

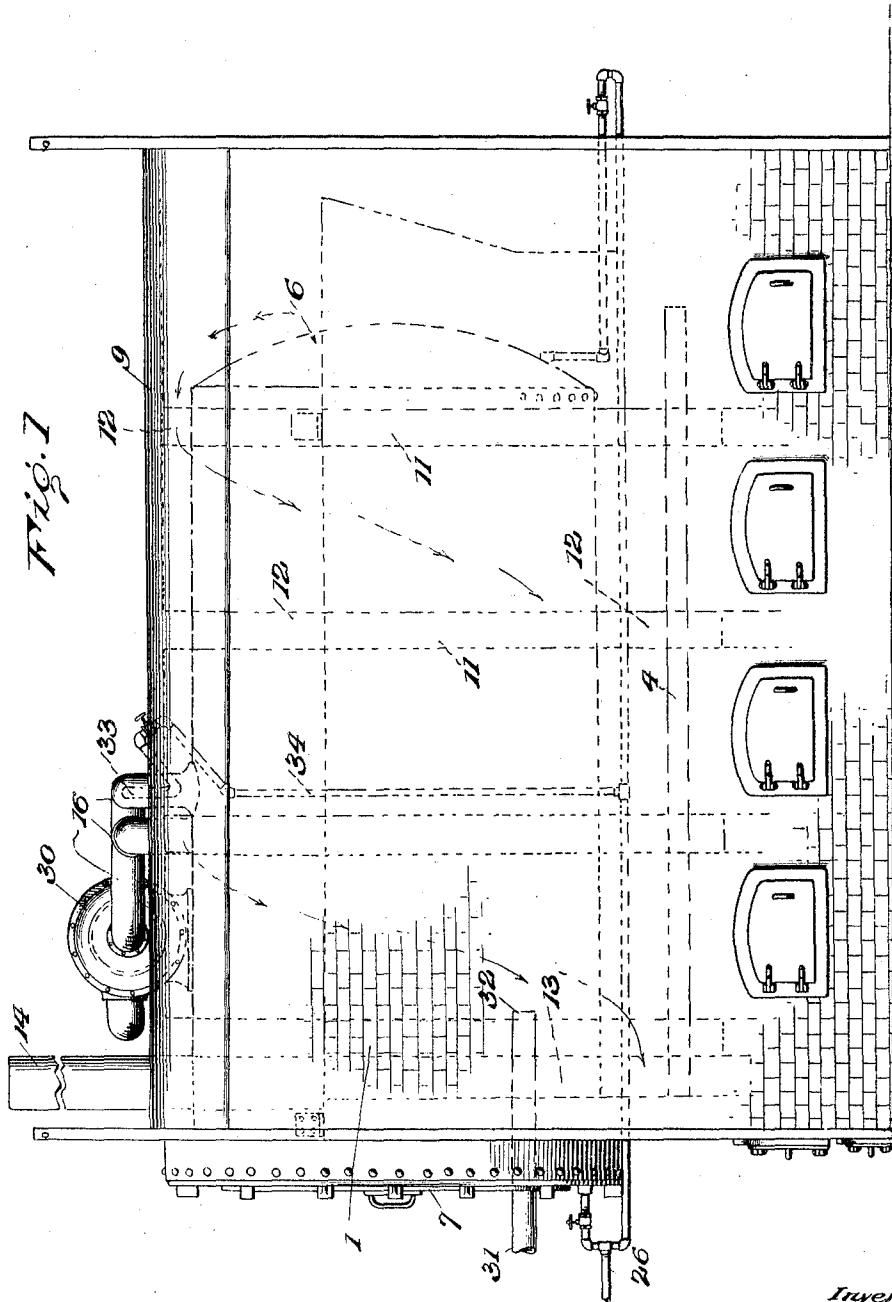
D. L. HANSON.

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APPLICATION FILED FEB. 7, 1919.

1,380,632.

Patented Feb. 10, 1920.

2 SHEETS—SHEET 1.



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David L. Hanson

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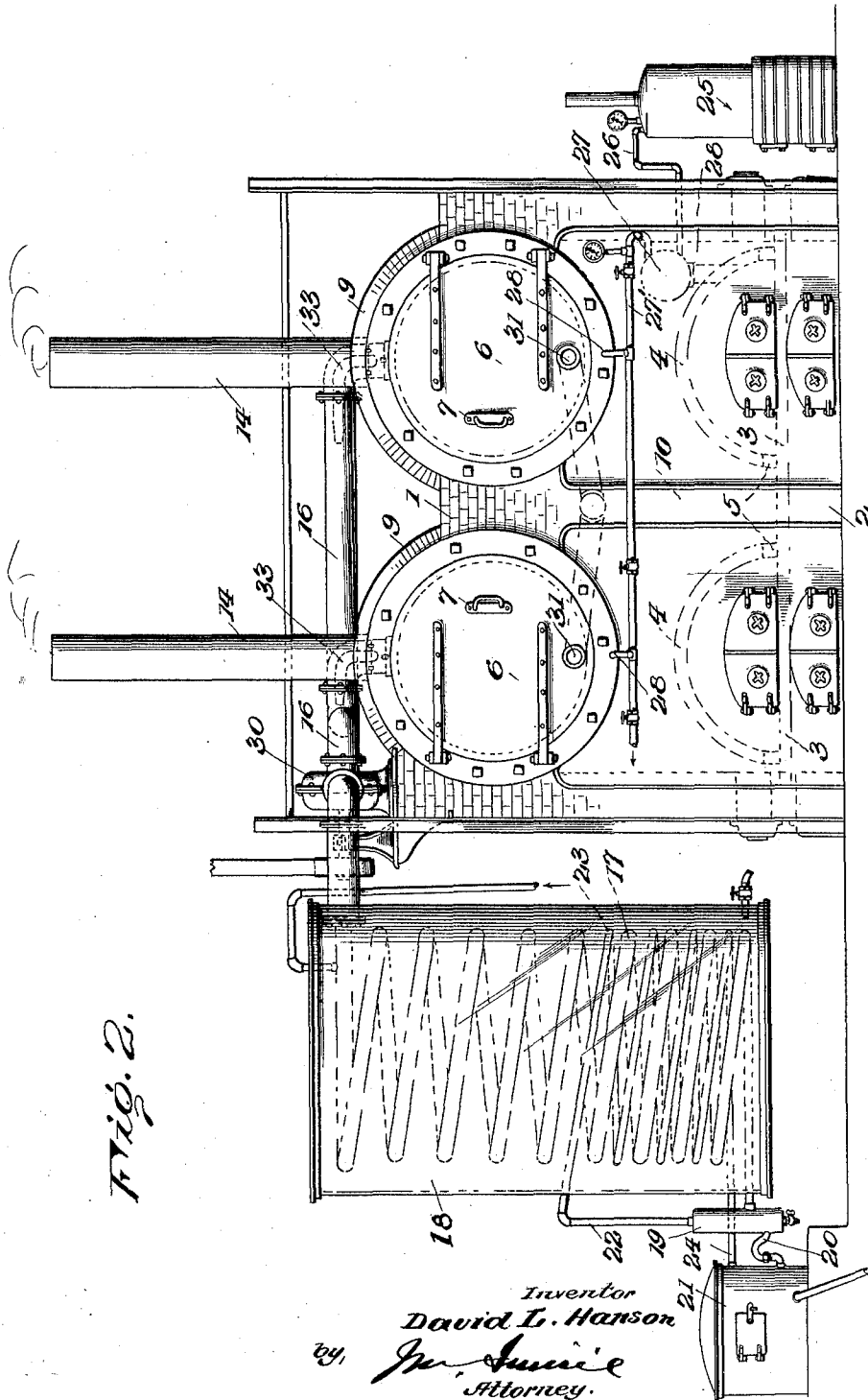


Fig. 2.

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UNITED STATES PATENT OFFICE.

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PROCESS FOR RECOVERING OILS THROUGH THE DESTRUCTIVE DISTILLATION OF WOOD.

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Specification of Letters Patent.

Patented Feb. 10, 1920.

Application filed February 7, 1919. Serial No. 275,612.

To all whom it may concern:

Be it known that I, DAVID L. HANSON, a citizen of the United States, residing at Wilmington, in the county of New Hanover and State of North Carolina, have invented certain new and useful Improvements in Processes for Recovering Oils Through the Destructive Distillation of Wood, of which the following is a specification.

This invention relates to an improved process and apparatus for recovering oils and other products through the destructive distillation of wood.

In destructive wood distillation for the recovering of oils and other products as heretofore practised, it has proved practically impossible to recover the oils with a desirable proportion of gum-content; or to recover the oils without a highly carboniferous characteristic. These objections appertain largely to and are apparently necessary incidents of the process heretofore employed, and which were generally characterized by a lagging of the vapors in the retort, so that the gum-content was to an appreciable degree carbonized prior to the delivery of such vapor to the condenser.

The present process is particularly directed to subjecting the vapor, immediately it is liberated in the distillation, to a force or forces, whereby it is, simultaneously with its liberation or generation, removed from the influence of the destructive process. Furthermore, the improved process, contemplates as one of such forces the use of air under pressure, through which agent a desired quantity of oxygen is introduced into the vapor as liberated with the effect to prevent the formation of carbon.

In carrying out the present process, the vapor as liberated under substantially any method of destructive distillation of wood, is immediately and constantly subjected to strong vacuum pull, which at the same time a current of air under pressure and superheated steam are constantly delivered to the retort, with these currents, vacuum and pressure, arranged to augment rather than neutralize each other.

As a direct result of this particular detail, the vapor liberated by the distillation is at once forced and pulled from the retort, and the gum liberated from the wood remains practically proportioned to the original condition. The gum is thus removed as

a content of the vapor, and but, little, if any, is given time to char. However, it has been found that under the vacuum pull alone, the resultant oils will be slightly darkened, and will indicate a carboniferous mixture incident to the charring of the gum. This is largely due to the fact that the vacuum force cannot be of equal efficiency throughout the entire retort, and that the complete vapor liberation of a given charge of wood, is necessarily a slow process. Furthermore portions of the retort are necessarily colder than others, and in such comparatively cooler portions the distillation will be less rapid, and condensation more liable to occur.

Therefore the additional force, air under pressure, effectively forces such lagging vapors within reach of the full vacuum pull, and additionally by the oxygen and superheated steam introduced, tends to a gasifying of the charred gum, if any.

The resultant product is an oil, for example, of exceedingly high gum-content, and one of substantially natural color, also a highly desirable characteristic.

Of course the present process is used as an addition to that commonly employed for wood distillation, and is particularly effective in such a process where superheated steam is introduced into the retort during the distillation.

The vacuum pull also performs another desirable and important function in this art; that is the vapors following their generation or liberation are not permitted in the retort a sufficient time to be subjected to unnecessary "cracking". This condition tends largely toward the production of a very light mobile oil, and one having a high flash point.

A preferred type of apparatus for carrying out the improved process is illustrated in the accompanying drawings, in which:—

Figure 1 represents a side elevation of the improved apparatus.

Fig. 2 is a front elevation of the same.

1 indicates the brick work forming part of the furnace, divided by central wall 2 into separate furnace structures. This provides a battery formation, and as the furnaces are identical, but one will be described.

An arch wall 4 is arranged above the grate 3, and formed at intervals in the side por-

tions with flues 5. A retort 6 is supported above the arch wall, having annular heads 7. Brick work 9 is supported on the walls 1 and 2 above the top plate to completely close the retort.

A division wall 10, is arranged between the opposite ends of the retort to form separate fireboxes, and flues 12 are formed by vertical partitions 11 between the central wall and end walls of the furnace, which flues 12 communicate with the flues 5. A stack 14 leads from the space 13 formed between the plate 8, the retort 6, the end wall 7 and the central partition 10, the flues 12 communicating with the space 13.

A delivery conduit 16 leads from each retort to a condensing coil 17, these conduits being preferably merged into a single conduit beyond the retorts. The coil 17 is supported in a tank 18 adapted to contain water or other cooling medium, and the lower end of the coil communicates with the trap 19 connected by a pipe 20 with a receptacle 21 into which the distilling oil passes. A pipe 22 extends from the top of the trap 19 and is formed within the tank 18 into an auxiliary coil 23, leading at 24 into the receptacle 21.

A steam boiler 25 is located at one side of the apparatus and a pipe 26 leads therefrom into a superheater 27 located in the flue space 28 above the arched wall 4. A pipe 27' extends from the superheater, and has branches 28 leading into the bottom of each of the retorts to inject superheated steam thereinto.

In or forming part of the conduit 16, and preferably at the juncture of the said conduit 16 beyond the retorts is a vacuum apparatus 30 here shown as of the fan type and driven by means not necessary to illustrate, which will maintain maximum mechanical efficiency of the vacuum within the retorts during the operation.

Preferably the vacuum pull is augmented by steam injectors 33, introduced into the conduits 16, between the retort and vacuum apparatus. These injectors may be supplied from the superheater, as by pipe 34, or from an independent source.

The forward ends of the retorts are naturally the coolest, and it is at such ends, if anywhere, that a lagging of the vapors and a comparatively cooling of the same will occur. Therefore a pipe as 31, is introduced into such ends of the retorts, and given a desirable form of outlet or outlets, as 32, through which pipe and outlets air under pressure is introduced into the retort from any suitable source.

Under the combined action of the vacuum and air pressure, with or without the use of the superheated steam the liberated vapors are pulled and driven from the retort immediately upon their liberation from the

wood, and in a condition substantially free of any or all impurities, particularly carbon, which the oxygen of the admitted air can destroy or divert. The resultant product, particularly the oils are thus light colored, of low specific gravity and viscosity, and therefore highly desirable from a commercial standpoint.

In the operation of the apparatus for carrying out the process, the retorts are charged with the desired quantity of wood, and the fire is started to slowly raise the temperature in the retorts to the desired degree, which for the purpose of this application may be stated to be between 600° and 700° Fr. Steam superheated approximately the heat degree noted is injected into the retort and forced upwardly through the wood. The volatilized compounds are liberated from the wood, as heretofore proposed.

Simultaneously with the initial liberation of vapors, the vacuum apparatus is started and quickly produces the maximum power. The air pressure admitted through the pipe 31 is also admitted through the retorts, whenever the combined effect of such vacuum pull, which it will be remembered is continuous, and the air pressure, also continues, the liberated vapors, immediately upon their liberation are carried from the retort to the condenser.

Under the action of the steam alone there is an appreciable time following the liberation of the vapors before they are forced by such steam into the condenser, and during this time the heat of the retort tends to raise the oils to substantially the cracking point, and to convert the gum-content of the oils into a carbon residue with the result that the final product is quite dark in color and of a comparatively low proportion of gum-content.

The vacuum pull, combined with the air pressure and the oxygen produced thereby materially changes the character of the product resultant of the same distillation, in that the vapors are not permitted to remain in the retort for any appreciable time following their liberation, and hence the gum-content of the oils is but slightly reduced from the natural proportion, and such small quantity of carbon that may be carbonized is converted by the oxygen of the admitted air and so removed as an impurity from the product. The oil thus delivered from the condenser is of the natural light color, with substantially the normal gum-content, as in the wood.

It will be noted that the vacuum pull, augmented by the air under pressure, constitutes a constant current through the retort through the outlet of a force sufficient to mingle with and carry off the vapors as they are liberated. The use of superheated steam adds to the force of the current and

also introduces an agent tending to reduce the oxidizing effect of the air.

While I have described in this application the liberating of the vapors by fire and superheated steam, it is to be understood that steam or superheated steam alone may be employed, and it is therefore to be understood that the term "destructive distillation" includes both means of liberating the vapors from the wood.

What is claimed is:—

1. The hereindescribed process of preventing deterioration of the liberated vapors of wood distillation, consisting in subjecting the vapors to a constant pressure stream to remove the vapors from the retort immediately upon generation, said pressure stream consisting of a vacuum pull toward the retort outlet and oxidizing agent

introduced remote from such outlet and forcing the vapors toward such outlet, whereby the vacuum pull and pressure agent assist each other in clearing the retort.

2. The hereindescribed process of preventing deterioration of the liberated vapors of wood distillation, consisting in subjecting the vapors to a constant pressure stream to remove the vapors from the retort immediately upon generation, said pressure stream consisting of a vacuum pull toward the retort outlet and air and superheated steam, introduced remote from such outlet and forcing the vapors toward such outlet, whereby the vacuum pull and pressure agent assist each other in clearing the retort.

In testimony whereof I affix my signature.

DAVID L. HANSON.