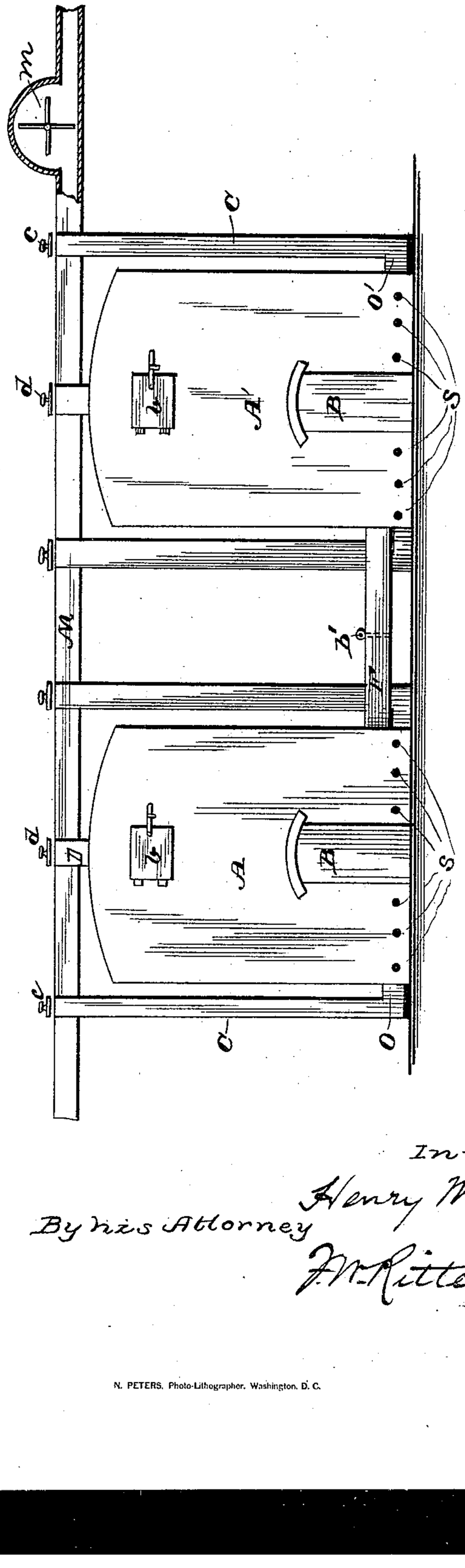
(No Model.) 2 Sheets—Sheet 1.

H. M. PIERCE.

METHOD OF AND APPARATUS FOR TREATING WOOD FOR THE MANUFACTURE OF CHARCOAL.

No. 309,874. Patented Dec. 30, 1884.



Witnesses
Wm J Tanner
Chas. H. Baker

Inventor
Henry M. Pierce
By his Attorney
F. W. Ritter

(No Model.) 2 Sheets—Sheet 2.

H. M. PIERCE.

METHOD OF AND APPARATUS FOR TREATING WOOD FOR THE MANUFACTURE OF CHARCOAL.

No. 309,874. Patented Dec. 30, 1884.

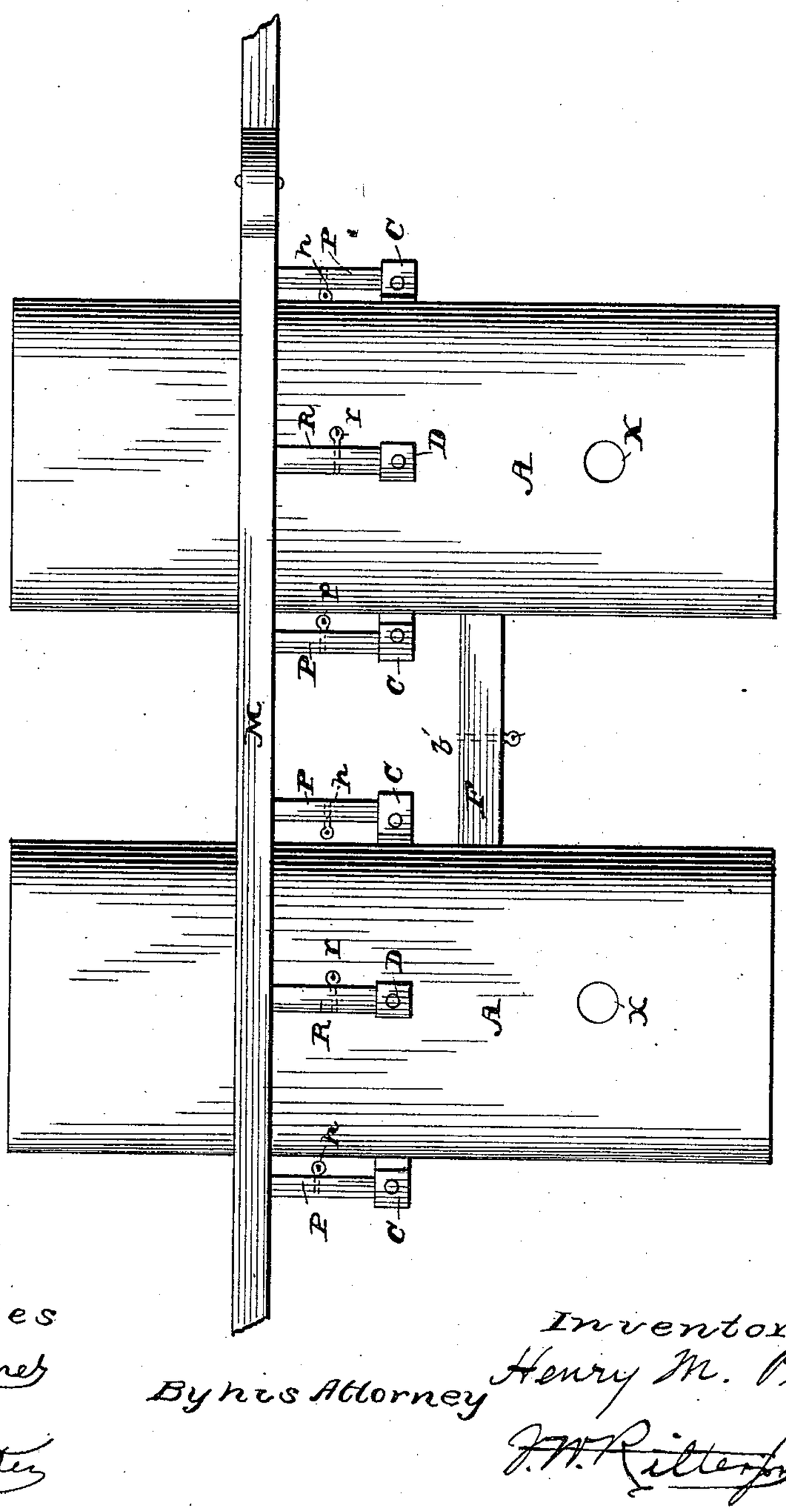


Fig. 2.

Witnesses
Wm J Tanner
Chas. H. Baker

Inventor
Henry M. Pierce.
By his Attorney
F. W. Ritter

UNITED STATES PATENT OFFICE.

HENRY M. PIERCE, OF CHICAGO, ILLINOIS.

METHOD OF AND APPARATUS FOR TREATING WOOD FOR THE MANUFACTURE OF CHARCOAL.

SPECIFICATION forming part of Letters Patent No. 309,874, dated December 30, 1884.

Application filed November 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. PIERCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of and Apparatus for Treating Wood for the Manufacture of Charcoal and the Recovery of Wood Products, such as Turpentine, &c.; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is an elevation of devices illustrating my invention. Fig. 2 is a plan view of the same.

Like letters refer to like parts wherever they occur.

The object of the present invention is to facilitate the preparation of woods for carbonization or distillation, whereby substantially the full equivalent of the material shall be obtained in the products.

While I do not confine myself exclusively to the treatment of soft woods—such as the pines and firs—or to the production of charcoal and turpentine rosin, yet I have especially devised the invention with reference to such uses, for the reasons that unless a larger yield of such products is obtained than can be obtained by the present method of manufacturing the woods will, owing to the growing scarcity of timber, soon be too valuable to apply to such purposes.

The common method of obtaining turpentine and resin is by tapping the trees and distilling the gum obtained thereby. This yields but a small per cent. of the valuable products, and the remainder is lost in coaling as commonly practiced. The production of turpentine for several years has fallen short of the demand, and the price has correspondingly advanced. This I conceive can only be remedied by obtaining the full value in charcoal and other products of the woods consumed in manufacturing.

The present invention, which is one of a series, applications for which have been filed of even date herewith, relates more especially to the utilization of waste heat and gases from the carbonizing or distilling process for the preliminary treatment of the woods, the resultant products being received and treated by a method and means described in another of my said applications. The first vapors given off in the combination or distillation of woods are aqueous and comparatively useless, and if collected with the subsequent products simply serve to dilute the same and retard their subsequent treatment, while the last products given off are very light and dry highly-heated gases which contain nothing of special value.

The first part of my invention consists in utilizing these final or highly-heated gases, to convey off the aqueous vapors in the preliminary treatment of the wood to dry the same for subsequent carbonization or distillation; and the second part of my invention relates to the construction and arrangement of devices especially adapted to carrying out said process.

I will now proceed to describe my invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A A′ indicate two of a series of carbonizing-chambers, which may be of any approved construction, but are preferably rectangular charcoal-kilns constructed of brick, with square corners and arched roofs, provided with timber-work to support the arches, and having charging-doors B *b* and firing-holes *x*. Below and around the base of the kilns are a series of air inlets or ports, *s s*, and at the sides are two or more flues or chimneys, C C, which connect below, as at *o*, with the interior of the kiln, and are provided above with dampers *c*. Each chimney or flue C, near its top, is connected with the gas and vapor main or conduit M by means of a short flue, P, provided with a damper, *p*. On top, and preferably near the center of the kiln, I also construct one or more short chimneys, D, which are connected with the main M by short flues R, provided with damper *r*. The tops of chimneys D are provided with dampers *d*.

M indicates a gas-main, into which the several flues P P and R R deliver the gases and vapors from the kilns or carbonizing-chambers A. This main may be round or of other suitable form, constructed of wood banded with iron, and supported at a suitable height above the kiln by frame-work resting on the kiln. It is preferably inclined, so as to free itself of

any condensed vapors, and delivers into a condenser. (Not shown.) The flues P P and R R may also be of wood.

The kilns A A′, &c., or carbonizing-chambers of the series are connected in succession, at or near their bases, by flue F, provided with a suitable damper, *b′*.

The above constitutes the preferred construction of my devices in so far as they relate to the present invention, and my method is carried out by means thereof, as follows: The several kilns or carbonizing-chambers A A′, &c., are filled with wood through the doors B *b*. The doors closed and luted up, the damper *b′* is turned to cut off the communication between kilns A and A′. Air-inlets *s s* and dampers *c* are opened and *d* closed, and the kiln is fired through the proper opening, *x*. The first vapors given off being aqeuous and comparatively valueless are permitted to escape by dampers *c;* but as soon as the valuable vapors begin to pass off the dampers *c* are closed and dampers *p* opened, said gases being conducted from the kiln through main M (by means of a fan, *m*, or other suitable exhaust, if desired, though the pressure in the kiln will effect the result) to a condenser, as hereinbefore specified. Toward the completion of the carbonizing process the products evolved will become less rich in valuable products and very hot, being little more than highly-heated non-condensable gases, and of a character adapted to absorb and carry off aqueous vapors. When this point is reached, I close the dampers *p* and open the damper *b′* in the flue F connecting the kilns A, and A′, thus directing the hot waste gases into kiln A′, where they rapidly absorb the useless aqueous vapors, and after becoming charged therewith escape by the flue D of kiln A′ the cap or damper *d* having been raised for that purpose. So long as the vapors evolved by the wood in kiln A′ are watery and valueless I permit them to escape by damper *d;* but a point is soon reached where the light and highly-heated gases commence to take up and convey the turpentine and to free the wood of resinous matters. I then close damper *d* and open damper *r* and conduct such products into the main M. It will thus be seen that the preliminary treatment of the wood is also a method of recovering the valuable products. By this means the wood in kiln A′ is thoroughly prepared for carbonization before being fired, and usually by the time the carbonization is completed in chamber or kiln A. Damper *b′* can then be shut down, kiln A closed and allowed to cool, and kiln A′ fired.

A third, fourth, or any number of kilns can be arranged and operated successively, as before specified, and the practical manufacturer will regulate the number and size of the kilns by the demands of his business, and the time required for the carbonizing and cooling processes, so as to obtain a continuously-working plant.

I am aware that it has been proposed to pass the vapors from a newly-lighted charge of wood continuously, during the period of desiccation, distillation, and carbonization of such charge, through a second charge of like material, for the purpose of converting the latter into *charbon roux.* In such process, however, the second charge acts as a condenser for the aqueous vapors and by-products given off from the first and becomes supersaturated, thereby materially lengthening the time necessary to bring it to the beginning of the period of carbonization, and requiring a larger quantity of fuel for that purpose. By allowing the aqueous vapors and other condensable products to escape from the first charge, and directing only the dry hot gases of carbonization into the second, I utilize the only portion of the waste heat which is practically available, wholly avoiding the disadvantages attendant upon the process referred to.

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

1. The method herein described of preparing woods for carbonization, which consists in permitting the condensable vapors of an initial charge to escape directly into the open air, or into a condenser, and then passing the light highly-heated gases given off toward the close of carbonization or distillation through the fresh charge to be treated, substantially as and for the purpose specified.

2. The combination of two kilns, each having collecting-flues which communicate with the base of its kiln, a gas-main common to both kilns and connecting with the collecting-flues, a flue which connects the kilns at their bases, and a series of valves or dampers for controlling the several flues, substantially as and for the purpose specified.

3. The combination of a charcoal-kiln having a collecting flue or flues communicating therewith at or near the base of the kiln; a gas-main, a flue or flues for connecting the collecting flue or flues with the gas-main, and suitable dampers for controlling the several flues, substantially as and for the purpose specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 20th day of November, 1882.

HENRY M. PIERCE.

Witnesses:
F. W. RITTER, Jr.,
H. B. MOULTON.