5 and the main conduit 7 are registers 8 or other means for shutting off the supply of the

heating medium. The distributing-tubes 5 also communicate with a main supply tube or conduit 15 for a cooling medium that, when the charring has been finished and the registers 8 have been closed, is led into the elements 2 for cooling the charred product while still within the furnace. The supply of the cooling medium can be shut off by registers 14 or other suitable means.

The furnace is closed at the top by removable covers 11, which are suitably made hollow and filled with sand, the lower side of said covers having edges entering into grooves in frames or the like placed at the top of the furnace, said grooves being filled with sand. The frames project into grooves 16 in the upper edge of the brickwork, said grooves being also filled with sand. 17 and 17' are sand stoppings for the distributing and outlet tubes, respectively.

The charring is performed in the following way: suppose the material to be charred consisting of wood ribs. Such a material is known to be better charred in a standing than in a lying position. On account thereof a quantity of wood ribs 10 is filled in a standing position into baskets 9 of plaited steel wire, perforated sheet metal, or the like, which may suitably be performed in a special filling-machine. The length of the ribs is measured in such a way as to be to the depth of the basket approximately as three to two, because the volume of the ribs is reduced during the charring process approximately one-third. The baskets filled with ribs are placed to a number corresponding to the charge necessary for each charring-chamber on special carts on which they are brought into the preparatory heating-chamber A in a standing position through doors or the like. The material is preparatively heated in the chamber A by means of the heating medium issuing from the heating elements 2. From the carts the baskets are lifted, suitably by fours, up to the roof of the preparatory heating-chamber, where they are left while the outmost one of the covers 11 is removed, whereupon the baskets are lowered into the heating-compartments and the cover 11 is replaced, and so on until the whole furnace is filled. Then the heating medium is let on and led through the heating elements. On account of the very great and suitably-disposed heating-surface, and especially on account of the fact that the heat from all four sides penetrates uniformly into each of the small lots into which the whole quantity of wood is divided, the charring is performed very rapidly and uniformly. The charring being finished the registers 8 are shut and the registers 14 are opened, whereby the cooling medium is brought to stream the same way as the heating medium before did, so that the charred product is cooled within the furnace. By this, as before stated, the advantage is

gained that the detrimental and time-wasting subsequent extinguishing with water is avoided. At last the covers 11 are removed one by one, and the baskets, that are now filled with charcoal are raised and loaded on carts which are then carried away.

In using a furnace of the kind described it is not suitable to take care of other by-products than tar, tar-oil, and distillation gases, because the furnace is principally adapted to afford a high outcome of first-rate charcoal with the employment of the shortest possible time of charring. The tar and tar-oil formed drip on the bottoms of the charring-chambers and are led therefrom through a tube 12, suitably of copper. The water-steam formed during the first period of the charring process is led away through a tube 13 and, after a valve having been reversed, the tar-gases and combustible distillation-gases afterward formed are led off through the same tube and caused to pass a cooler from which the non-condensable gases are led in known manner to the source of heat and burned.

Charring peat is performed in a similar way as charring wood, with the only difference that the baskets are introduced empty into the compartments of the charring-chambers and then filled with peat from carts of the same length as the breadth of the charring-chamber, said carts running on rails on the walls of the furnace.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A furnace for the purpose specified, comprising in combination a charring-chamber divided into compartments bounded by heating elements, incombustible-receptacles, for the material to be charred, adapted to be placed within the compartments, means for causing a heating medium to pass through the heating elements, means for shutting off the heating medium, and means for cooling the heating elements, substantially as described.

2. A charring-furnace, comprising in combination a plurality of charring-chambers; each containing a plurality of compartments formed by heating elements, said charring-chambers being arranged in two rows with a preparatory heating-chamber located between the said two rows of charring-chambers, and means for causing a heating medium to pass through the said elements into the preparatory-heating chamber, substantially as described.

3. A charring-furnace, comprising in combination a plurality of charring-chambers divided into a suitable number of compartments by heating elements connected one with the other so as to form passages for a suitable heating medium, distributing-tubes for leading the heating medium to the passages formed by the heating elements, a sup-

ply-conduit for the heating medium connected with the distributing-tubes, means for shutting off the supply of the heating medium, a supply-conduit for a cooling medium, and
5 means for distributing the cooling medium to the several heating elements, substantially as described.

4. A charring-furnace, comprising in combination a plurality of charring-chambers,
o each containing a plurality of compartments formed by heating elements, said chambers having bottoms each sloping toward the middle of the chamber, said bottoms being hollow and forming passages for a suitable heating
5 medium, and means for causing the said heating medium to pass through the heating elements and also through said hollow bottoms, substantially as described.

5. A furnace for the purpose specified, having a charring-chamber divided into compartments by hollow heating elements, receptacles to be placed within said compartments,
20 said receptacles to contain the material to be charred and being of refractory material, means for causing a heating fluid to pass
25 through the hollows of said heating elements, means for controlling the flow of the heating medium, and means for cooling said heating elements, substantially as described.

In witness whereof I have hereunto signed
30 my name in the presence of two subscribing witnesses.

CARL JACOB RUDOLF MÜLLER.

Witnesses:

AUG. SORESENSEN,
AXEL EHRLICKE.