

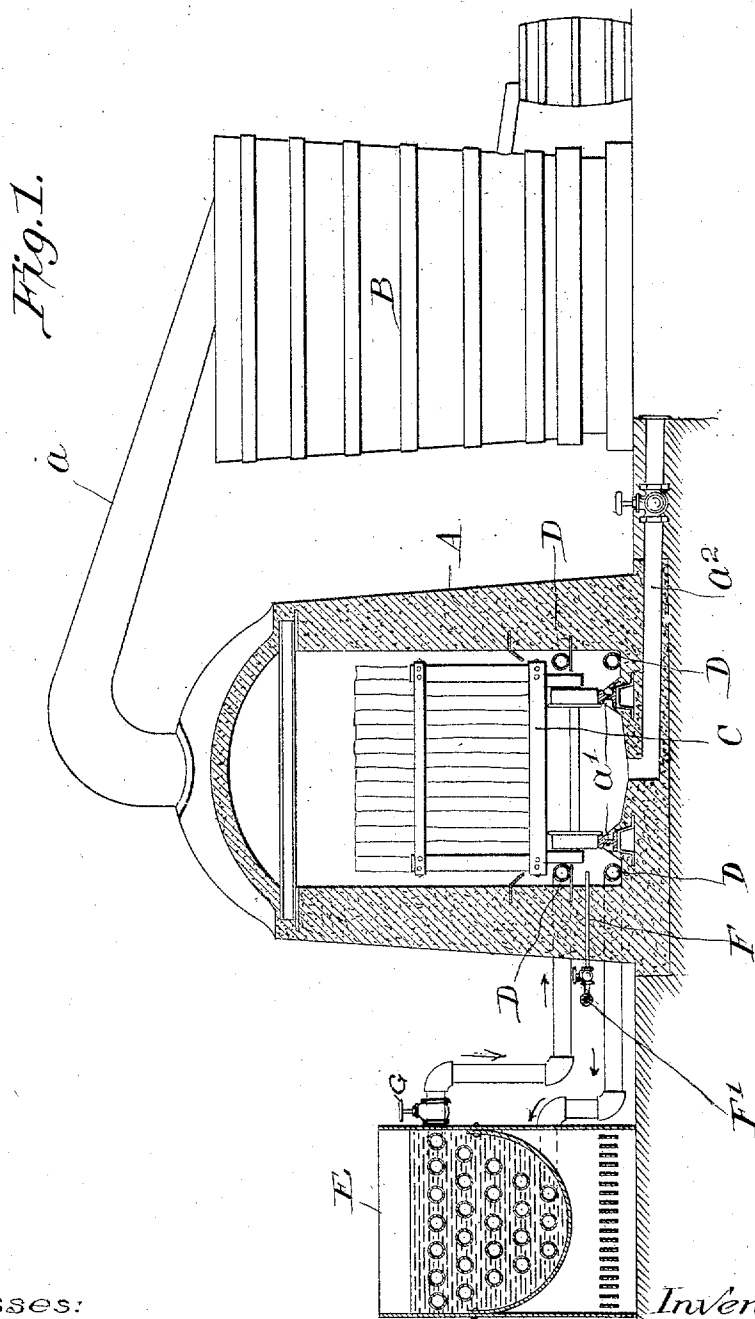
No. 878,785.

PATENTED FEB. 11, 1908.

T. A. DUNGAN.
METHOD OF DISTILLATION.

APPLICATION FILED JULY 20, 1905.

2 SHEETS—SHEET 1.



Witnesses:
Robert H. Wiles
A. M. Cornwall

Inventor:
Thomas A. Dungan,
by Robert Wiles & Sherry
Attys.

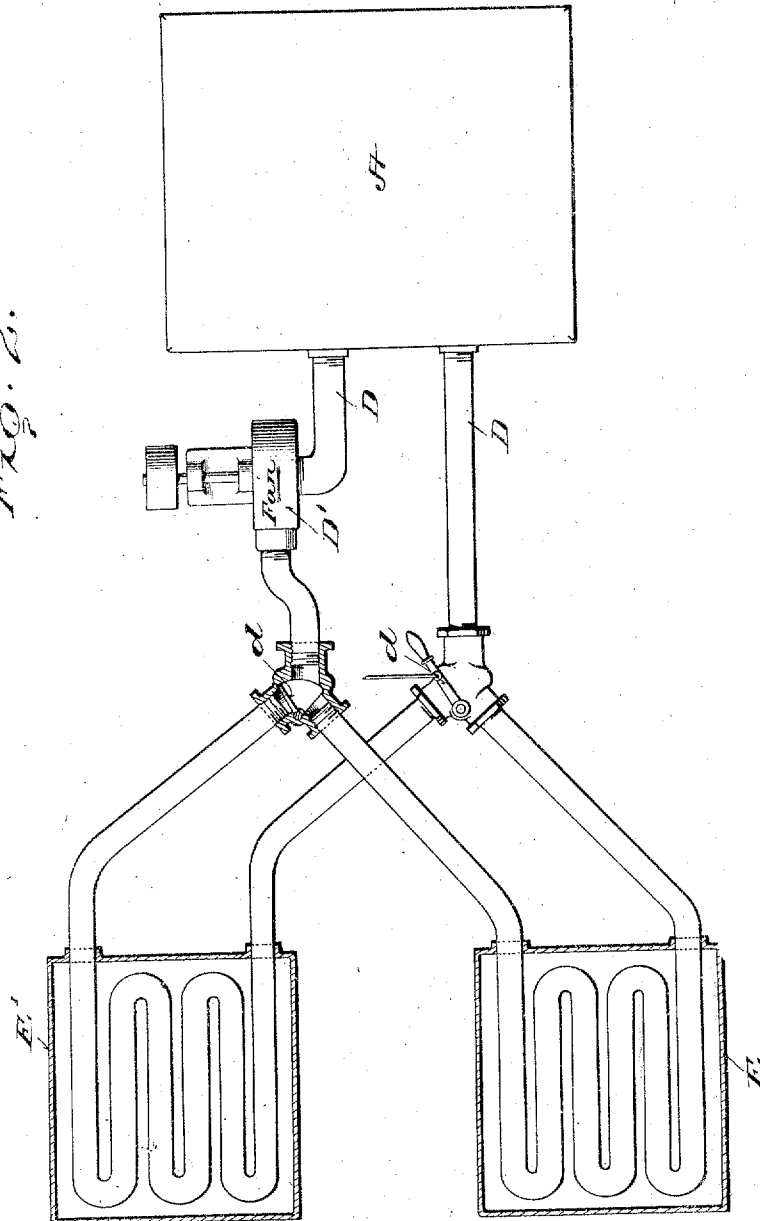
No. 878,785.

PATENTED FEB. 11, 1908.

T. A. DUNGAN.
METHOD OF DISTILLATION.
APPLICATION FILED JULY 20, 1905.

2 SHEETS—SHEET 2.

FIG. 2.



Inventor

Witnesses
F. H. Choate
L. B. Baker

Thomas A. Dungan
By,
Symonds, Lee, Christen & Wiles
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS A. DUNGAN, OF CHICAGO, ILLINOIS.

METHOD OF DISTILLATION.

No. 878,785.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed July 20, 1905. Serial No. 270,474.

To all whom it may concern:

Be it known that I, THOMAS A. DUNGAN, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Method of Distillation, of which the following is a specification.

My invention relates to an improved method of distillation, the preferred form of apparatus which I use in practicing my method being illustrated in the drawings furnished herewith, in which

Figure 1 is a view of the apparatus partly in elevation, and partly in cross-section; and Fig. 2 is a diagrammatic view partly in section of the heating system and illustrating the method of raising the temperature in the retort from a certain constant degree of temperature to one of a higher constant degree.

The apparatus used in practicing my method consists preferably in a retort, A, which may be in the form of a tunnel adapted to be closed at both ends and having in its upper end an eduction flue, *a*, communicating with a condensing worm, B, in which the vapors are condensed and from which the product may be run to suitable barrels or other receptacles. Within the retort are rails, *a'*, upon which run cars, C. The wood to be distilled is piled upon these cars in a suitable manner and drawn into the retort and left there during the process of distillation. In the bottom of the retort is an eduction pipe, *a''*, through which the heavier products are run away from the same.

D, represents a system of pipes adapted to circulate a heating medium, such as hot air, steam, or other substance. These pipes run through a heater, E, which is adapted to maintain a certain constant predetermined degree of heat in the retort. As shown in the drawings, this heater contains a suitable material the melting or boiling point of which is in a constant relation to the fixed temperature desired, so that as long as the fire underneath this material is kept up and the material is kept at a boiling or melting point, the heat imparted to the fluid which circulates in the heating system will be constant at all times. This heater therefore acts as a heat regulator, operating to maintain in the retort a constant predetermined degree of heat. During the course of distillation I raise the temperature in the retort from one constant predetermined degree to

a much higher one and this I accomplish by using two heaters, E E' the melting or boiling point of the heating material in one being much higher than that in the other. As shown in Fig. 2, the circulating pipe of the heating system branches at the point, *d*, each branch of the pipe entering one of the heaters. A valve is located at this point whereby the passageway to either or both of said branches may be opened. These pipes are brought together again where they return from the two heaters and are here also provided with a similar valve. A fan or pump, D¹, is interposed in the heat-circulating pipes to cause free circulation therein.

F, represents a nozzle extending from a steam-pipe, F¹, through which steam may be injected into the retort to produce circulation therein at the initiation of the process of distillation.

G represents a valved supply pipe through which the conducting medium may be supplied.

I have found through my experiments, that by maintaining one or more constant temperatures within the retort for a certain period of time, practically all the rosin and turpentine may be separated from the wood without destroying the fibers thereof, and in practicing my improved method, this is what I aim to do. In my process of distillation the heat first causes the included water to distil, carrying off a portion of turpentine. The temperature may then be raised to melt out the resin carrying the remaining turpentine, which remaining turpentine then distils from the resin. The heat used, however, is not sufficient to break up any part of the cellulose, and no part of the acid or tar of such distillation is carried over or melted out. In practice, I aim to maintain constant temperatures between 250 and 450 degrees F.

In practicing my improved method, the cars are loaded up with resinous wood and run into the retort, the ends of which are then properly closed, and the cars allowed to remain in the retort from eight to twenty-four hours, depending upon the size of the wood. If it is necessary, I introduce a jet of steam to cause freer circulation of air in the retort at the initiation of the process, but this is no part of the distillation. The wood is then subjected to the influence of radiated dry heat at a constant temperature of say, 250° F., until that portion of the tur-

pentine has been distilled which is carried off with the included water. The temperature is then raised to say, 450° F. by opening the valves in the circulating pipes, so that heat
5 circulating fluid will pass through the second heater where the temperature of the heat circulating medium will be raised to the higher degree of temperature. The resin will now exude from the wood carrying with
10 it the remaining turpentine. This resin will collect in the bottom of the retort where it will be allowed to remain until all of the turpentine has been distilled therefrom. The vapors rise to the dome of the retort and pass
15 out through the eduction flue, *a*, into the worm, *B*, where they are condensed. When the resin is melted out of the wood, and the distillation of turpentine completed, the rosin which remains in the bottom of the retort is drawn out through the eduction flue,
20 *a*². After all the rosin and turpentine have been separated from the wood, the car is run out and another one run into the retort to take its place. I find that the wood after
25 having been subjected to this process has not been destroyed, but is a commercial article of considerable value.

In the course of my experiments in this
30 art, I have discovered that the most important factor in the process of distilling wood is to maintain one or more constant degrees of temperature in the retort and that without this, successful commercial separation is almost impossible. I have discovered that by
35 passing the heat circulating pipes through a heat regulating device, such as the one described in this specification, the temperature in the retort will be kept constant. It is not sufficient that the regulation of the heat be

left to an attendant because the best that he
40 can do is to watch a pyrometer and when the temperature gets below the proper point, to increase the fire the effect of which will be to greatly increase the heat in the retort which will soon again fall below the one desired.
45 In the course of my experiments this is exactly the difficulty attendant when no mechanically perfect regulation is employed.

While I have shown and described my improved method of distilling as applied to
50 the separation of gum from resinous wood, it is obvious that the same is applicable to the distillation of materials other than wood.

I claim as new and desire to secure by
Letters Patent:—

55 1. The method of distilling by means of a medium circulating through a heating agent of such a nature that its superior possible temperature under atmospheric pressure is adapted to impart to the circulating medium
60 the temperature required for distilling the desired fraction.

2. The method of distilling resinous wood by means of a medium circulating through a heating agent of such a nature that its superior possible temperature under atmospheric pressure is adapted to impart to the circulating medium the temperature required
65 for distilling the desired fraction.

In witness whereof I have signed the above
70 application for Letters Patent at Chicago, in the county of Cook and State of Illinois, this 18th day of July, A. D. 1905.

THOMAS A. DUNGAN.

Witnesses:

CHAS. O. SHERVEY,
K. W. CORNWALL.