

No. 708,898.

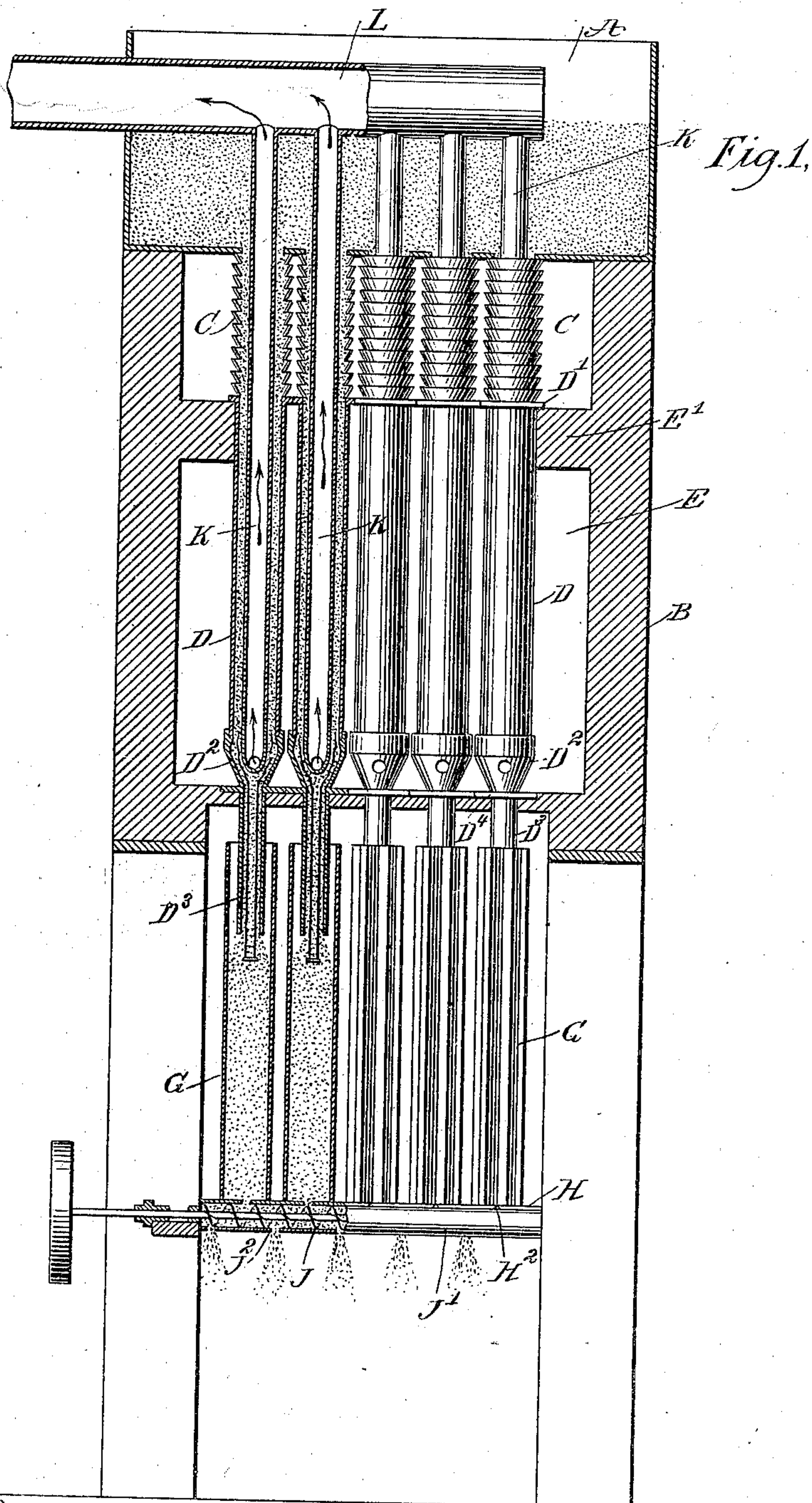
Patented Sept. 9, 1902.

W. T. MOHR.
BONE BLACK KILN.

(Application filed May 9, 1902.)

(No Model.)

3 Sheets—Sheet 1.



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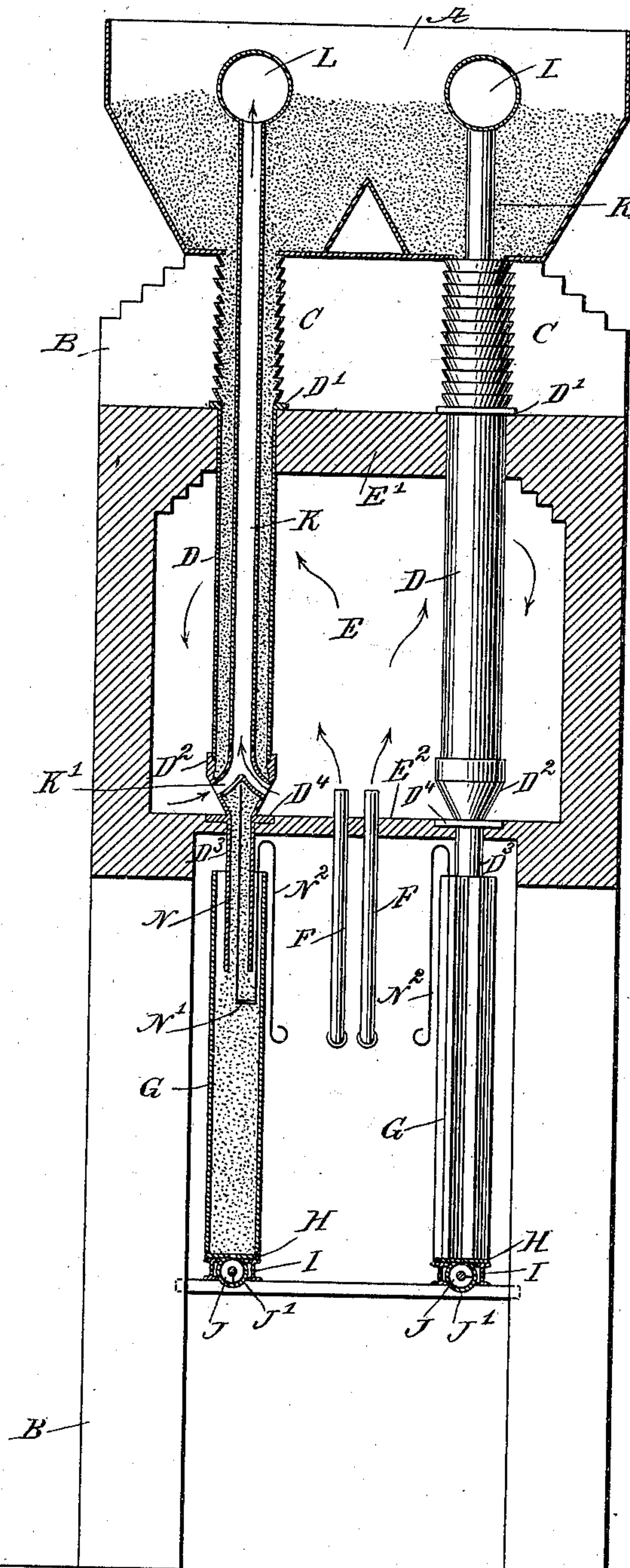


Fig. 2.

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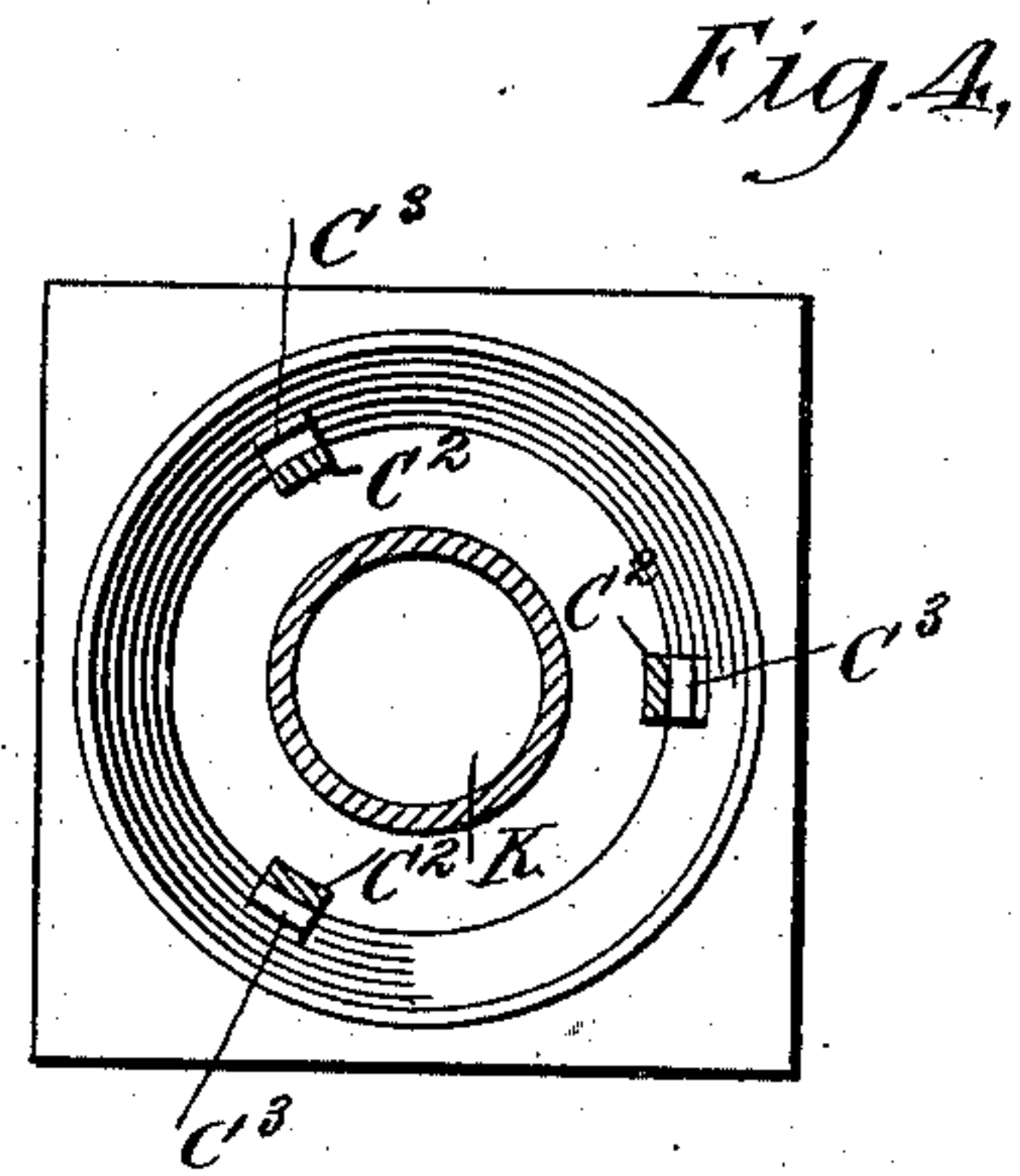
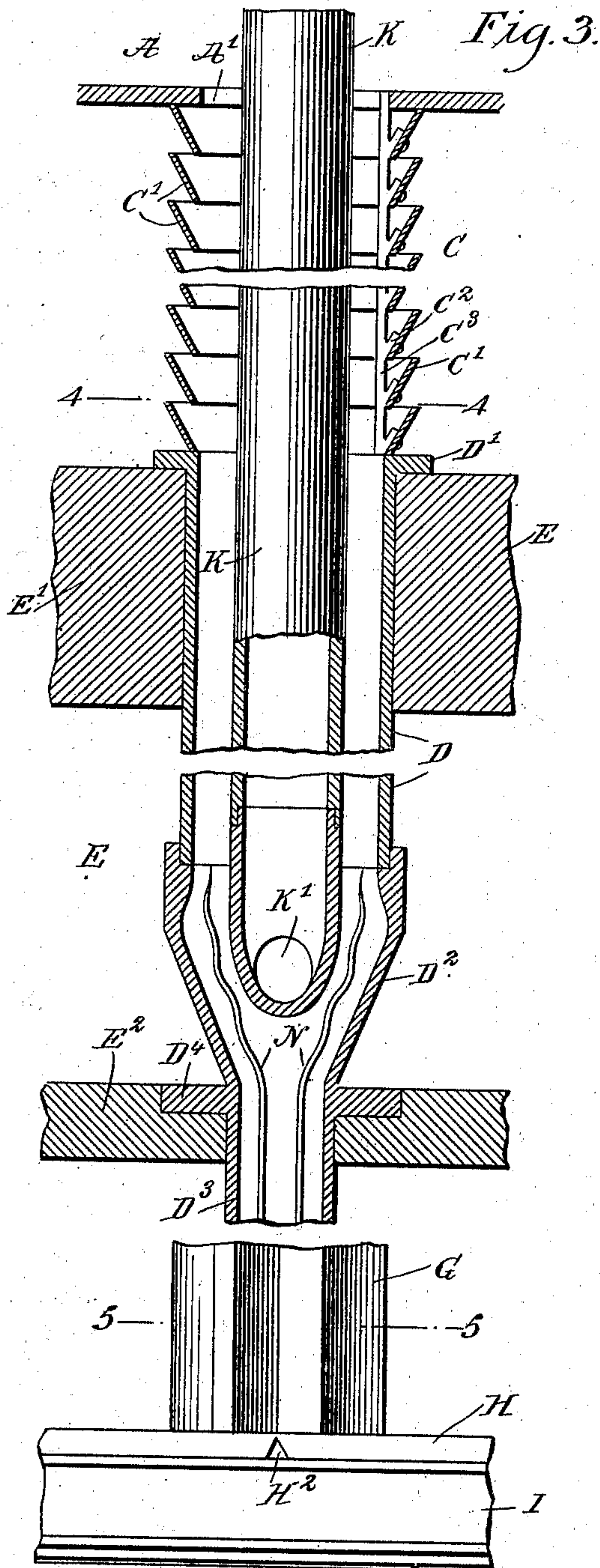


Fig. 5.

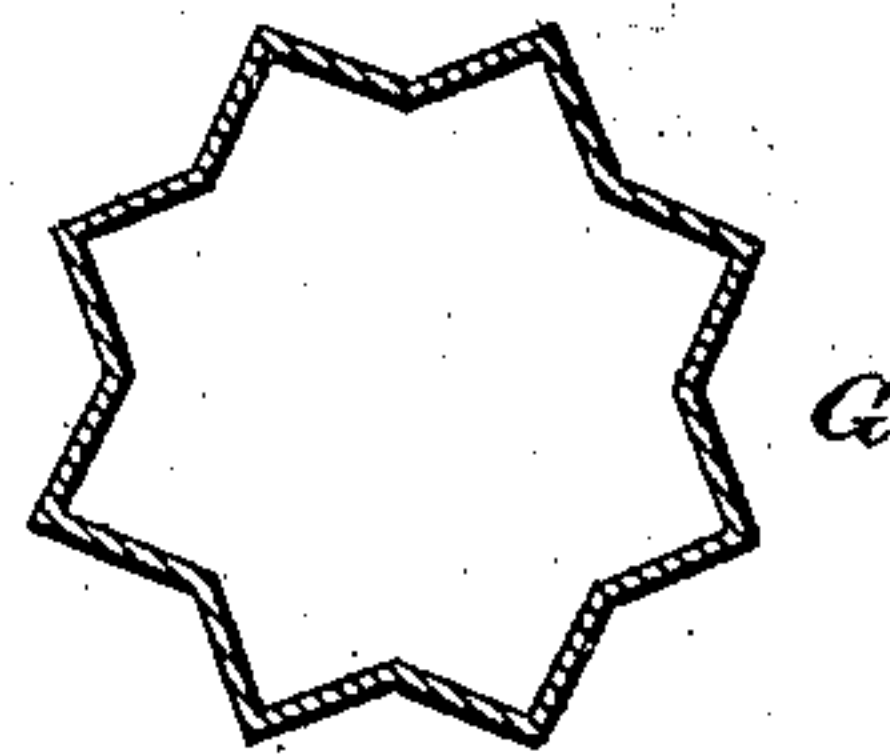
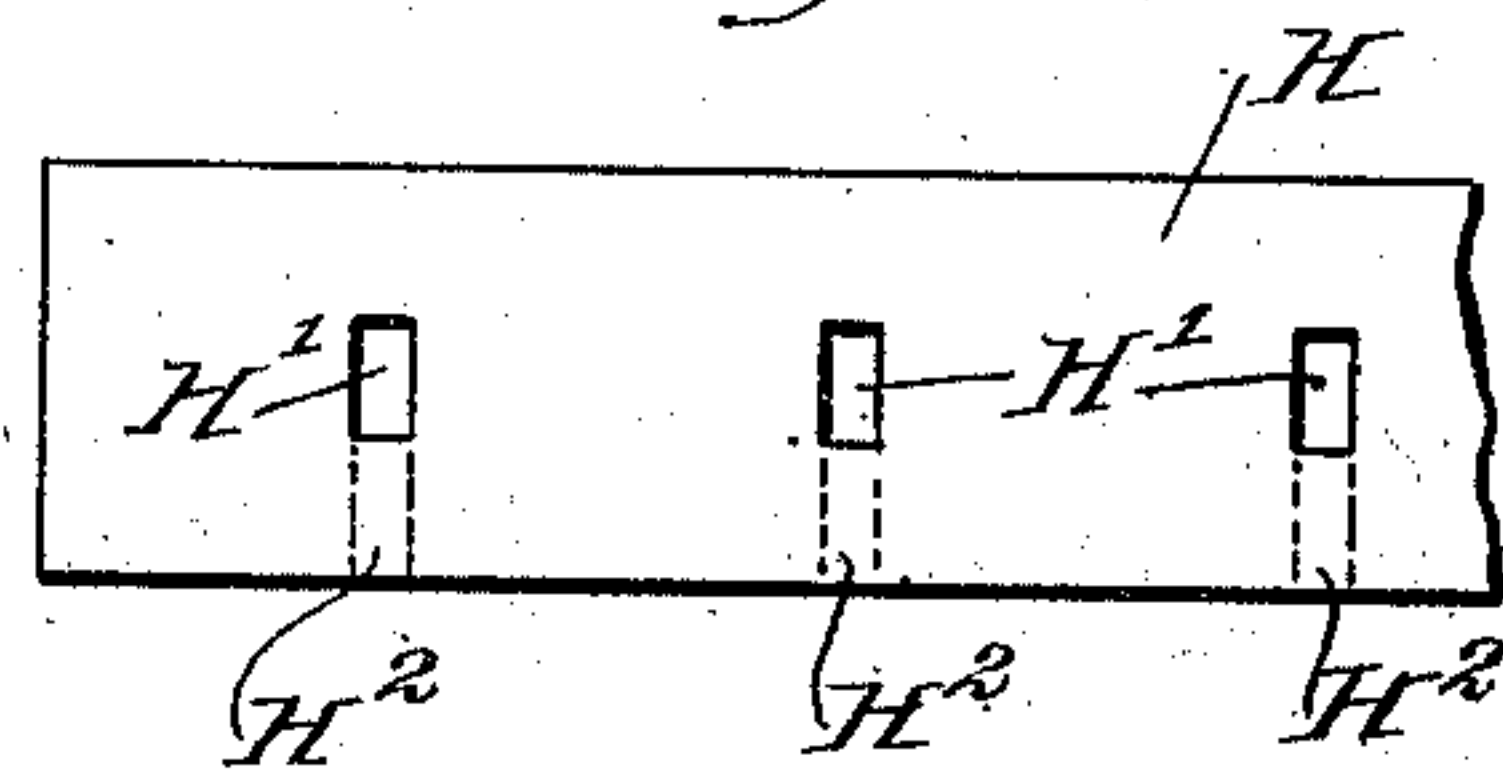


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM THEODORE MOHR, OF GLADERUN, PENNSYLVANIA.

BONE-BLACK KILN.

SPECIFICATION forming part of Letters Patent No. 708,898, dated September 9, 1902.

Application filed May 9, 1902. Serial No. 106,522. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM THEODORE MOHR, a citizen of the United States, and a resident of Gladerun, in the county of Warren and State of Pennsylvania, have invented a new and Improved Kiln, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved kiln more especially designed for drying, revivifying, and decarbonizing bone-black, fullers' earth, and like materials which is simple and durable in construction, not liable to easily get out of order, and arranged to relieve the material under treatment of all gases and moisture previous to its entrance into the revivifying-retorts and to insure the manufacture of a high grade of bone-black, fullers' earth, and the like ready for efficient use in the purifying of sugar, petroleum-oils, and the like.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement, parts being in elevation. Fig. 2 is a transverse section of the same. Fig. 3 is an enlarged sectional side elevation of the improvement, parts being in elevation. Fig. 4 is a sectional plan view of one of the driers, the section being on the line 4 4 of Fig. 3. Fig. 5 is a sectional plan view of one of the coolers, the section being on the line 5 5 of Fig. 3; and Fig. 6 is a plan view of the supporting-plate for the coolers.

The material to be treated is placed in a hopper A, supported on the top of a suitable frame or structure B, of brick, masonry, or the like, the said hopper discharging into one, two, or more rows of upright driers C, through which gravitates the material from the hopper A into retorts D, likewise arranged in rows and disposed vertically and extending through the top E' and the bottom E² of a heating-chamber E, formed in or constructed on the structure B, as plainly illustrated in the drawings. The interior of the heating-cham-

ber E is heated by suitable means—such as burning gas, for instance—introduced into the chamber by suitable burners F, as indicated in Fig. 2.

Each of the retorts D is preferably made in the form of a tube having its upper end formed with a flange D', resting on the upper face of the top E', so as to support the tube, the lower end of the latter being set into a head D², formed with a discharge-spout D³, extending through the bottom E² and having a flange D⁴ resting in a recess formed in the said bottom E².

Each of the driers C is formed of superimposed and spaced rings C', each in the form of an inverted frustum of a cone, attached to branches C² of rods C³, extending vertically and resting at their lower ends on the flanges D' and engaging at their upper ends the walls of the openings A' formed in the bottom of the hopper A, and through which openings A' material gravitates from the hopper into the driers. The driers extend through an open space between the upper surface of the top E' of the heating-chamber and the under side of the hopper A, so that the moisture and gases passing out of the material gravitating down through the driers can escape between adjacent rings C' into the said open space, and thus into the open air, without danger of any of the material passing out of the space between adjacent rings C'. (See Fig. 3.) It is understood that the apex end of one ring C' opens into the base end of the ring next below, so that sufficient space is formed between successive rings to allow the free escape of the moisture and gases from the material into the open air.

The spout D³ of each retort E opens into a tubular cooler G, preferably in the form of a star or polygonal figure, as indicated in Fig. 5, so as to produce as much cooling-surface as possible. Each of the coolers G rests at its lower open end on a supporting-plate H, carried by beams I, supported in the structure B, and the said supporting-plate H is provided with openings H', each leading centrally to a cooler G and all opening into the conveyer-casing J' of a spiral horizontal conveyer J of any approved construction. In the bottom of the conveyer-casing J' are formed openings J², located about midway between

adjacent coolers G, so that when the conveyer is set in motion the material passing from a cooler G into the conveyer-casing J' is moved by the conveyer J in a longitudinal direction to finally discharge the finished material through an opening J² into a suitable receptacle placed below the conveyer. The coolers G are arranged in an open space formed in the structure B, so as to allow free circulation of air to cool the coolers and the material passing down through the same.

The heat from the closed heating-chamber E is conducted through inlets K' into a flue K, extending centrally through each retort D, the corresponding drier C, and the opening A' into the hopper A to connect therein with a chimney-flue L for conducting the heat to a chimney. The inlets K' for each flue K are preferably in the form of double branch pipe extending through openings in the side walls of the head D² of the corresponding retort D, so that the heat in the heating-chamber E can pass into the said branches of the inlet K' to finally reach the flue K to rise therein, so that the material passing down through the retort between the wall of the latter and the wall of the flue K is heated both from the outside and the inside to insure a perfect revivifying and decarbonizing of the material during its passage through the retort D. As the flue K also extends through the material in the corresponding drier C, it is evident that part of the heat is utilized to heat the material in the driers to cause evaporation of any moisture in the material, also causing discharge of any gases in the material preparatory to the material passing into the retort D. The initial heating is given to the material in the hopper A, as the upper ends of the flues K extend into the hopper to reach the chimney-flues L. The material finally passes through the spouts D³ and through the coolers G, in which the material is cooled to the desired degree and from which the material is finally removed by the conveyers J and discharged into suitable receptacles, as previously explained, it being understood that the conveyers form a drawing device for drawing the material from the coolers. In case the material becomes clogged in the head D² by forming lumps and the like it is necessary to break such lumps, and for this purpose I provide an agitating device, consisting of a plurality of rods N, having pointed corrugated ends extending in the heads D², as plainly shown in Fig. 3, the rods passing down through the spouts D³ into the corresponding coolers G to connect by a cross-piece N' with a U-shaped handle N², extending through the open upper end of the corresponding cooler G to the outside thereof to be within convenient reach of the operator. Now by the latter moving the handle N² up and down a like movement is given to the rods N, so that the pointed ends thereof readily break up the lump material, thus insuring free flow of the material from the re-

tort through the spout D³ into the corresponding cooler G.

The flanges D' of the retorts fit one against the other, so as to keep the retorts spaced apart for the free circulation of the heat around the same and close the upper ends of the slot in the top E', through which slot extend the upper ends of the retorts, as will be seen by reference to Fig. 1.

In order to prevent clogging of the material between a cooler G and the opening H' in the supporting-plate II, I provide the latter with transverse openings II² (see Figs. 3 and 6) for the insertion of a pin or rod to reduce the material, so as to insure its ready flow through the opening II into the conveyer-casing.

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

1. An apparatus of the class described, comprising a heating-chamber, an upright retort extending through the heating-chamber and through which gravitates the material to be treated, and a vertical flue extending through the retort and opening at its lower end into the heating-chamber, to form an escape for the heat from the heating-chamber, as set forth.

2. An apparatus of the class described, comprising a heating-chamber, an upright retort extending through the heating-chamber and through which gravitates the material to be treated, a flue extending vertically through the retort and opening at its lower end into the heating-chamber, to form an escape for the heat from the heating-chamber, and a drier for feeding the material into the upper end of the retort and through which the said flue also extends, the drier having means for the escape of gas and moisture from the material gravitating through the drier in its passage to the retort, as set forth.

3. An apparatus of the class described, comprising a heating-chamber, an upright retort extending through the heating-chamber and through which gravitates the material to be treated, and a drier through which the material passes to the retort, the said drier being formed of superimposed spaced sections, each in the form of an inverted frustum of a cone, the apex end of one section opening into the base end of the section below to allow the material to gravitate through the drier in its passage to the retort, and allow the moisture to escape through the spaces between adjacent sections, as set forth.

4. An apparatus of the class described, comprising a heating-chamber, an upright retort extending through the heating-chamber and through which gravitates the material to be treated, a flue forming the escape for the heat from the heating-chamber and extending vertically through the retort, and a drier, through which gravitates the material in its passage to the retort, the said drier being formed of superimposed sections, spaced apart, to allow escape of moisture and gas from the material

to the spaces between adjacent sections, the said flue also extending vertically through the said drier, as set forth.

5. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a closed heating-chamber through which extends the said retort in a vertical direction, and a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber, as set forth.

6. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a closed heating-chamber through which extends the said retort in a vertical direction, and a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber at or near the bottom thereof, as set forth.

7. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a closed heating-chamber through which extends the said retort in a vertical direction, a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber, and a tubular cooler below the heating-chamber, into which discharges the discharge-spout of the said retort, as set forth.

8. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a closed heating-chamber through which extends the said retort in a vertical direction, a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber, a tubular cooler below the heating-chamber, into which discharges the discharge-spout of the said retort, and a conveyer into which discharges the lower end of the said cooler, as set forth.

9. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a

closed heating-chamber through which extends the said retort in a vertical direction, a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber, a tubular cooler below the heating-chamber, into which discharges the discharge-spout of the said retort, and a conveyer into which discharges the lower end of the said cooler, the conveyer having an apertured top and an apertured bottom, as set forth.

10. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, disposed vertically and composed of superimposed spaced sections, to form escapes for the moisture and gas, a retort into which passes the lower end of the drier, a closed heating-chamber through which extends the said retort in a vertical direction, a flue extending centrally through the said retort into the said hopper, to connect with a chimney-flue therein, the lower end of the flue opening into the heating-chamber, a tubular cooler below the heating-chamber, into which discharges the discharge-spout of the said retort, and an agitating device extending into the said spout and through the open end of the cooler to the outside thereof, as set forth.

11. An apparatus of the class described, provided with a drier formed of superimposed spaced ring-sections, each in the form of an inverted frustum of a cone, and vertically-arranged rods having branches inclined outwardly and upwardly and on which the said sections are secured, as set forth.

12. An apparatus of the class described, provided with a closed heating-chamber, a retort extending vertically through the same, and a vertical flue extending centrally through the said retort and having an inlet at its lower end opening through the wall of the retort into the heating-chamber, to form an escape for the heat from the heating-chamber, as set forth.

13. An apparatus of the class described provided with a tubular cooler into which passes the material, a supporting-plate on which the lower open end of said cooler rests, and having an opening for the passage of the material and a conveyer having a casing and into which leads the said opening, the bottom of the conveyer-casing being provided with a discharge-opening, the said supporting-plate having a transverse opening leading to the opening for the passage of the material, as set forth.

14. An apparatus of the class described, provided with a tubular cooler, polygonal in cross-section and into which passes the material, a supporting-plate for carrying the said cooler and having an opening for the passage of the material, and a conveyer below the said supporting-plate, into which leads the said opening, the conveyer having the bottom of its casing formed with a discharge-opening, as set forth.

15. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, a retort into which opens the lower end of the drier, the said retort
5 having a head at its lower end provided with a discharge-spout, a closed heating-chamber through which extends the said retort, and a flue extending centrally through said retort into the hopper and connected with a chim-
10 ney-flue therein, the lower end of the flue having inlets comprising branch pipes leading to openings in the side wall of the said head of the retort and communicating with the heating-chamber, as set forth.

15 16. An apparatus of the class described, comprising a hopper, a drier into which discharges the hopper, and arranged to permit of the escape of gas and moisture from the material, a retort with which the lower end
20 of the drier communicates, the said retort being provided with a head at its lower end provided with a discharge-spout, a heating-chamber through which extends the said retort, a flue extending centrally through the

retort and drier into the hopper and connect- 25
ed with an outlet-flue therein, the lower end of the flue having branch inlet-pipes leading to openings in the side walls of the head of the retort, and a cooler below the heating-chamber into which extends the discharge- 30
spout of the head of the retort, as set forth.

17. An apparatus of the class described, comprising a heating-chamber, a retort extending vertically through the heating-chamber and provided with a head at its lower end 35
having a discharge-spout, a flue extending centrally through the retort and opening at its lower end into the heating-chamber and an agitating device extending through the discharge-spout of the retort into the head, as 40
set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM THEODORE MOHR.

Witnesses:

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H. A. MAHAFFY.