

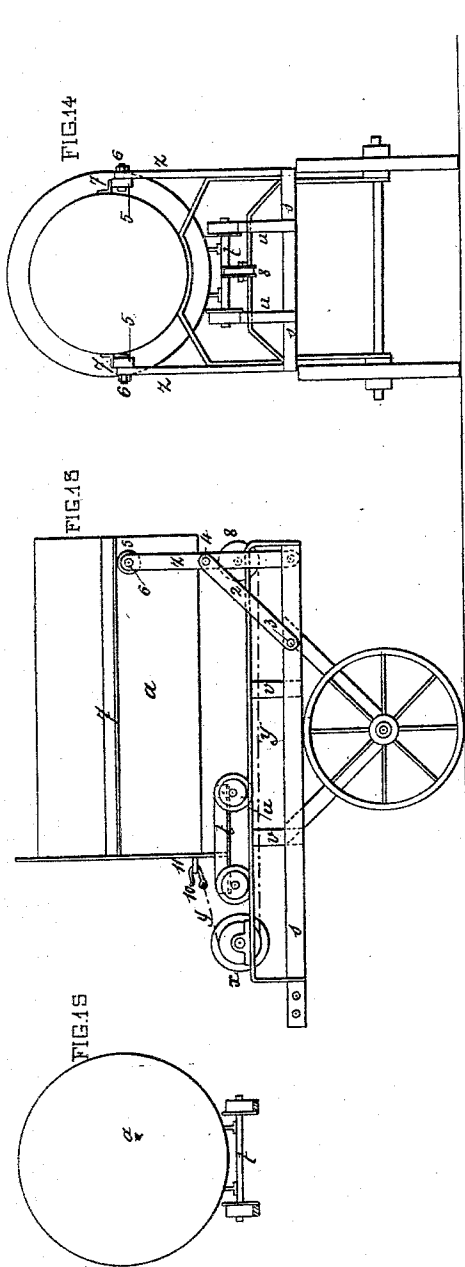
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J. H. DU VIVIER.  
APPARATUS FOR CHARGING RETORTS.

No. 425,538.

Patented Apr. 15, 1890.



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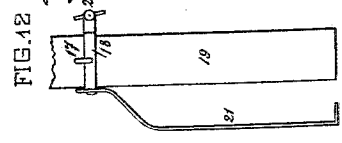
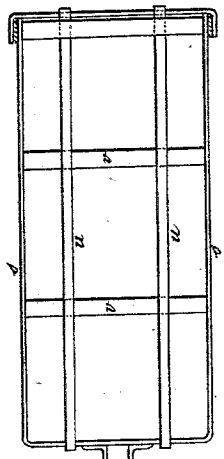


FIG. 1

FIG. 15

FIG. 12

WITNESSES.

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INVENTOR.

*Jules Henri du Vivier*  
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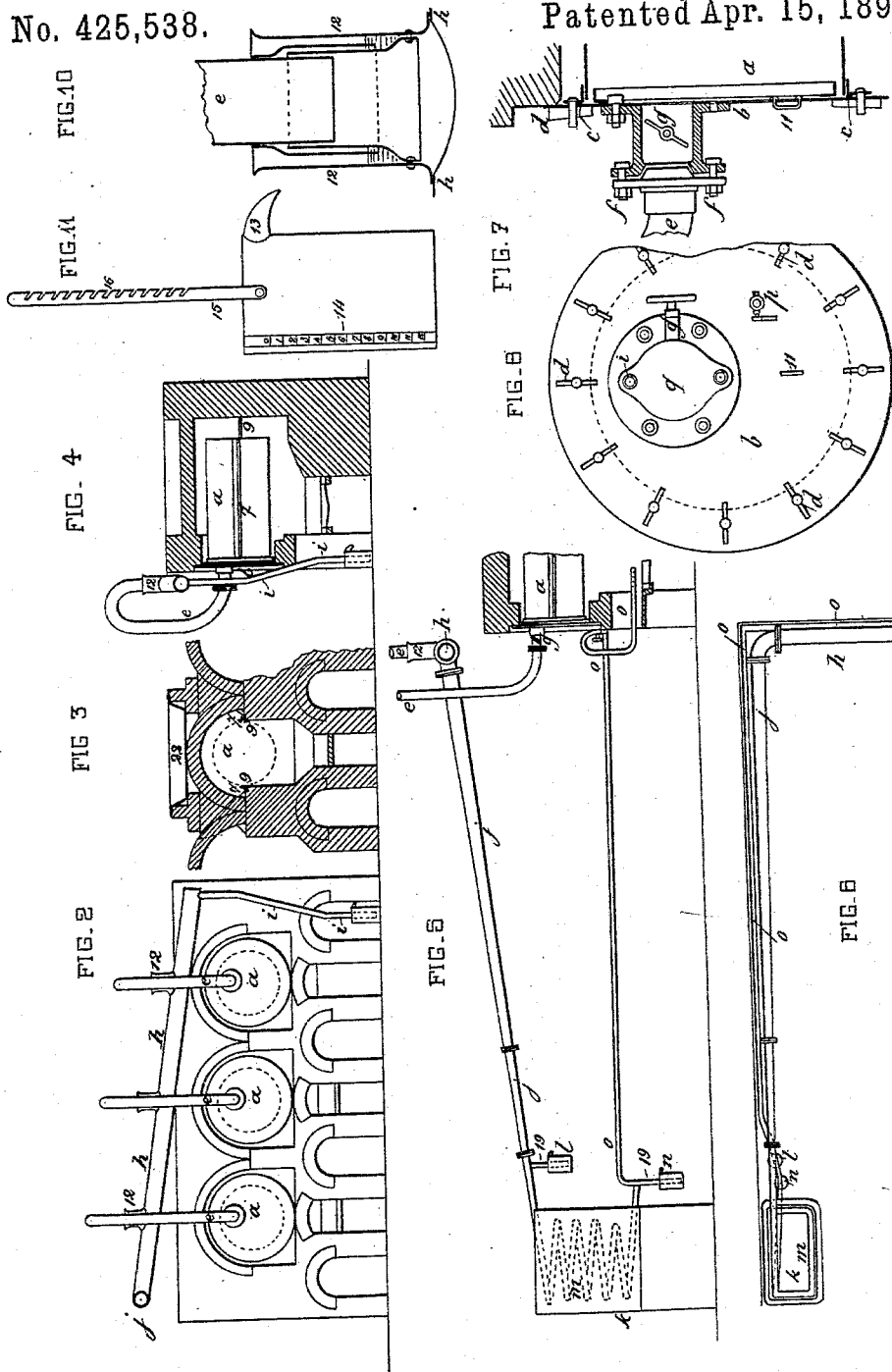
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2 Sheets—Sheet 2.

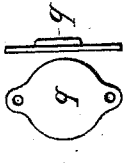
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WITNESSES.  
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FIG. 9.  


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# UNITED STATES PATENT OFFICE.

JULES HENRI DU VIVIER, OF PARIS, FRANCE.

## APPARATUS FOR CHARGING RETORTS.

SPECIFICATION forming part of Letters Patent No. 425,538, dated April 15, 1890.

Application filed March 22, 1889. Serial No. 304,291. (No model.)

*To all whom it may concern:*

Be it known that I, JULES HENRI DU VIVIER, of the city of Paris, France, have invented Improvements in Apparatus for the Production of Pyroligneous Acid, of which the following is a full, clear, and exact description.

My invention relates to improvements in apparatus for the economic extraction of pyroligneous acid.

It is known that when vegetable substances—such as wood—are subjected to destructive distillation in a closed vessel for the purpose of obtaining pyroligneous or acetic acid, empyreumatic oil or tar is at the same time produced, the density of which increases in proportion to the quantity of carbon. Carbonic-acid gas is also evolved, as well as a considerable amount of hydrocarbons, and toward the end a notable quantity of carbonic oxide. The greater part of the carbon which has not entered into these several combinations constitutes the residue in the retort.

The products obtained in the various apparatus heretofore employed for the production of pyroligneous acid on a large scale have always been costly, owing in the first place to the cost of carriage of the wood and also to the inconvenience of and time required for the operation of charging the retorts, as well as of drawing them, which cannot be done until the furnaces have cooled down, thereby entailing a waste of heat.

My invention consists in a continuous method of treating wood in portable apparatus, whereby the acid may be obtained at the spot where the wood is felled, the apparatus being so combined that they may be charged, brought into operation, and discharged in a continuous manner by means of movable retorts, whereby loss of time is avoided and the whole of the heat of the furnaces is utilized.

Reference is to be had to the accompanying drawings, forming part of this specification, which illustrate an example of my apparatus.

Figure 1 is a diagram showing the general arrangement of two benches of retorts. Fig. 2 is a front elevation, Fig. 3 a cross-section, and Fig. 4 a longitudinal section, of a furnace with the retort removed. Fig. 5 is a side elevation, and Fig. 6 a plan, of the pipes for

carrying off the gases and tar. Fig. 7 shows in section the mode of connecting the ascension-pipes to the retort-covers. Fig. 8 is a face view of a retort-cover. Fig. 9 shows the cover for the mouth of the retort when the ascension-pipe has been disconnected. Fig. 10 shows the hydraulic joint between the ascension-pipe and the collecting-main. Fig. 11 shows one of the acid or tar receivers, which acts also as a pressure-regulator. Fig. 12 shows the index for denoting the depth of immersion of the discharge-pipe in the receiver and pressure-regulator. Fig. 13 is a side elevation, and Fig. 14 a rear elevation, of a truck for introducing the retorts into and withdrawing them from the furnaces. Fig. 15 shows the trolley by which the retorts are shifted on and off the truck. Fig. 16 is a plan of the truck-framing.

Referring to Figs. 2 to 12, the furnaces (which may be constructed either of brick or of iron lined with fire-brick) having been erected in the desired situation, the portable retorts *a* before being placed in the furnace are charged with wood in twelve or fourteen inch lengths. The cover *b* is luted with clay at *c* and secured by cotters *d*. The retorts are then conveyed to the respective furnaces upon the two-wheeled truck, Figs. 13 and 14, and the ascension-pipe *e* is then secured to the mouth by bolts *f*, (see Fig. 7.) after which the valve *g* is opened and the distillation proceeded with. The gases distilled off ascend through the pipe *e* to the collector *h*, which is placed at an inclination in order that the tar may run off through the pipe *i*, connected to the lower end of the collector, while the gases flow in the opposite direction through the collector and are conveyed by a pipe *j* to the worm *m* of a condenser *k*, the tars deposited in the pipe *j* being previously intercepted by the receiver *l*, which also serves as a pressure-regulator. The pyroligneous acid produced is collected in a receiver *n*, connected to the lower end of the worm *m*, the permanent gases passing away through the pipe *o* to the furnace, where they are consumed, thus economizing fuel. When the operation is terminated, which is indicated by the color of the flame at the test-cock *p*, the valve *g* is closed, the ascension-pipe *e* disconnected and replaced by the cover *q*, which is clamped tightly upon the mouth by

means of the screw-bolts  $r$ , so as to prevent the admission of air, and the retort is then removed upon its truck and replaced by another one kept ready filled, and so on in succession for each furnace, the action being thus practically continuous.

To facilitate the introduction and removal of the retorts, the furnaces are arranged in rows of twenty-four placed back to back, as shown in Fig. 1, the number twenty-four being adopted when each retort requires about one hour for the complete carbonization and distillation of its contents. The number of furnaces would therefore depend upon the dimensions of the retorts.

The truck employed for moving the retorts is represented in Figs. 13 to 16, and is constructed of a framing  $s$ , upon which a small trolley  $t$  travels on rails  $u, u_1$ , connected together by iron tie-bars  $v$ . A chain-drum  $x$  is mounted at the front end of the truck, and at the rear end are two standards  $z$ , pivoted to the frame at 1 and held normally upright by means of struts 2, jointed to the framing at 3 and to the standards by a pin 4. Upon rollers 5, turning on pins 6 at the upper ends of the standards, rest two angle-iron rails 7, fixed longitudinally to the sides of the retort, whereby the rear end of the retort is supported, while the front end rests upon the trolley  $t$ . To introduce the retort into the furnace, the truck is run up to the mouth of the furnace, and fixed. The chain  $y$ , having been carried round a pulley 8 at the rear end of the truck and attached to the trolley  $t$ , is wound upon the drum  $x$ , thus hauling the retort into the furnace, where the angle-irons 7 rest upon rails 9 within the furnace. (See Figs. 3 and 4.) The pin 4 is then removed and the standards  $z$  folded down, the barrel  $x$  being then again rotated and the retort hauled to the desired position in the furnace. The lowering of the standards  $z$  is rendered necessary to allow the flange of the retort-cover to enter the mouth of the furnace, after which the truck is unhooked and withdrawn, the flange of the retort being then pushed up home against the brick-work, the joint being luted with clay. In order to withdraw the retort from the furnace, the truck is fixed in front of the retort close up to the brick-work and the chain  $y$  is attached by its hook 10 to the ring 11 on the retort-cover, and the retort is drawn partly out of the furnace by winding up the chain on the barrel. The retort is then hauled upon the trolley into the posi-

tion shown in Fig. 13, and is conveyed away to be cooled and discharged. The furnaces being grouped back to back, as before described, the ascension-pipes  $e$  can all be connected with the same collecting-pipe  $h$  by means of the hydraulic joints 12, which are gas-tight and capable of being readily dismounted when desired.

The receiver, Fig. 11, consists of a vessel of sheet-iron provided with a pouring-spout 13, and also with a centimeter scale 14 upon the exterior, the zero of which scale corresponds to the highest level or overflow-point of the liquid. The receiver is further provided with a bail 15, forming two racks having notches 16 at distances apart of one centimeter by which the receiver is hung upon hooks 17, carried on a collar 18, clamped upon each of the dip-pipes  $i$  and 19 by the thumb-screws 20. An index 21 is fixed to the collar 18 and shows on the scale 14 the depth of immersion of the dip-pipe, which acts as a pressure-regulator.

In order to utilize the waste heat of the furnaces I provide above each a sheet-iron tank 22, in which the tarry products are dried or brought to a pasty condition, so as to reduce their volume and weight and facilitate transport.

It will be evident that the details of construction, form, and dimensions of the various parts, as well as the number of furnaces grouped together, &c., may be varied according to the kind of wood to be treated and the space at disposal without in any way departing from the nature of my invention.

I claim—

The combination of a furnace with portable retorts adapted to be placed into and removed from said furnace, and with a truck for transporting said retorts to and from the furnace, and with rails and rollers carried by said truck for supporting and permitting movement of said retort on the truck, and with a chain or rope and windlass carried by said truck and adapted to propel the retort on the truck, substantially as specified.

The foregoing specification of my improvements in apparatus for the production of pyroligneous acid signed by me this 12th day of February, 1889.

JULES HENRI DU VIVIER.

Witnesses:

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ALBERT MOREAU.