

(No Model.)

J. A. MATHIEU.

### CONDENSER FOR PYROLIGNEOUS ACID.

No. 354,330.

Patented Dec. 14, 1886.

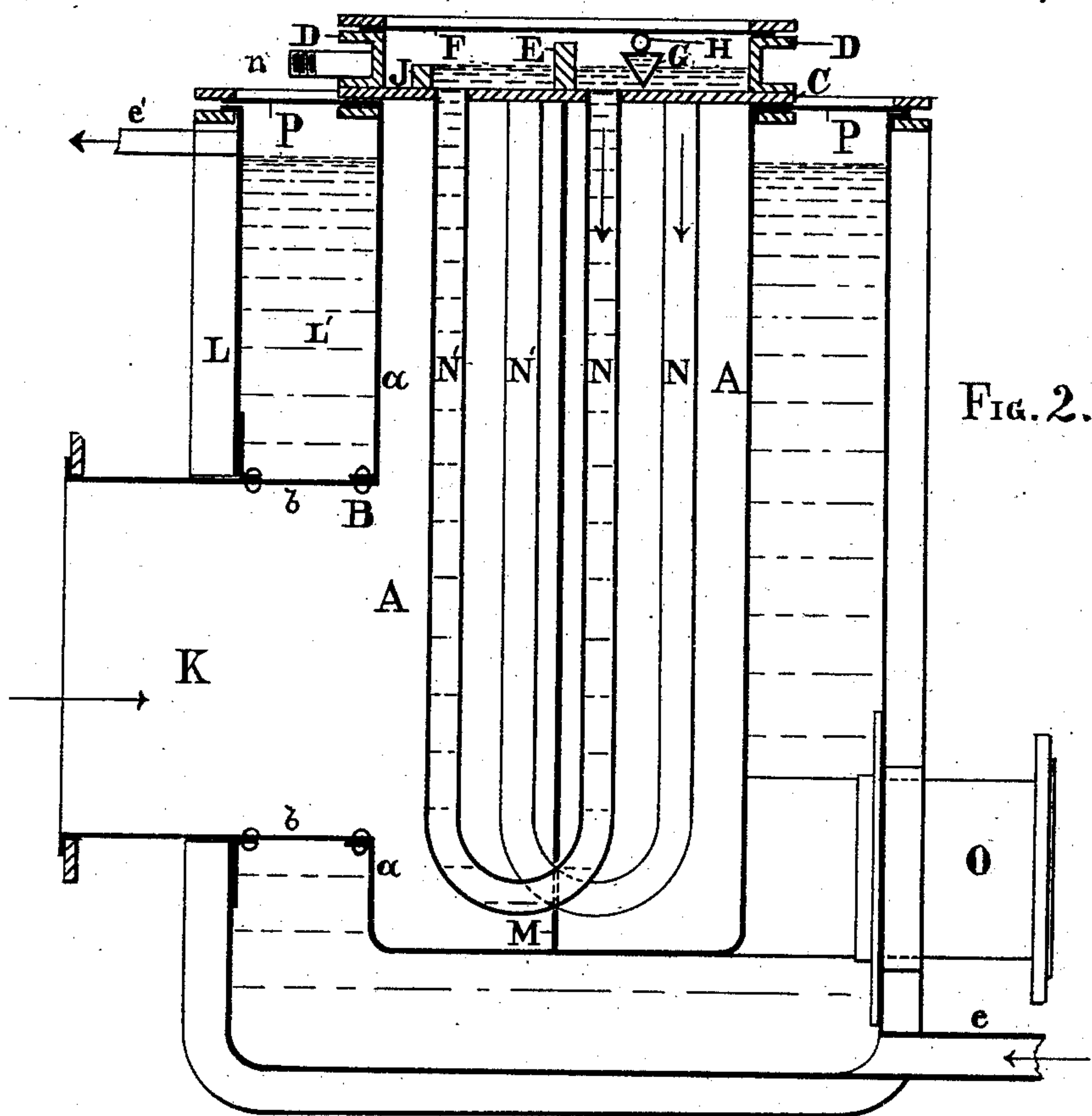
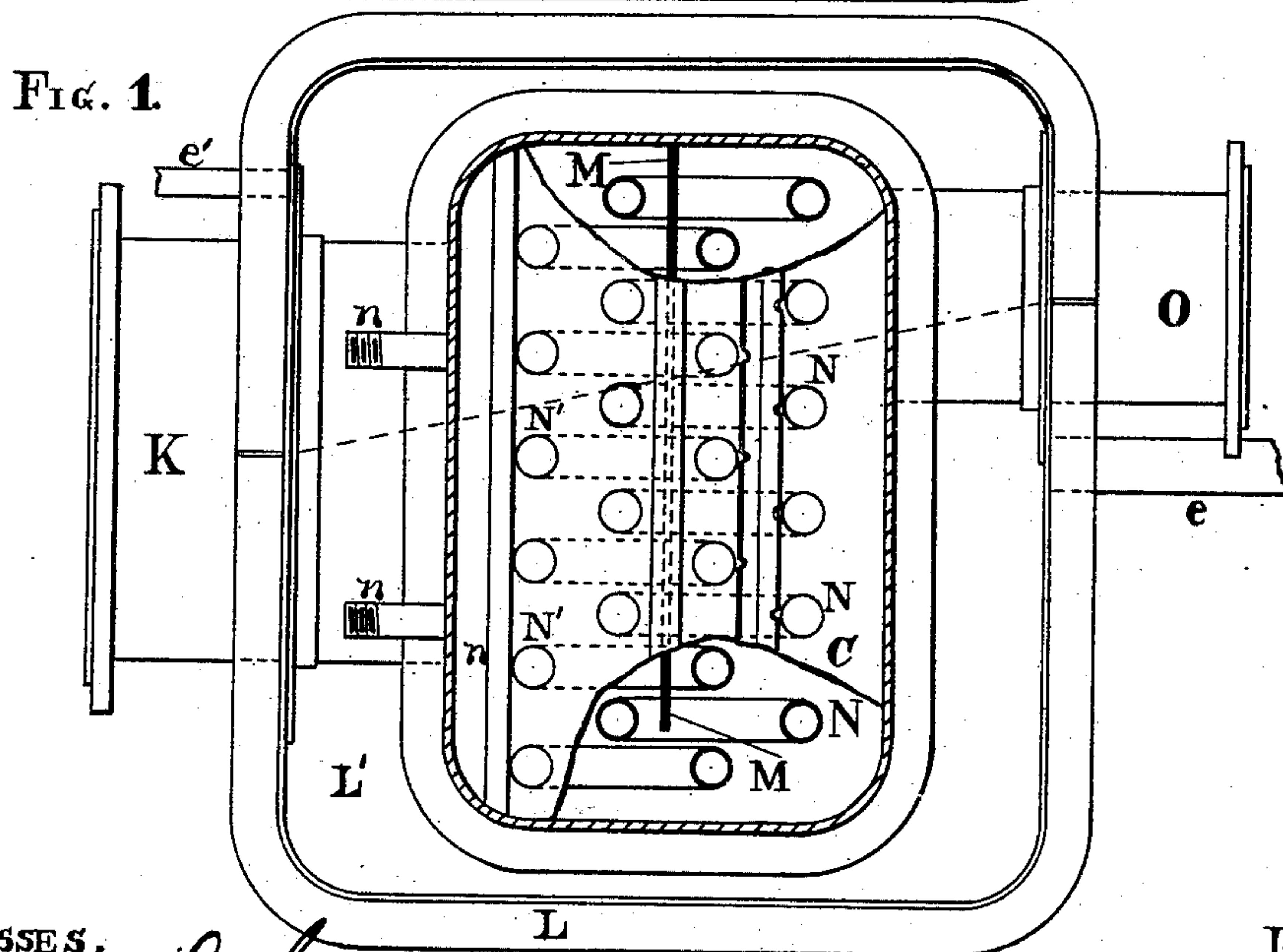


FIG. 2.



**FIG. 1.**

**WITNESSES:**

WITNESSES:  
*Grace E. Lathrop*  
*Sumner Collins*

**INVENTOR.**

INVENT  
J. A. Mathieu  
by Geo. H. Lathrop  
Atty.

# UNITED STATES PATENT OFFICE.

JEAN ANTOINE MATHIEU, OF DETROIT, MICHIGAN.

## CONDENSER FOR PYROLIGNEOUS ACID.

SPECIFICATION forming part of Letters Patent No. 354,330, dated December 14, 1886.

Application filed March 25, 1884. Serial No. 125,407. (No model.)

*To all whom it may concern:*

Be it known that I, JEAN ANTOINE MATHIEU, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Condensers for Purifying Pyroligneous Acid, of which the following is a specification.

Figure 1 is a plan view with the top plate partly broken away, and Fig. 2 is a vertical section.

My invention consists in certain improvements in the construction of condensers for purifying pyroligneous acid, hereinafter pointed out in the claims.

A consists of a copper vessel, which is connected by a copper pipe, K, with a boiling-kettle, or with another condenser which is connected with a boiling-kettle. Wherever a joint is made between two plates forming the sides of the condenser, as *a b*, it is done by overlapping the plates and securing them by rivets B.

The top plate, C, of the condenser is made somewhat heavier than the sides, and in it is fastened a number of U-shaped seamless copper pipes, N N', the ends thereof being expanded in plate C. On the top of plate C is fastened a rim, D, making a basin, which is divided by the center partition, E. An open trough, G, supplied with water by a pipe, H, furnishes water to one side of this basin, which descends through pipes N, rises through the bends thereof N', and is discharged through pipe *n*.

O represents a pipe connected with condenser A at the bottom and one side, as shown in Fig. 1, to lead off the condensed products therefrom.

M represents a partition or diaphragm running the whole height of the condenser, but not extending clear across the condenser, as shown in Fig. 2, being in contact with the wall at the side from which outlet-pipe O leads, but not reaching the opposite wall. It is pierced with holes to receive the bent pipes N, and need not be closely fitted to the walls of the condenser, its object being to prevent the passage of vapor in a direct line from pipe K to pipe O.

The whole condenser A is set in a wooden tub, L, the pipes K O making tight joints with said tub where they pass through it, and the tub is kept full of pyroligneous acid L', which

is forced in a cold state through the pipe *c*, and is drawn off through the pipe *c'* into the boiling-kettle. By this means the acid to be distilled is used as a cooling and condensing agent, and thereby partially heated before being distilled, thus saving an amount of heat which is usually wasted.

It will be observed that the U-shaped copper tubes are of uniform length, and are located side by side across the condenser, and, further, that the inner limbs of the pipes are alternately opposite the spaces between the two limbs of the series, whereby the efficiency of the circulation and the condensing-surface are largely increased and the condensing of the vapors rapidly effected.

By my improvements in construction I avoid soldered joints entirely, and am enabled to use seamless copper pipe of small size, thus effecting a large reduction in first cost, a great increase in durability, and, I believe, increased efficiency.

F represents a close cover for the basin at the top of the condenser, and consists of a copper plate held down by an iron flange, which is bolted to rim D. By thus making this basin tight I am enabled to circulate cold pyroligneous acid through pipes N, instead of water, without danger of losing any wood-alcohol by evaporation.

Tub L is covered by a copper plate, P, secured in the same manner as cover F.

When tub L is made of copper instead of wood, I prefer to make it in two parts, separated on the dotted line in Fig. 1, which runs from the center of pipe K to the center of pipe O.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the condenser A, having the inlet and outlet pipes K and O, with the cap-plate C, a series of U-shaped pipes, N N', secured at their ends in the cap-plate, the vertical diaphragm M, extending across the condenser and terminating at a short distance from one wall thereof, and pierced at its lower ends with holes, through which the bends of the pipes pass, the rim D, water-supply pipe H, and discharge-pipe *n*, substantially as and for the purpose described.

2. The combination of the condenser A, having the inlet and outlet pipes K and O, with



the cap-plate C, a series of U-shaped pipes, N N', of uniform length, located side by side across the condenser, with the inner limbs of the pipes alternately opposite the spaces between the two limbs of the series, the vertical diaphragm M, extending across the condenser and terminating a short distance from one wall thereof, and pierced with holes at its lower end, through which the limbs of the pipes pass, the rim D, the water-supply H, and the discharge-pipe n, substantially as and for the purpose described.

3. The combination, with the condenser A, having the inlet and outlet pipes K and O, and the series of pipes N N', of the tub L, surrounding the condenser, and having the pipes e e' for the circulation of cold pyroligneous acid

around the exterior of the condenser, substantially as described.

4. The combination of the condenser A, having inlet and outlet pipes K and O, and the series of pipes N N', with the cap-plate C, the rim D, forming a basin, a tight cover, F, secured upon the rim, the water-supply pipe H, the trough G in the basin for receiving the water from the supply-pipe, and the discharge-pipe n, substantially as and for the purpose described.

JEAN ANTOINE MATHIEU.

Witnesses:

M. W. EDGAR,  
SUMNER COLLINS.