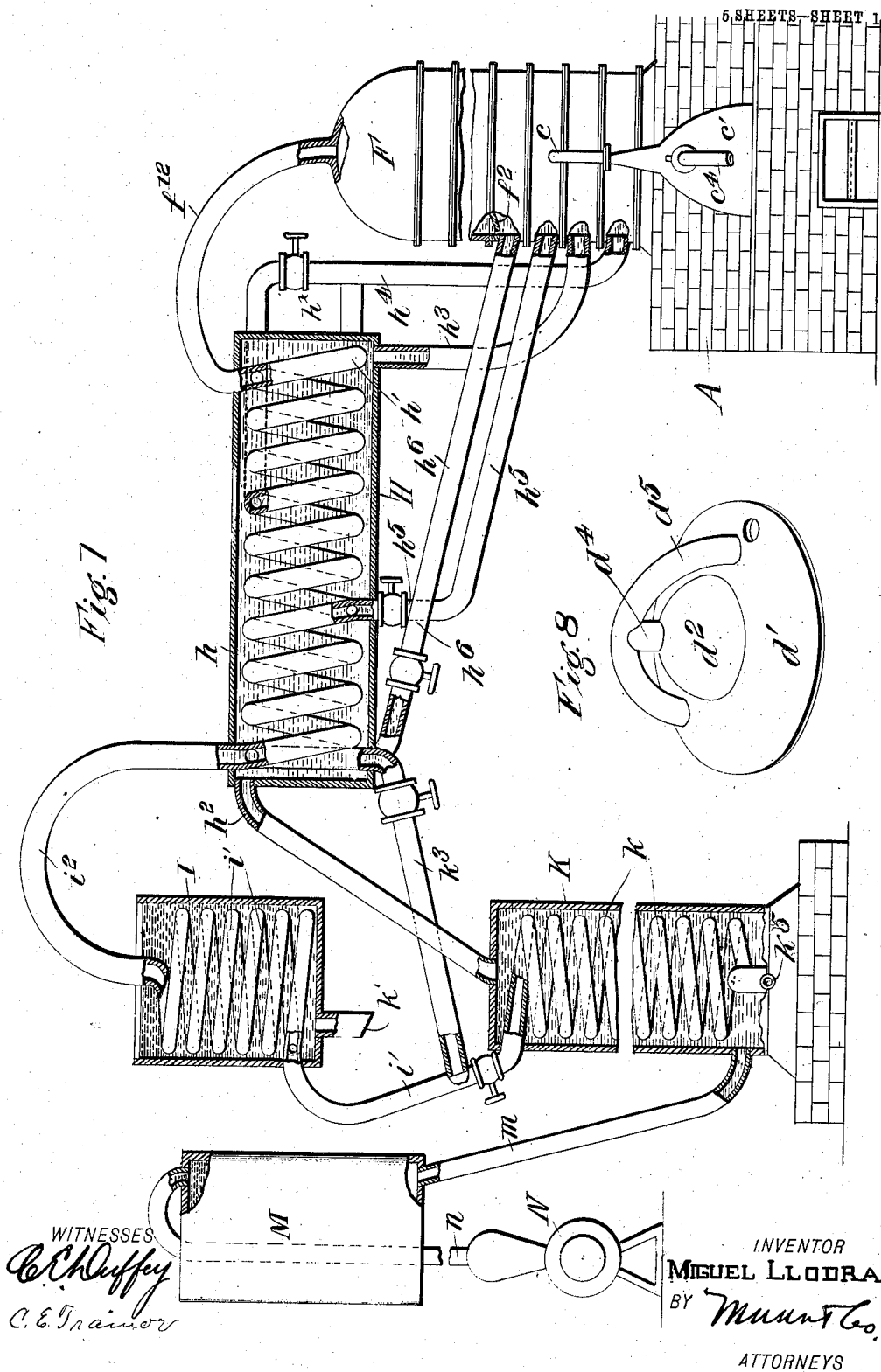


No. 858,346.

PATENTED JUNE 25, 1907.

M. LLODRA.
DISTILLING APPARATUS.
APPLICATION FILED DEC. 4, 1905.

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No. 858,346.

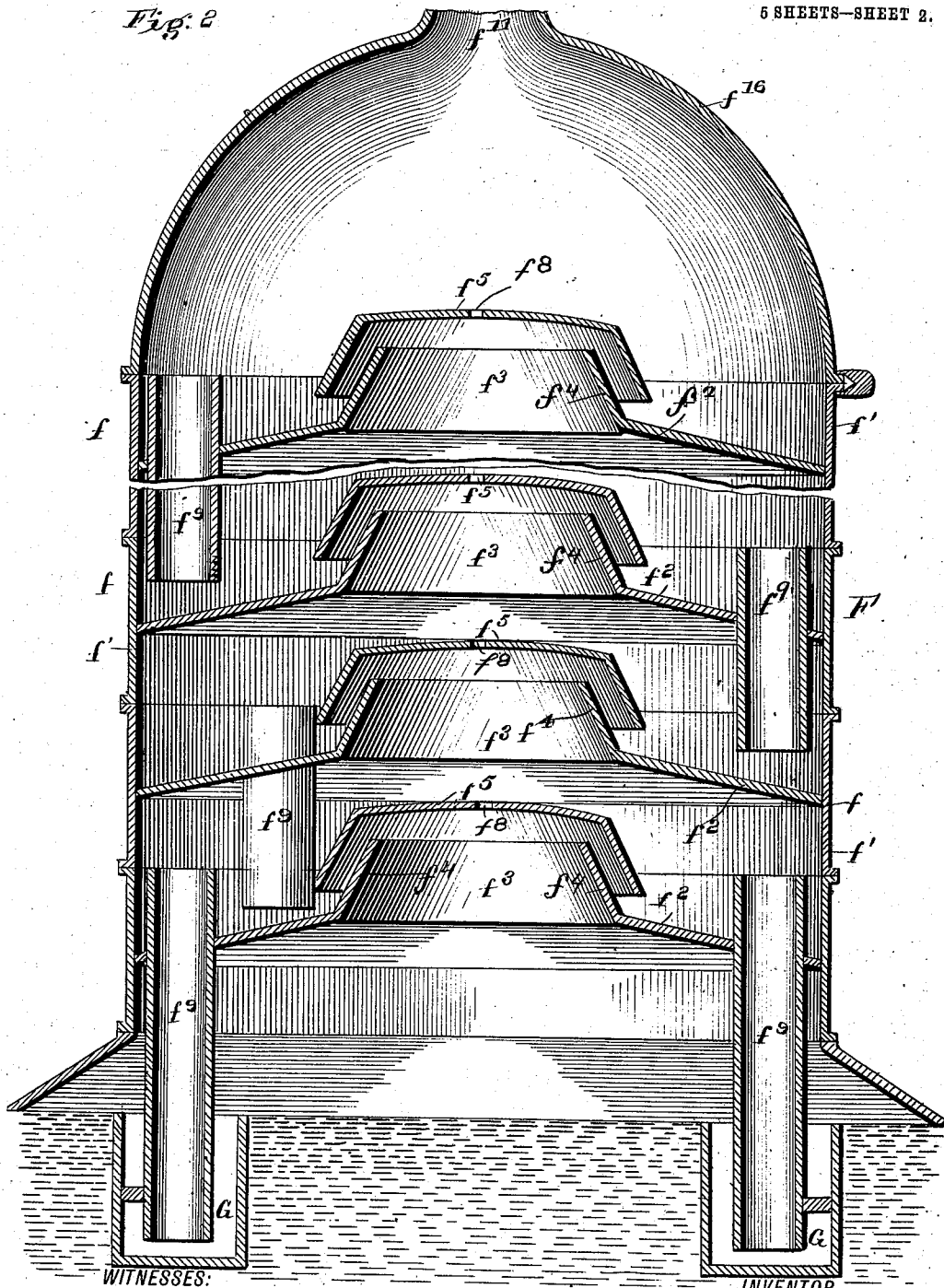
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5 SHEETS—SHEET 2.

Fig. 2



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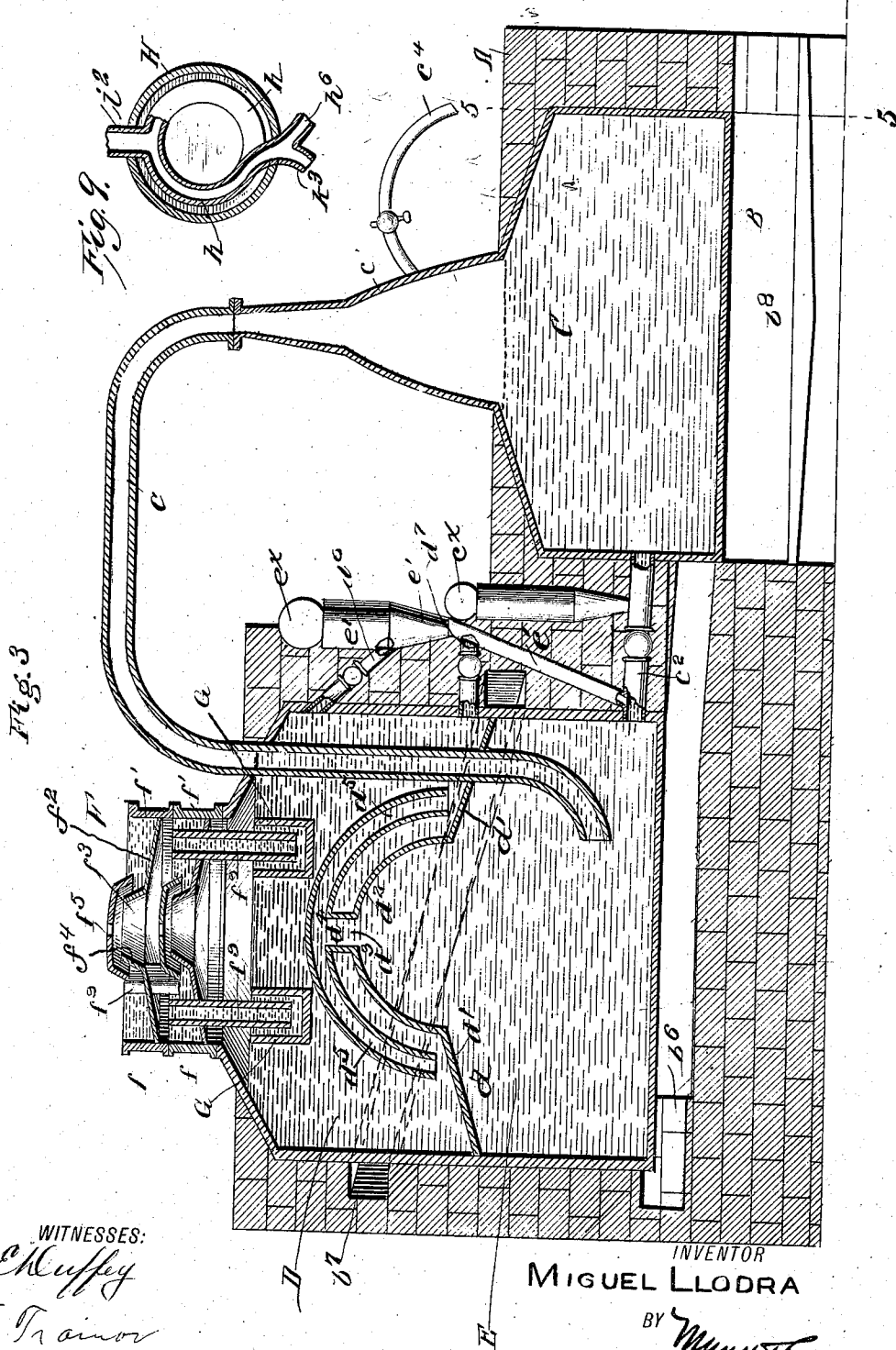
ATTORNEYS

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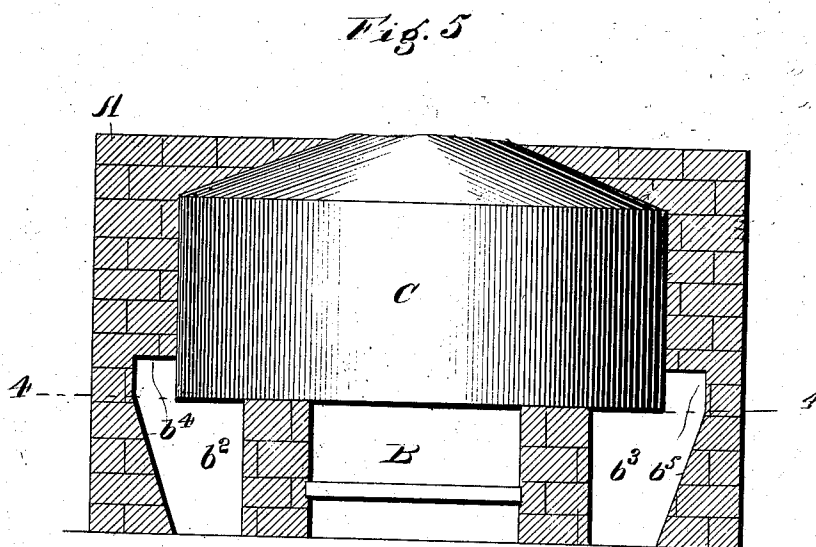
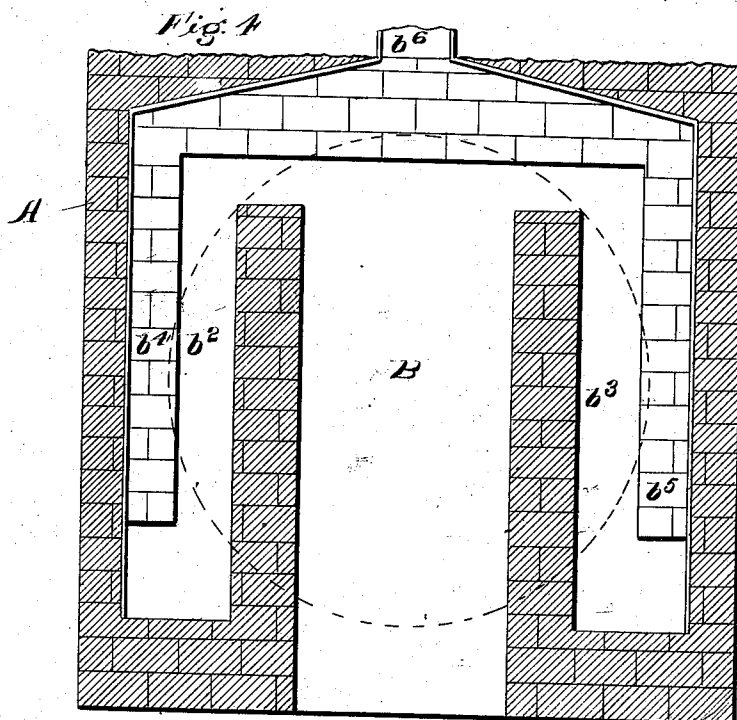


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UNITED STATES PATENT OFFICE.

MIGUEL LLODRA, OF MANILA, PHILIPPINE ISLANDS.

DISTILLING APPARATUS.

No. 858,346.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed December 4, 1905. Serial No. 290,142.

To all whom it may concern:

Be it known that I, MIGUEL LLODRA, a resident of Manila, Philippine Islands, have invented certain new and useful Improvements in Distilling Apparatus, of which, the following is a specification.

My invention is an improvement in distilling apparatus and consists in certain novel constructions and combinations of parts hereinafter described and claimed.

Referring to the drawings forming a part hereof Figure 1 is a diagrammatic view of my distilling apparatus. Fig. 2 is a vertical section through the distilling column. Fig. 3 is a vertical longitudinal section through the furnace and the caldrons. Fig. 4 is a section on the line 4—4 of Fig. 5. Fig. 5 is a section on the line 5—5 of Fig. 3. Fig. 6 is a vertical section through one of the sections of the distilling column. Fig. 7 is a plan view of same. Fig. 8 is a perspective view of the partition between the caldrons, and Fig. 9 is a vertical section through the condensing cylinder.

In the practical application of my invention, I provide a furnace A, comprising a fire box B arranged at one end and extending to approximately the longitudinal center thereof, and at the rear of the furnace are flues b^2 b^3 , which double forward alongside the fire box to a point adjacent to the front thereof, and again double back upon themselves as at b^4 b^5 to the rear of the furnace where they are united to form a single passage b^6 which winds spirally upward within the wall of the rear portion of the furnace as at b^7 , to the chimney. The fire box is provided with grate bars b^8 , dividing it into the fire box proper and the ash chamber.

A caldron C is arranged above the fire box and above the flue portions b^2 b^3 b^4 b^5 , and at the rear thereof is a second caldron comprising an upper portion D and a lower portion E separated from each other by a partition wall d , the second caldron being arranged within the winding of the spiral portion of the flue. The partition d comprises a substantially horizontal portion d' and an arched portion d^2 provided with a centrally arranged aperture d^3 , the edges of the opening being extended upwardly to form a pipe d^4 provided with arched lateral branches d^5 , forming a communication between the lower caldron E and the upper caldron D.

The caldron C is provided with a pipe c leading from the bell c' thereof, upwardly, horizontally, and downwardly into the lower caldron E, and the pipe c^2 having a valve c^x forms a communication between the caldron E and the caldron C adjacent the bases thereof. Arranged in the sides of the caldrons D and E are pipes d^6 , d^7 , communicating with the vertical pipe e' , which in turn communicates with the horizontal pipe c^2 , the pipes d^6 , d^7 , being provided with a suitable valve e^x , whereby to control the flow of liquid through the pipes.

Arranged above the caldron D is a distilling column F composed of a series of sections f , each comprising the outer casing f' , having arranged therein the partition f^2 provided with a central opening f^3 , the edges of the opening being flanged as at f^4 , and supported above the opening, is an inverted basin-shaped hood f^5 having secured at equidistant points on the circumference thereof the legs f^6 , the lower end of the legs being secured to the partition by bolts f^7 . The hood f^5 is provided with a centrally arranged aperture f^8 for a purpose to be hereinafter described, and each of the sections is provided with a pipe f^9 extending above and below the partition and forming a means of communication between the respective sections. The lower section of the distilling column differs in some respects from the remaining sections, in that it is provided with two pipes f^9 , the lower ends of the pipes extending into the caldron D, and arranged below the open ends of the latter pipes are receptacles G for a purpose to be hereinafter described.

The distilling column is provided with a bell-shaped cover f^{10} , having a central aperture f^{11} , communicating with a pipe f^{12} , forming a communication between the distilling column and the worm of the condensing cylinder H.

The condensing cylinder H is arranged adjacent the distilling column, and comprises an outer casing h having arranged therein the spiral worm h' , communicating at one end as before stated with the pipe f^{12} , and at the other end with the pipe i^3 communicating with the spiral worm i in an auxiliary refrigerating tank I, the lower end of the said worm communicating in turn by means of the pipe i' with a third spiral worm k having a discharge pipe k^5 and supported in a refrigerating tank J.

erating column K. The worm h' also communicates with the pipe i' leading from the worm i to the worm k , by means of the valved pipe k^3 , the valve being provided in order
 5 that the pipe k^3 may be closed when it is desired to make use of the auxiliary refrigerating tank I.

A receiving tank M is arranged above and adjacent to the refrigerating column K and
 10 communicates therewith by means of a pipe m . The refrigerating column K communicates with the condensing cylinder H by means of a pipe h^2 , and the condensing cylinder communicates by means of the pipe h^3
 15 with the second section of the distilling column F.

At different points in the worm of the condensing cylinder are arranged valved pipes h^4 , h^5 , h^6 , forming communication between the
 20 sections of the worm and the distilling column F for the purpose of conducting the earlier condensed alcohol back to the distilling column. The auxiliary refrigerating tank I is provided with a discharge pipe k'
 25 and may be filled with cool water by any suitable means. For supplying the wash to the receiving tank M, a force pump N is arranged adjacent thereto and communicates there-
 30 with by means of a pipe n . When the products of distillation are to be passed through the auxiliary refrigerating tank the valve in the pipe k^3 is closed thus constraining the said products to pass through the worm i in the said tank I.

In operation the wash is pumped into the receiving tank, flowing from thence to the refrigerating column K, completely filling the same and surrounding the worm therein. From the refrigerating column the wash
 40 passes upwardly to the condensing cylinder H surrounding the worm therein, and thence to the second section of the distilling column F. The wash is introduced at the second section, since did it enter the lower section it
 45 could not flow readily, because of the ebullition of the alcohol vapor rising from the caldron D immediately below. As the section is filled the wash rises to the level of the mouth of the communicating tubes and
 50 passes downward into the lower section where the process is repeated, and the wash passes through the second series of tubes into the receptacles H, which are for the purpose of preventing the retardation of the flow by
 55 the action of the vapor rising from the caldron. Overflowing the receptacle, wine begins to fill the caldron D the liquid resting upon the partition d . The wine is drawn off from the caldron D by means of pipes d^6 , d^7
 60 into the lower caldron E, and thence through the lower pipe c^2 to the caldron C. Here the wash receives the strongest heat being directly over the fire box, and a considerable quantity of the wash is converted into vapor

passing upward and downward through the
 65 pipe c into the caldron E, whence it passes upward through the liquid therein to the pipe d^4 and by its lateral branches into the caldron D. From the caldron D the vapor passes upwardly through the distilling col-
 70 umn which is ordinarily composed of approximately twenty sections, the vapor being permitted to pass from section to section by means of the apertures in the partition and in the hood. From the distilling column
 75 the vapor passes through the spiral worm in the condensing cylinder where a part of it is condensed and is drawn off through the pipes h^4 , h^5 , h^6 and returned into the distilling column. The vapor of the high proof alcohol
 80 passes from the condensing cylinder to the refrigerating column, where the process of condensation is completed. In making high grade alcohol the vapor is passed from the condensing cylinder to the auxiliary refriger-
 85 ating tank, in which the worm is surrounded by cool water instead of by the wash.

It will be evident from the description, that the wash as it passes through the re-
 90 frigerating column and the condensing cylinder, will condense the vapor from the distilling column, and that the vapor will give up its heat to the incoming wash, thus gradually heating the same during its passage toward the caldron.
 95

The caldron C, is provided with a valved discharge pipe c^4 shown in Fig. 3; it is used in testing in the following manner. Toward the end of the distillation, the valve in the
 100 pipe c^4 is opened and a light is applied to the vapor which issues therefrom, which vapor ignites if it contains alcohol. The process is continued until no alcohol is found in the vapor.

A brace h^x extends between the pipe h^4
 105 and the condensing cylinder.

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

1. In distilling apparatus the combination
 110 with the furnace having a firebox and a spiral flue leading therefrom, of a caldron arranged above the fire box, a caldron arranged behind the fire box and within the winding of the spiral flue, a partition divid-
 115 ing the second caldron into upper and lower communicating sections, a pipe forming a communication from the top of the first caldron to the lower part of the lower section of the second caldron, a distilling column
 120 above the second caldron and comprising a plurality of communicating sections, pipes forming a communication between the lower section of the distilling column and the upper section of the second caldron, receptacles
 125 within the second caldron below the said pipes, a condensing cylinder adjacent to the distilling column and communicating with

the second section thereof, a spiral worm within the condensing cylinder and communicating with the upper section of the distilling column, a refrigerating column adjacent to the condensing cylinder and communicating therewith, a spiral worm therein and communicating with the worm of the condensing cylinder, an auxiliary refrigerating tank adjacent to the refrigerating column and communicating therewith and with the condensing cylinder, a spiral worm within the auxiliary refrigerating tank and communicating with the worms in the refrigerating column and in the condensing cylinder, a receiving tank adjacent the refrigerating column and communicating therewith, and a force pump communicating with the receiving tank.

2. In distilling apparatus the combination with a furnace having a fire box and a spiral flue leading therefrom, of a caldron arranged above the fire box, a caldron arranged behind the fire box and within the winding of the spiral flue, a partition dividing the second caldron into upper and lower communicating sections, a distilling column above the second caldron and comprising a plurality of communicating sections, a condensing cylinder adjacent to the distilling column, a spiral worm within the condensing cylinder, a refrigerating column adjacent the condensing cylinder, a spiral worm therein, a receiving tank adjacent to the refrigerating column, means whereby the wash may be conducted from the receiving tank through the refrigerating column and the condensing cylinder, the distilling column and the caldrons, and whereby vapor may be conducted from the first caldron through the lower section of the second caldron, the upper section thereof, the distilling column and the worm in the condensing cylinder and in the refrigerating column in the order named.

3. In distilling apparatus, the combination with the furnace, a plurality of caldrons arranged within the furnace, a distilling column above one of the caldrons, a condensing cylinder adjacent to the distilling column, a refrigerating tank adjacent to the condensing cylinder, a receiving tank adjacent to the refrigerating column, worms in the condensing cylinder and refrigerating column, and a communication between the receiving tank, refrigerating column, the condensing cylinder, the distilling column and the caldrons, and a communication between the caldrons and the distilling column, and the worms of the condensing cylinder and the refrigerating column.

4. In distilling apparatus and in combination, a furnace provided with a fire box having a spiral flue leading therefrom, a caldron arranged above the fire box, a second caldron arranged behind the fire box and within the

winding of the spiral flue, a partition dividing the second caldron into upper and lower sections, and means whereby the vapor may pass from the first caldron into the lower section of the second caldron and from thence to the upper section of the same.

5. In distilling apparatus and in combination, a furnace having a fire box and a spiral flue leading therefrom, a caldron arranged above the fire box, a second caldron arranged behind the fire box and within the winding of the spiral flue, a partition within the second caldron dividing it into upper and lower sections, means connected with the partition whereby to prevent the flow of wash from the upper to the lower section, and whereby to allow the passage of vapor from the upper to the lower section.

6. In distilling apparatus and in combination, a furnace having a fire box and a spiral flue leading therefrom, a caldron arranged above the fire box, a second caldron arranged behind the fire box within the winding of the spiral flue, means for permitting the passage of wash from the second caldron to the first caldron, and means whereby vapor may pass from the first caldron to the second caldron.

7. In distilling apparatus and in combination, a furnace having a fire box and a spiral flue leading from the fire box, a caldron arranged above the fire box, a second caldron arranged behind the fire box and within the winding of the spiral flue, a partition dividing the second caldron into upper and lower sections, a distilling column arranged upon the second caldron, means for maintaining the wash at a predetermined level in the sections of the distilling column, and means for permitting the passage of vapor from the caldrons to the distilling column.

8. In distilling apparatus and in combination, a furnace, a plurality of caldrons arranged within the furnace, a distilling column connected with one of the caldrons, means for supplying wash to the distilling column, means for maintaining the wash at a predetermined level in the sections of the distilling column, and means for permitting the passage of vapor from the caldron to the distilling column.

9. In distilling apparatus and in combination, a caldron, a second caldron adjacent thereto and comprising upper and lower sections, means for connecting the lower parts of the upper and lower sections with the lower part of the first caldron, and means for connecting the upper part of the first caldron with the lower part of the lower section of the second caldron, and the upper part of the lower section with the lower part of the upper section.

10. In distilling apparatus and in combination, a furnace, a caldron above the furnace, a second caldron behind the furnace

and comprising upper and lower sections, a
distilling column above the second caldron,
a condensing cylinder adjacent to the distil-
ling column, a worm within the condensing
5 cylinder, means for permitting the passage
of wash through the condensing cylinder and
the distilling column to the caldron, means
for permitting the passage of vapor from the
caldron through the distilling column to the
worm of the condensing cylinder, and means 10
whereby the passage of wash may condense
the vapor.

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Witnesses:

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