

P. BROWN.  
 RETORT FOR THE DISTILLATION OF RESINOUS WOODS.  
 APPLICATION FILED DEC. 10, 1908.

917,531.

Patented Apr. 6, 1909.  
 3 SHEETS—SHEET 1.

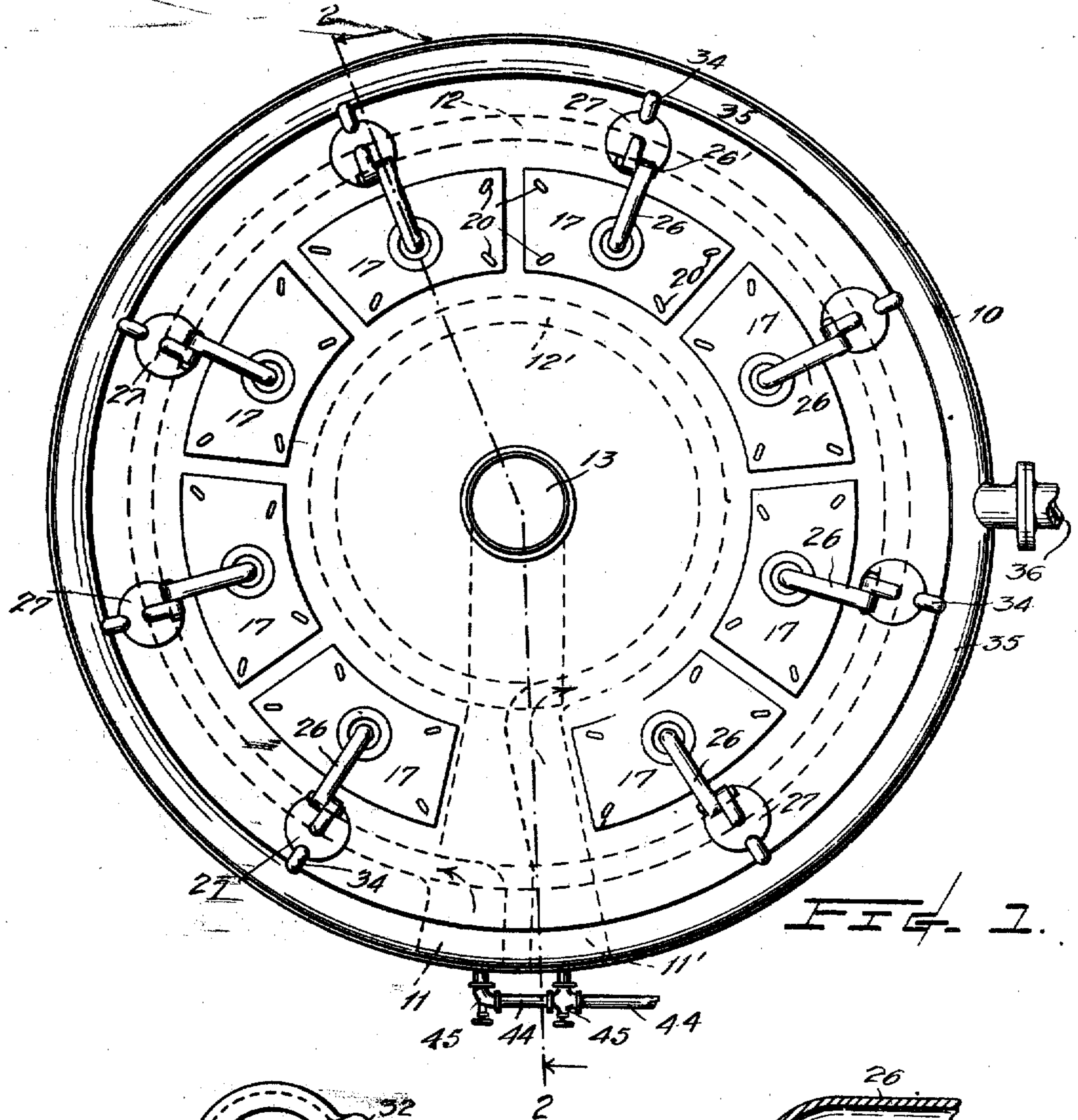


FIG. 1.

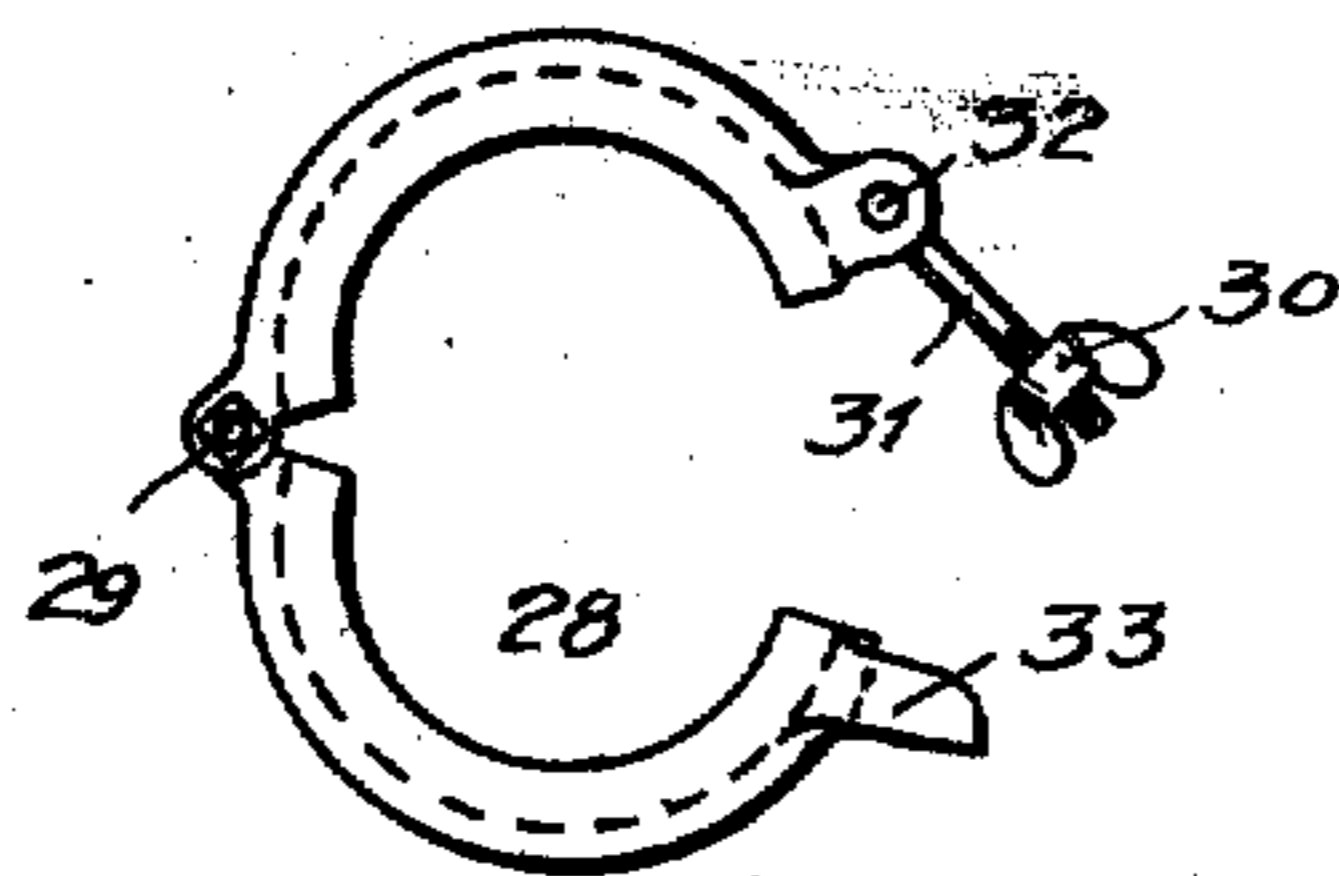


FIG. 5.

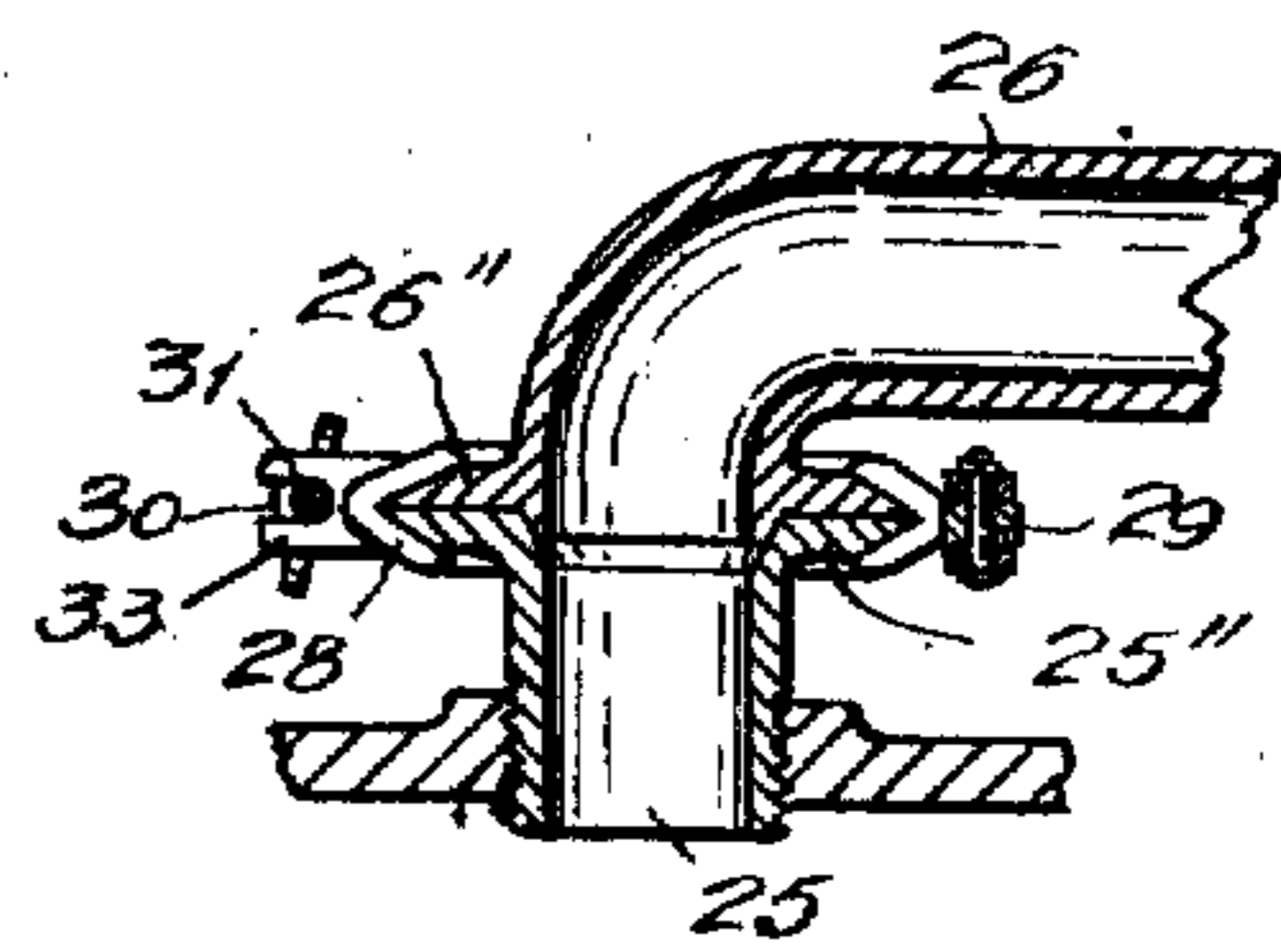


FIG. 6.

WITNESSES:

Horace Barnes.  
 W. H. Bennett

INVENTOR

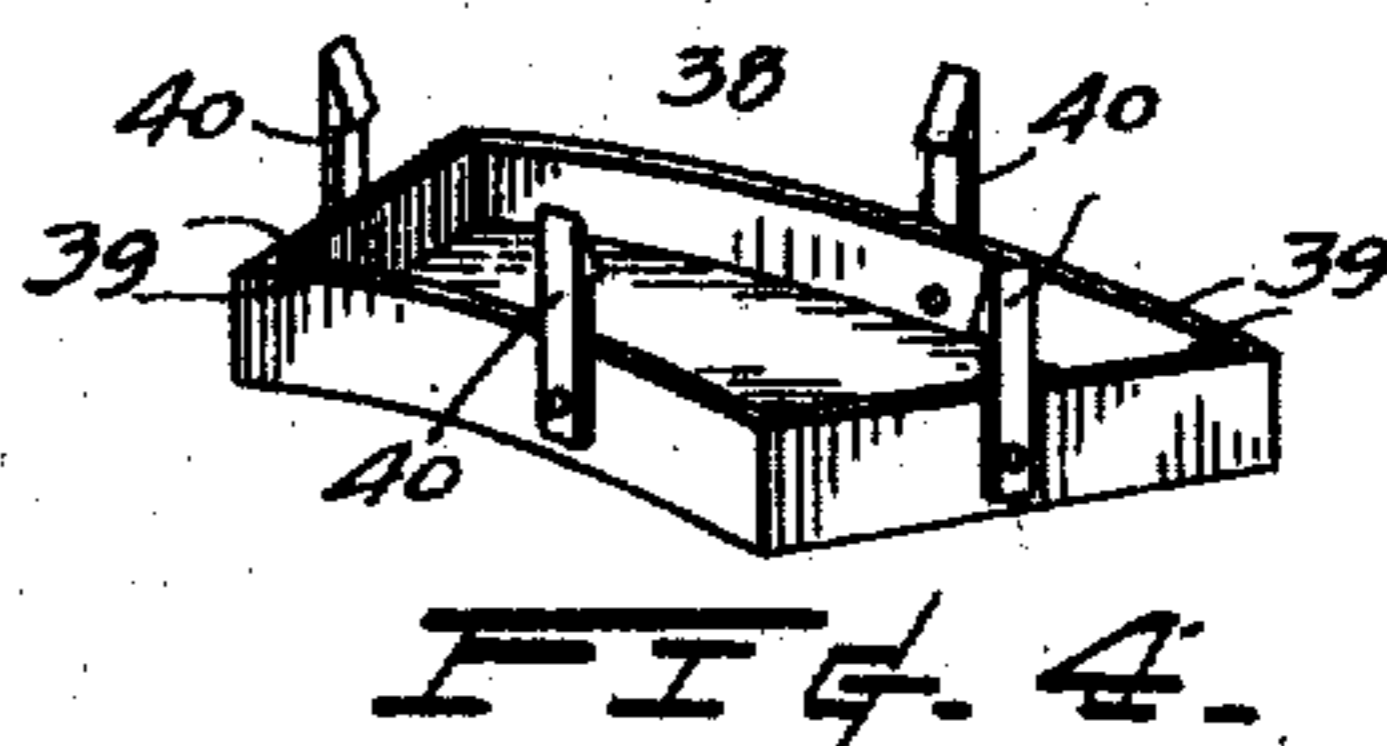
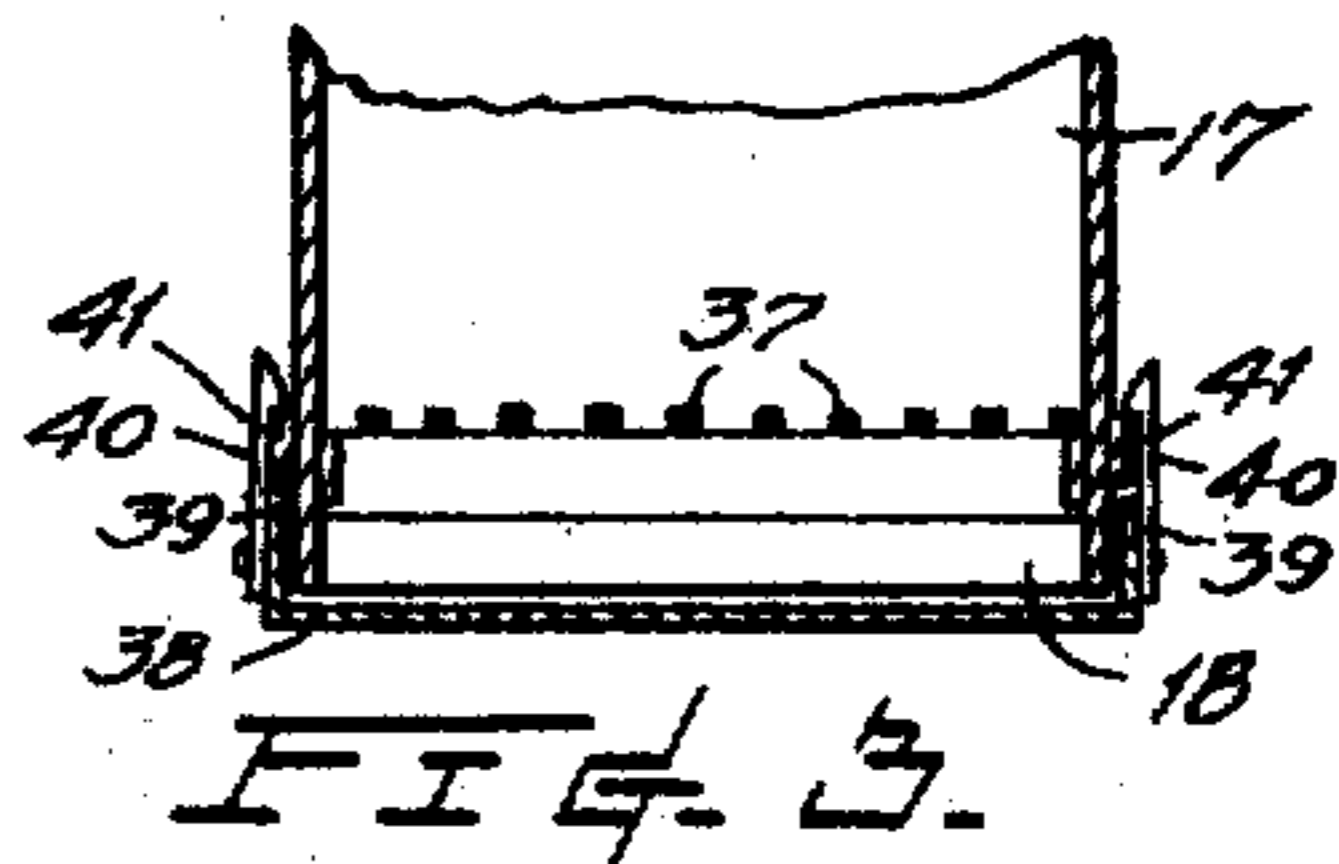
Peter Brown

BY

Pierre Barnes  
 ATTORNEY

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3 SHEETS—SHEET 2.



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**WITNESSES:**

Horace Barnes.  
W. H. Bennett.

**INVENTOR**

*Peter Brown*

BY

BY  
*Pierre Barnes*  
ATTORNEY

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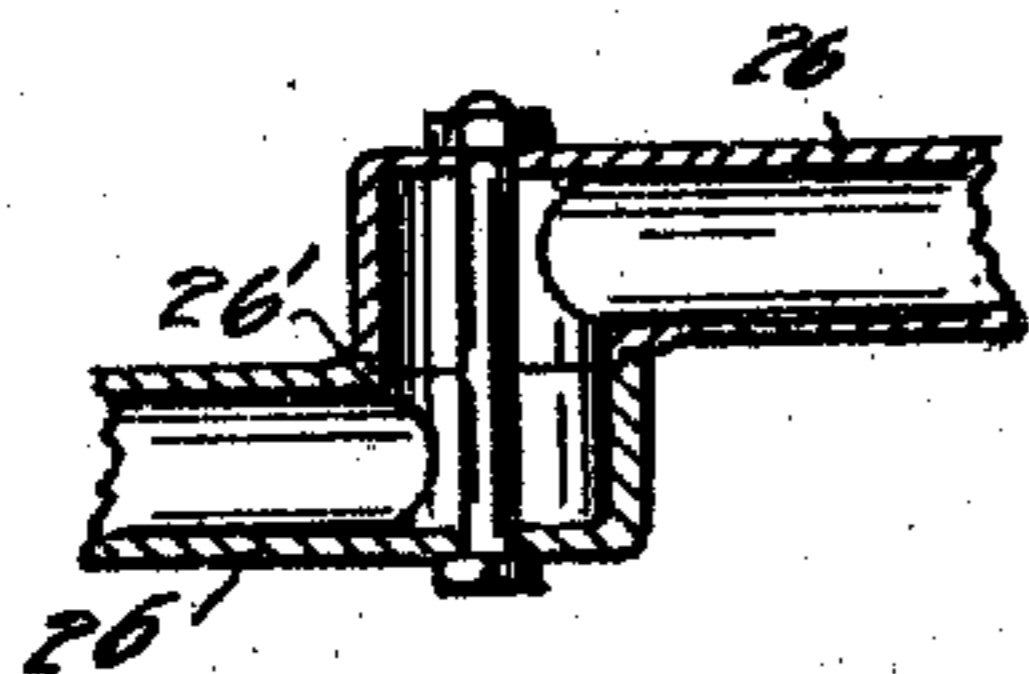
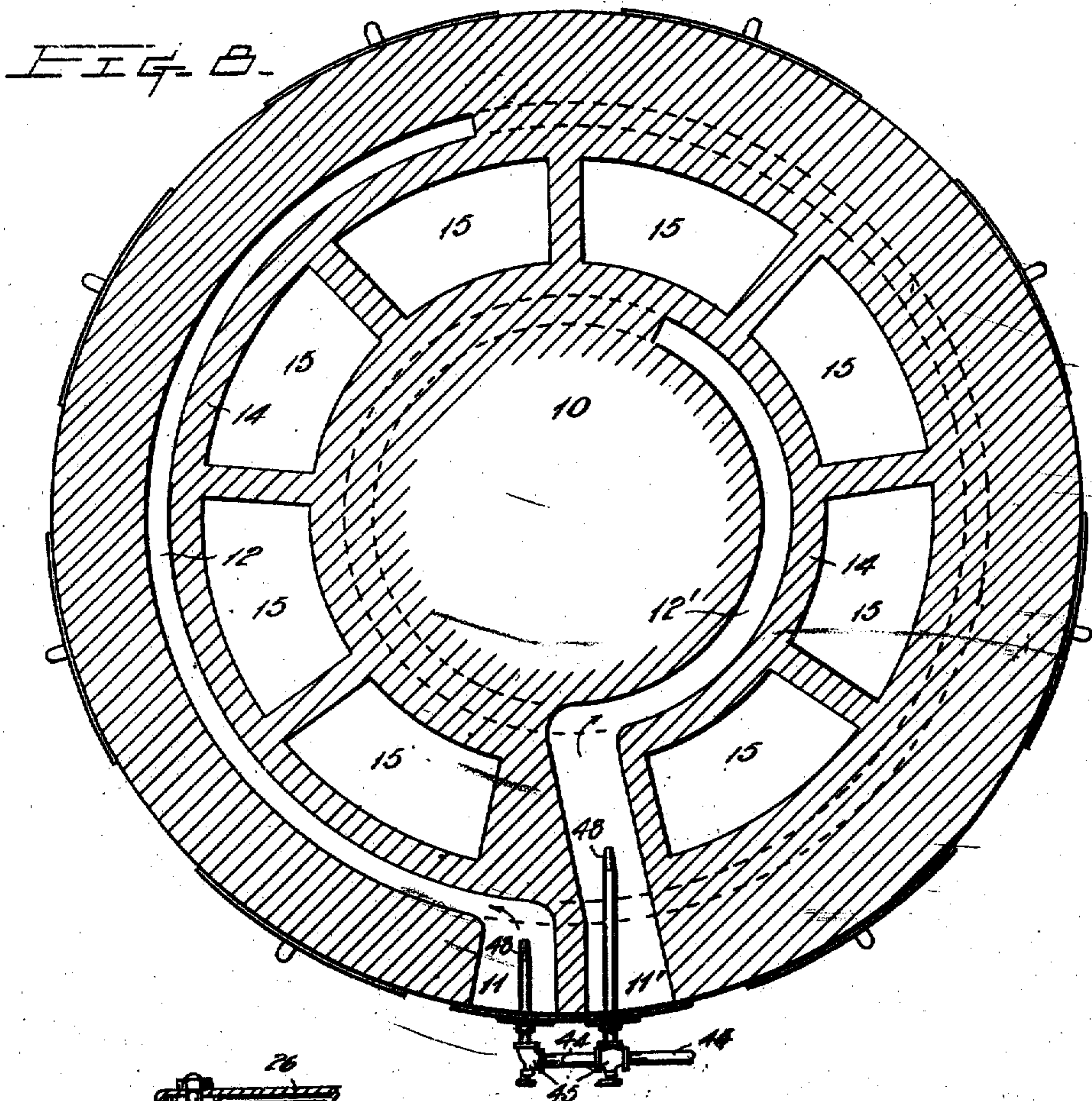
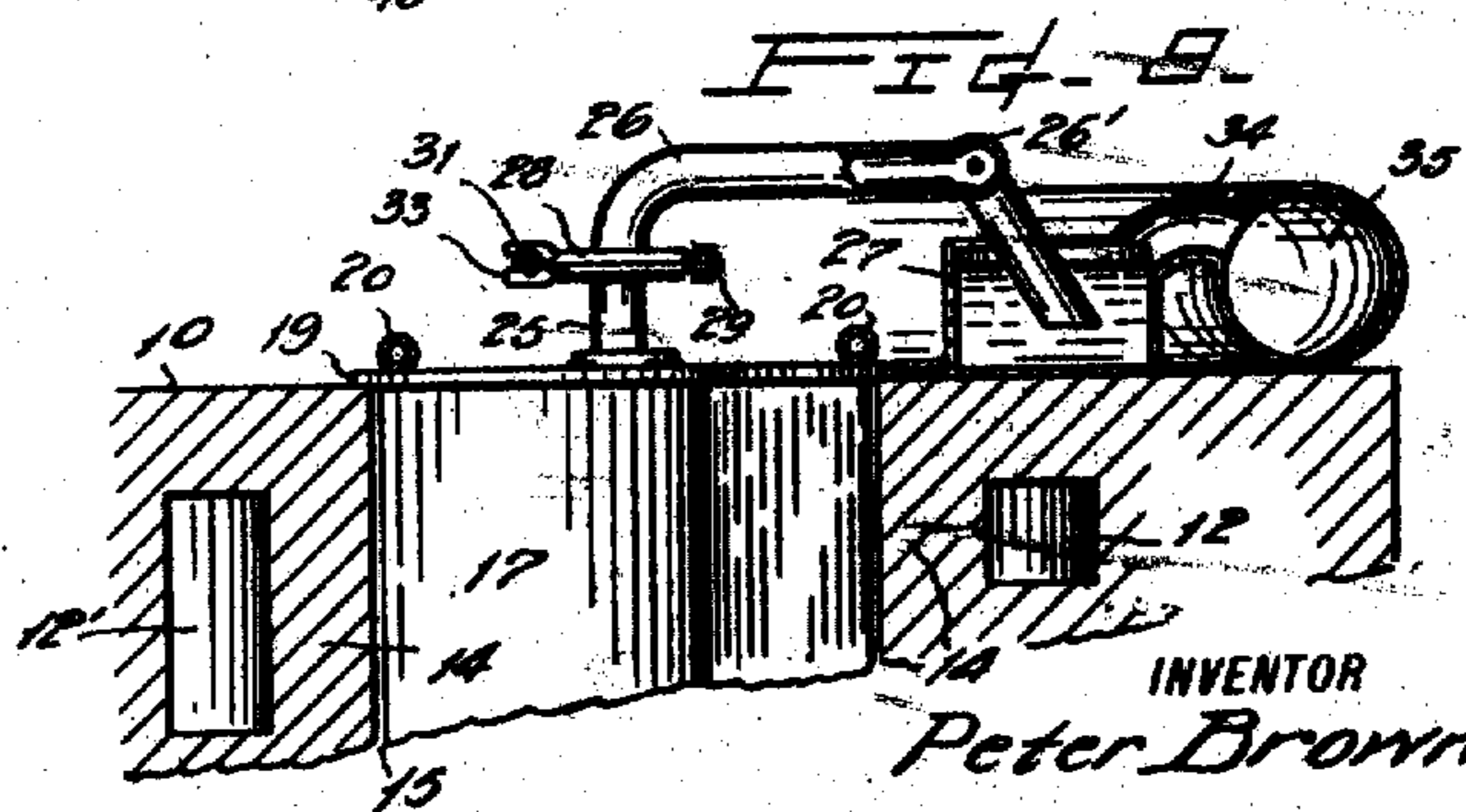


FIG. 7.



WITNESSES:

Horace Barnes.  
E. H. Alvord

INVENTOR

Peter Brown

BY

Horace Barnes  
ATTORNEY

# UNITED STATES PATENT OFFICE.

PETER BROWN, OF TROY, IDAHO.

RETORT FOR THE DESTRUCTIVE DISTILLATION OF RESINOUS WOODS.

No. 917,531.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed December 10, 1908. Serial No. 347,211.

*To all whom it may concern:*

Be it known that I, PETER BROWN, a citizen of the United States, residing at Troy, in the county of Latah and State of Idaho, have invented certain new and useful Improvements in Retorts for the Destructive Distillation of Resinous Woods, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a plan view of apparatus embodying my invention; Fig. 2, a cross sectional view taken through 2—2 of Fig. 1; Fig. 3, a fragmentary vertical section of the lower end of a retort with a sealing pan attached; Fig. 4, a perspective view of a pan such as illustrated in the preceding view. Fig. 5 is a plan view of a pipe coupling collar; Fig. 6, a detail sectional view of the separable pipe connection such as is employed with the various retorts. Fig. 7 is a detail sectional view of the swivel joint of a pipe connecting a trap-box; Fig. 8 is a cross sectional view illustrating the construction of the furnace, the flues thereof being shown somewhat diagrammatically; and Fig. 9 is a fragmentary sectional view of parts of the invention illustrated in Figs. 1 and 2.

The object of this invention is the provision of improved apparatus whereby resinous woods are economically decomposed by destructive distillation and whereby the heat to which it is subjected is so applied and controlled as to provide a maximum of efficiency with a minimum of waste.

A further object of the invention is the provision of a system of retorts which are capable of being interchangeably used in a furnace whose capacity in the quantity of material treated is increased and the operations of charging the retorts and removing the products in charcoal and distillates are uninterruptedly continued.

The invention consists in the novel construction and combination of parts, as will be hereinafter shown and claimed.

In the drawings, the reference numeral 10 represents a furnace of cylindrical form, preferably, which is constructed of brick, or the like, and is provided with two combustion chambers 11 and 11' which communicate by helical flues 12 and 12' extending through the furnace structure with individual smoke stacks or with one stack 13 which is common to both flues. Between these helical flues with relatively thin inter-

vening walls 14 is a plurality of oven chambers 15, open at their upper ends and respectively communicating with chambers 16 below.

17 represent metal retorts, each formed with a shell adapted to be inserted loosely within the ovens, interchangeably, and having an open end 18 and peripheral flanges 19 at its other end to furnish supporting bearings to rest upon the top of the furnace and cover the interstice between the oven walls and the shell of the respective retort. Adjacent of the closed end of a retort are eye-bolts 20, or an equivalent, wherewith a sling 21 of suitable hoisting gear such, for example, as a block 22, lines 23 and a derrick boom 24, may be connected with the retort for withdrawing or replacing the same in its oven.

Each retort is provided with a pipe 25 opening from its closed end, which pipe is adapted to be detachably connected by a complementary pipe 26 with any of the trap boxes 27. The last named pipes are each provided with a swivel joint 26' so as to be swung clear of the pipe 25 and the respective retort, as indicated by broken lines at the right hand side of Fig. 2, and at the meeting ends of the two pipes 25 and 26 are flanges 25" and 26" with oppositely beveled peripheries to be operatively engaged by an inter-nally grooved collar 28 for making the union, see Figs. 5 and 6. Such collar is made of two semi-circular portions which are hinged at 29 and removably held in clamping position upon said flanges by a nut 30 upon a bolt 31 which is pivotally connected by a pin 32 with the free end of one of the collar parts and adapted to be embraced by the bifurcated lug 33 of the other part. Said trap boxes are individually connected by branch pipes 34 with a receiving main 35 which in turn is provided with an outlet 36 to carry the escaping gases from the retorts to proper refining and storage receptacles which are not illustrated in the drawings.

Removably fitted within each retort, and in proximity of its open end, is a grate 37 for supporting the charge of wood which is being treated. For closing the open end of a retort, prior to its withdrawal from the furnace, a pan 38 is provided with an upwardly extending rim 39 to overlap the retort extremity and, when thus employed, the pan would be supplied with sufficient liquid to submerge such extremity and seal the end of

the retort against the escape of any gases which may then be in the retort and which, if allowed to escape into the oven from which the retort is being withdrawn, would be liable to catch fire. The pans are connected to the retorts so as to be conveniently detached by hooked spring arms 40 upon a pan engaging with cleats 41 upon a retort, as shown in Fig. 3. A drip-vessel 42 is provided in the chamber below each oven for the purpose of collecting the liquid products exuding from the wood before they have had time to vaporize and the tar, etc., thus collected is drawn off through trap-pipes 43. To provide a seal, or non-leakable connection, between a retort, when in place within an oven, as illustrated in Fig. 2, and its respective drip-vessel 42, the latter is provided about the upper edges of its sides with a gutter 42' for the reception of a quantity of water for submerging the bottom edges of the retort and preventing the escape of gases into the oven.

The heat to carry out the distillation of the wood is created by combustion of any suitable fuel, but desirably from the wood gas produced in the work and it is conveyed to the burners, such as 48, by pipes 44 provided with regulating cocks 45.

The operation of the invention is as follows: The wood to be treated is placed within a retort through its open end, while the retort is in a horizontal or reversed position, and the grate is then secured in its position to retain the wood in the retort while the latter is being carried to and deposited in an oven of the furnace and also during the time the charge is being treated. The retort is carefully lowered by means of the hoisting gear to cause the lower edges thereof to enter the liquid within the marginal gutter of the vessel below and until the flange 19 bears upon the top of the furnace, as aforesaid. Connection is now made with the trap-box 27 therefor by coupling the particular pipes 25 and 26. The charged retort now considered being in an oven is affected by the heat to cause the pitchy substances to exude and the greater portion thereof to fall into the vessel 42 below while such of these products as are vaporized flow through the above mentioned pipes to the connected trap-box and thence into the main 37 wherefrom they are conducted to a gasometer or elsewhere. After the wood within a retort has been sufficiently exposed to the heat to drive out or permit the escape of the resinous components and these liberated products in the form of liquid and gases have passed off through the proper channels, or at least the greater portion of them, the retort is removed from its oven by means of the hoisting gear to empty the retort of the residual charcoal and to recharge the same. In removing a retort the gas outflow pipes are first uncoupled and the pipe 25 is stopped with a

plug. Then the retort is raised a short distance to allow of the sealing pan 38 being placed between the vessel 42 and the bottom edges of the retort, whereupon the retort is lowered and engages with the fastening devices upon the pan 38 thereby closing up the open end of the retort to confine the contained gases while the retort is being taken from its oven.

The various retorts are subjected to the action of heat after being successively charged and handled as above explained and it is obvious that the operations can be continuously carried out by simply changing the retorts that have fulfilled their functions within the respective ovens for others which have been reloaded with wood for treatment.

The length of time which is necessary for a retort to remain in the oven will depend upon the character of the wood, and the temperature to which it is exposed and may be arrived at with a close degree of accuracy from former graded trials.

The invention is especially valuable in situations where tar and pitch are the main products sought for though the others, such as turpentine, pyroligneous acid, can be manufactured in various proportions by varying the attendant conditions, as the temperature of the furnace and the introduction of steam into the ovens.

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

1. In apparatus of the class described, the combination with a furnace provided with two combustion chambers, two helical shaped flues respectively connecting the combustion chambers with a stack, and a plurality of ovens interposed between said flues, said ovens being open at their top and bottom ends, of removable retorts for said ovens such retorts being severally provided with an open lower end, a removable grate for each said open end, a trap-box for each retort, a separable pipe connection between the respective retorts and trap-boxes, an open top vessel located in the furnace below each said oven, means to prevent the escape of gases from between said vessels and the respective retorts when the latter are in operative position, and a detachable closure for the open end of each retort.

2. In apparatus of the class described, the combination with a furnace provided with a combustion chamber, a helical shaped flue connecting the combustion chamber with a stack, and a plurality of ovens which are open at their top and bottom ends, of removable retorts for said ovens each of which is provided with an open lower end, a removable grate for each said open end, a trap-box for each retort, a separable pipe connection between the respective retorts and trap-boxes, discharge conduits for the trap-boxes,

an open top vessel located in the furnace below each said oven, means to prevent the escape of gases from between said vessels and the respective retorts when the latter are in operative position, and a detachable closure for the open end of each retort.

3. In apparatus of the class described, the combination with a furnace provided with combustion chambers, and helical shaped flues respectively connecting the combustion chambers with a stack, and a plurality of ovens which are open at their top and bottom ends, of removable retorts for said ovens each of which is provided with an open lower end, a removable grate for each said open end, a trap-box for each retort, a separable pipe connection between the respective retorts and trap-boxes, discharge conduits for the trap-boxes, an open top vessel located in the furnace below each said oven, and means to prevent the escape of gases from between said vessels and the respective retorts when the latter are in operative position.

4. In apparatus of the class described, the combination with a furnace provided with a combustion chamber, a helical shaped flue connecting the combustion chamber with a stack, and a plurality of ovens which are open at their top and bottom ends, of removable retorts for said ovens each of which is provided with an open lower end, a removable grate for each said open end, a trap-box for each retort, a separable pipe connection between the respective retorts and trap-boxes, discharge conduits for the trap-boxes, and means to prevent the escape of gases from between said vessels and the respective

retorts when the latter are in operative position.

5. In apparatus of the class described, the combination with a furnace provided with a combustion chamber, a helical shaped flue connecting the combustion chamber with a stack, and a plurality of ovens which are open at their top and bottom ends, of removable retorts for said ovens each of which is provided with an open lower end, a removable grate for each said open end, a trap-box for each retort, a separable pipe connection between the respective retorts and trap-boxes, and discharge conduits for the trap-boxes.

6. In apparatus of the class described, the combination with a furnace provided with two combustion chambers, two helical shaped flues respectively connecting the combustion chambers with a stack, and an oven interposed between said flues, said oven being open at its top and bottom ends, of a removable retort for said oven, such retort being provided with an open lower end, a removable grate for said open end, a trap-box, a separable pipe connection between the retort and the trap-box, an open top vessel located in the furnace below said oven, and means to prevent the escape of gases from between said vessel and the retort when the latter is in operative position.

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

PETER BROWN.

Witnesses:

PIERRE BARNES,  
JOSEPH RISSE.