

A. E. BADGLEY.  
APPARATUS FOR DISTILLING WOOD.

No. 453,606.

Patented June 9, 1891.

Fig 1

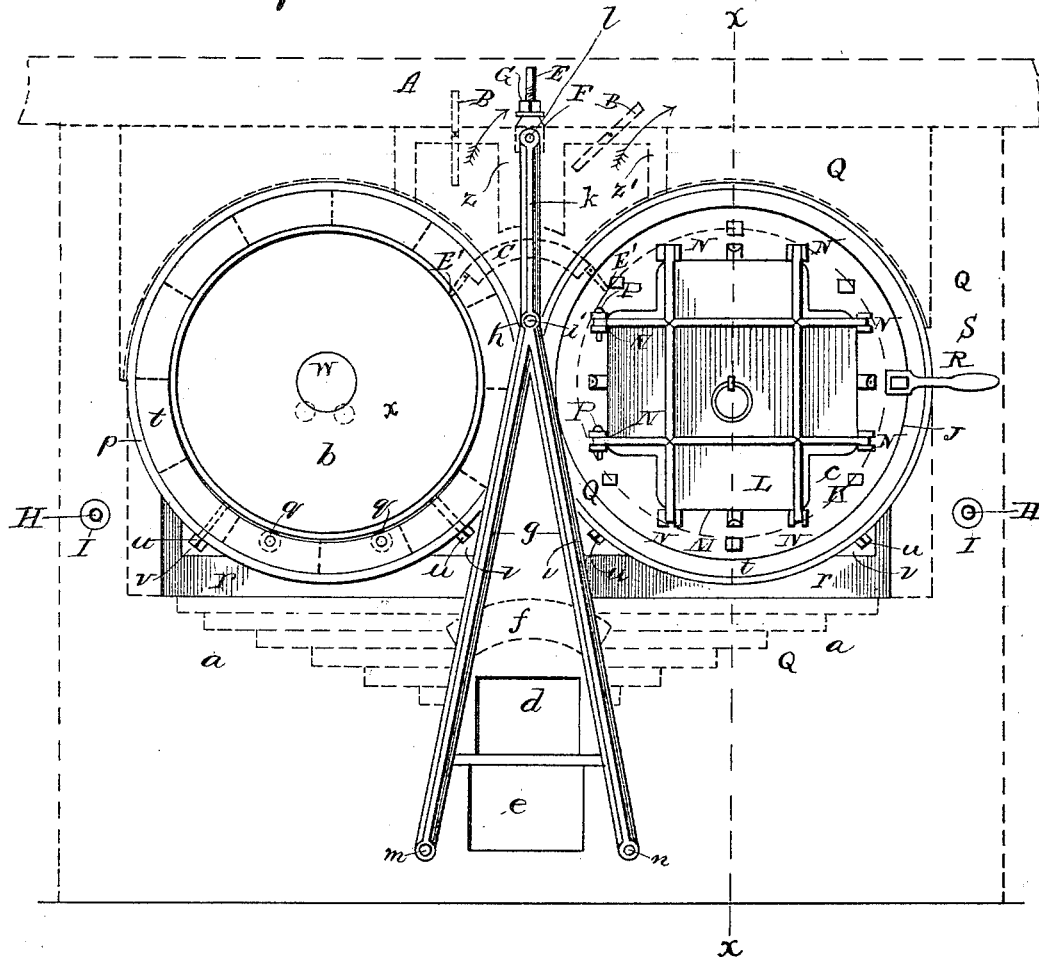
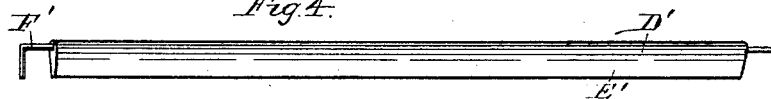


Fig 4.



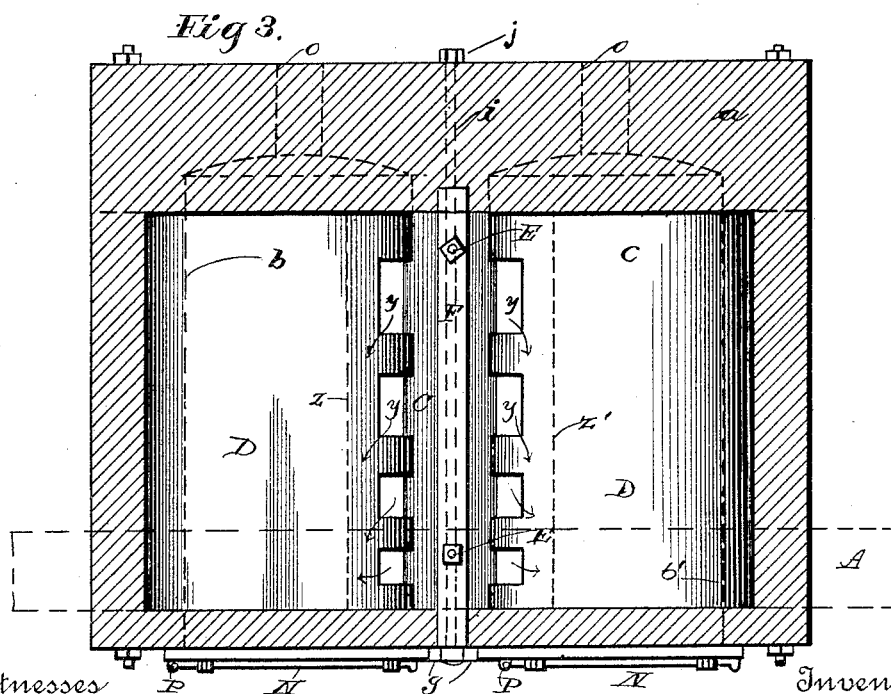
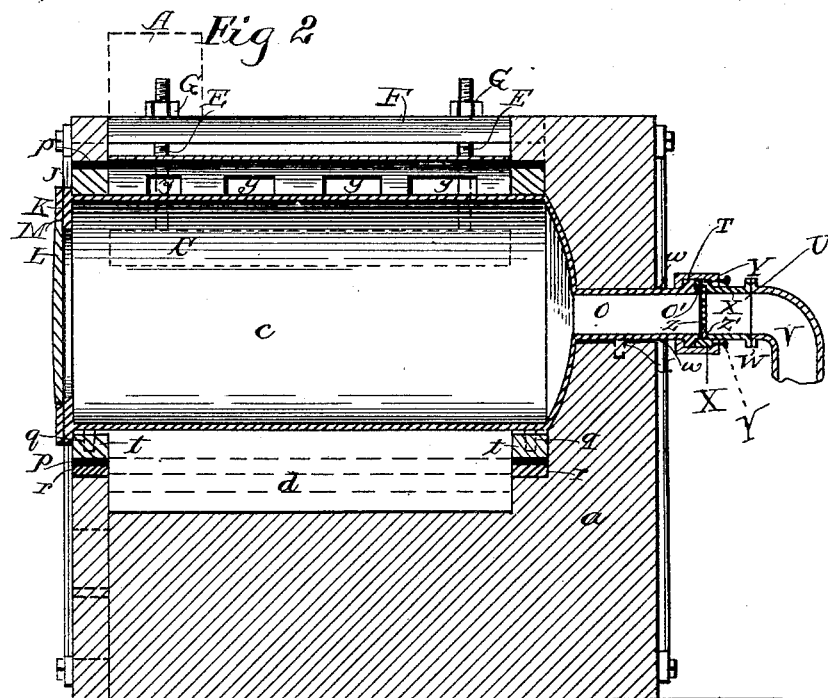
Witnesses  
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J. P. Dunn.

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By his Attorneys  
R. W. Boies

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# UNITED STATES PATENT OFFICE.

ALFRED E. BADGLEY, OF SUSQUEHANNA, PENNSYLVANIA.

## APPARATUS FOR DISTILLING WOOD.

SPECIFICATION forming part of Letters Patent No. 453,606, dated June 9, 1891.

Application filed April 8, 1890. Serial No. 347,135. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED E. BADGLEY, a citizen of the United States, residing at Susquehanna, in the county of Susquehanna and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Making Acids; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an apparatus specially intended for the manufacture of acids from wood, although it might be successfully employed for other similar purposes.

The object sought to be accomplished is to provide a furnace, a retort, and their auxiliaries with means which will make them far more durable than those heretofore in vogue, thus effecting a great saving in the cost of maintenance.

With this purpose in view my invention consists in the peculiar features and combinations of parts more fully described herein-after, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation, in which dotted lines represent the masonry; Fig. 2, a side elevation, in section, through line *x x* of Fig. 1; Fig. 3, a top view, with the masonry above the retorts removed to better show the provision made for more thoroughly distributing the heat over the retorts; and Fig. 4, a detail view.

The reference-letter *a* represents the usual masonry or retort-setting, and *b c* the retorts, beneath which are situated the usual fire-pit *d* and ash-pit *e*. In practice it has been found that the intense heat of the furnace soon causes the arch *f* over the fire-pit to crumble or settle, so that frequent repairs become necessary. To avoid this I provide an inverted-V-shaped bar or casing *g*, which passes astride the fire-pit, with its apex *h* located just beneath the upper central section of the wall between the upper portions of the retorts, at which point a horizontal stay-rod *i* passes transversely through the furnace-walls and is retained by a duplicate bar *j* upon the opposite side. The bar *g* is continued up in

a straight piece *k* to the top of the masonry, where another stay-rod *l* passes through the setting to still further strengthen the walls and prevent them from bulging. Two more stay-bars *m n* are attached to the lower ends of the bar *g* and pass horizontally through the setting to the corresponding bar *j* upon the opposite side.

The retorts *b* and *c* consist of metallic cylinders having upon their rear ends the usual outlet-pipes *o*, which extend through a hole in the rear wall and project beyond the latter to receive the external attachments, which will presently be described. The retorts are arranged so that they can be turned or rotated without removing them from their setting, and I also provide means to permit them to be removed from the furnace when it becomes necessary to replace them by fresh ones. This I accomplish by setting the retorts within the metallic rings *p*, which are provided with anti-friction rollers *q* to support the retorts while being turned. The lower portion of each ring is provided with a solid seat *r*, cast integral therewith and bearing upon the masonry. The front rings are lined with segmental fire-brick *t*, which can be removed to enlarge the opening to permit the withdrawal of the swollen and used-up retorts when renewal becomes necessary.

In order to hold the retorts securely in their seats, I provide a pair of locking-bolts *u*, which pass radially through the rings and bear against the periphery of the retort, and by turning the heads within the recesses *v* the bolts force the upper part of the retort tightly against the interior walls of the ring and prevent them from turning by the heat of the fire, which they would do if not locked. The small opening *w*, through which the outlet-pipe passes, is also provided with anti-friction rollers *x* to still further facilitate the rotation of the rear end of the retorts.

To prevent the heat of the fire from affecting only the front portion of the retorts, I provide a series of outlet-flues *y* along the edges of both arches, and these flues gradually increase in area as they are distant from the front of the retorts. Thus the heat will be attracted to the rear of the retorts and more

evenly distributed over the entire surface, whereby the heat is used to better effect and the retorts made to last longer. The heat passes from these outlet-orifices to the flues  $z$   $z'$ , lying contiguous to each other and communicating with a common scape-flue A, and the mouth of the flues  $z$   $z'$  is commanded by dampers B, by means of which the heat can be diverted from one retort to the other.

10 A large damper C is suspended below the contiguous edges of the arches D by means of the bolts E, which pass through and are supported by the truss F. The nuts G upon their upper threaded ends enable the damper to be

15 adjusted up and down to admit or cut off the heat, whereby the latter can be made to pass directly out of the flues or to encircle the retorts. The bottom of this damper is faced with fire-brick C' or other refractory material

20 to resist the effects of the intense heat of the furnace. When the retorts become swollen in the center, they will frequently become immovable by reason of the swell coming in contact with the damper C, and if the damper

25 were moved to clear this swell the space between it and the retort would permit the heat to pass through, which would be objectionable. Therefore I have provided each retort with a metallic apron D', which has its free

30 edge E' resting upon the periphery of the retort to close the gap which might be between it and the retort. This apron is provided with a handle F', extending through the wall to the exterior of the front, whereby it can be operated from the outside.

35 As a still further measure for strengthening the masonry of the retort, I provide the stay-rods H, which have suitable nuts I upon their opposite extremities.

40 The front end of each retort is provided with an annular flange J, to which is bolted the door-frame K. The door L is made to fit snugly within the seat M in the frame, and by four sets of hinges N, all of which are

45 alike, is capable of swinging vertically or horizontally by simply shifting the pins P. The door is by preference given the form of a Greek cross, with hinges projecting beyond the edges of each arm of the cross. The face

50 of the door-frame is provided with several square heads Q, to which a handle R, having a socket S, can be applied to rotate the retort.

The outlet-pipe  $o$  is connected with the usual copper down take-pipe V by means of

55 a coupling device consisting of a collar T upon the pipe  $o$  and a short section of iron pipe U bolted to the copper pipe by means of the flange-joint W. A collar X upon the end of the section enables it to be fastened to the end

60 O' of the pipe by means of the clamps Y, and the two are made tight by packing Z, interposed between said end and a shoulder Z' upon the section U.

Now in using my improved apparatus each

65 retort is first charged with wood in the usual way and sealed by closing the doors.

The furnace is prepared and operates upon the retorts in the usual way, excepting that the heat is more perfectly diffused by reason of the series of the graduated flues previously described. After the retorts have been used

70 a sufficient length of time they are given a partial rotation to expose a fresh side to the direct effects of the heat. This may be done by simply loosening the locking-screws beneath the retort and the clamps at the rear,

75 then applying the handle R to the heads Q. When given the required rotation, the retort may be locked in rigid adjustment by setting up the locking screws and clamps. Then by

80 shifting the pins P to the hinges upon the right or left, as the case may be, the door will swing as before, and the retort is ready for use.

It is evident that my invention could be

85 varied in many ways which might suggest themselves to a skilled mechanic. Therefore I do not limit myself to the exact construction herein shown, but consider myself entitled to all such variations as come within the scope

90 of my invention.

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

1. In an apparatus for distilling wood, a

95 furnace provided with a retort mounted upon rollers whereon the retort is rotatable, in combination with locking-bolts the ends of which are adapted to contact with the outside of the

100 retort, whereby the retort may be held in rigid adjustment, in the manner and for the purpose substantially as described.

2. In an apparatus for distilling wood, a furnace provided with a retort, in combination with a retort-door provided with hinge

105 connections upon four sides, and removable pins applicable to said connections, whereby the door may be opened both vertically and horizontally, in the manner and for the purpose substantially as described.

3. In an apparatus for distilling wood, a furnace provided with an arch located over the retorts and having graduated outlet-orifices increasing in area as they are distant

115 from the door, in the manner and for the purpose substantially as described.

4. In an apparatus for distilling wood, a furnace provided with twin retorts, a pair of longitudinal flues located above the retorts, a

120 partition located between the flues, and a vertically-adjustable damper located below the partition and controlling the flues, whereby the space between the retorts is opened and closed, in the manner and for the purpose substantially as described.

125

5. In an apparatus for distilling wood, the combination of a furnace provided with twin retorts, a pair of longitudinal flues located

130 above the retorts, a partition between said flues, a vertically-adjustable damper located below the partition and controlling the flues, and hinged aprons upon said dampers and

adapted to rest upon the peripheries of the retorts, in the manner and for the purpose substantially as described.

- 5 6. In an apparatus for distilling wood, a furnace provided with retorts, in combination with metallic rings embracing said retorts, and removable segmental bricks interposed between the retorts and rings, whereby the retorts can be removed without injury to the

surrounding masonry, in the manner and for the purpose substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED E. BADGLEY.

Witnesses:

R. G. DuBois,

W. C. DUVALL.