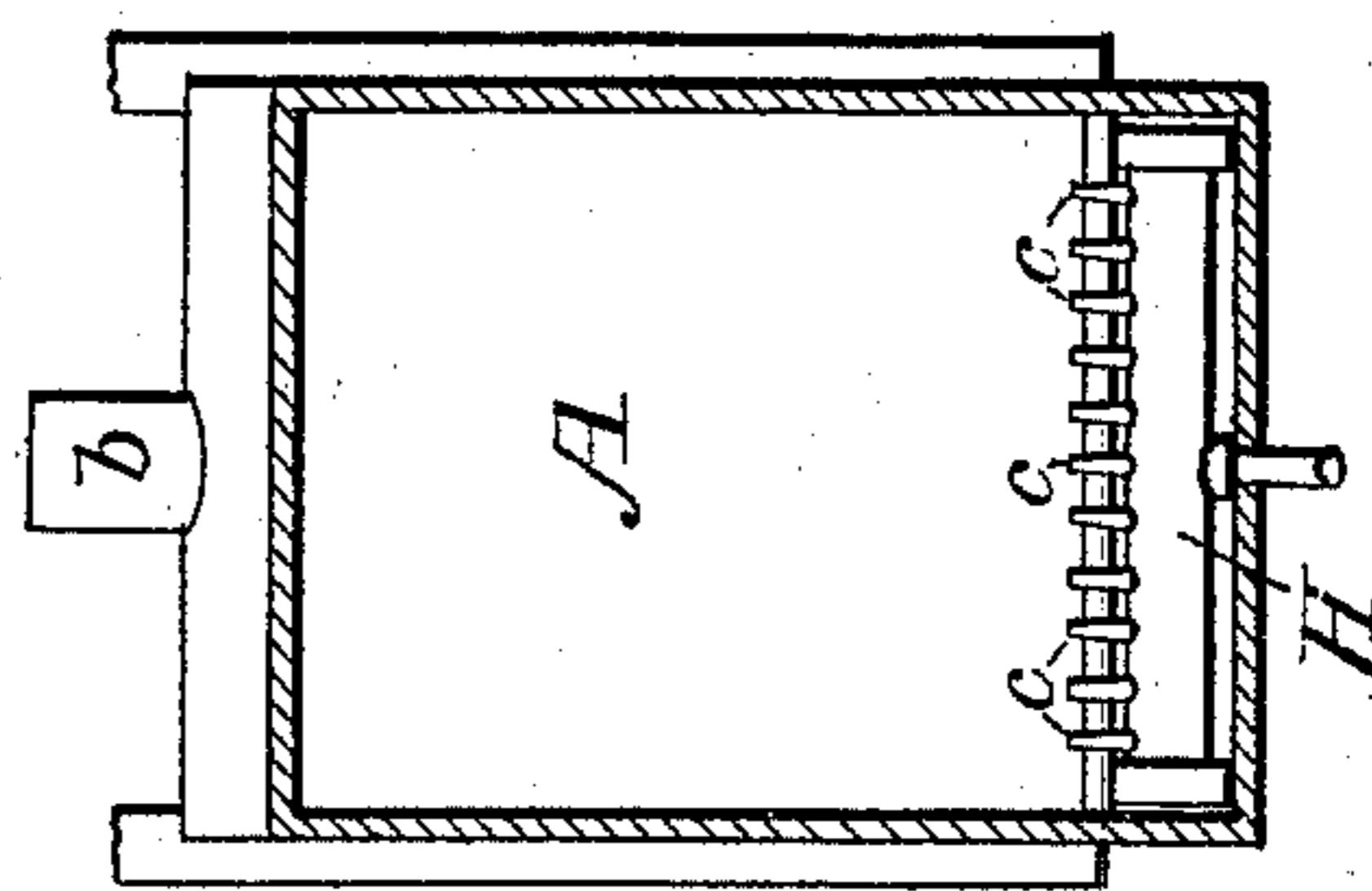
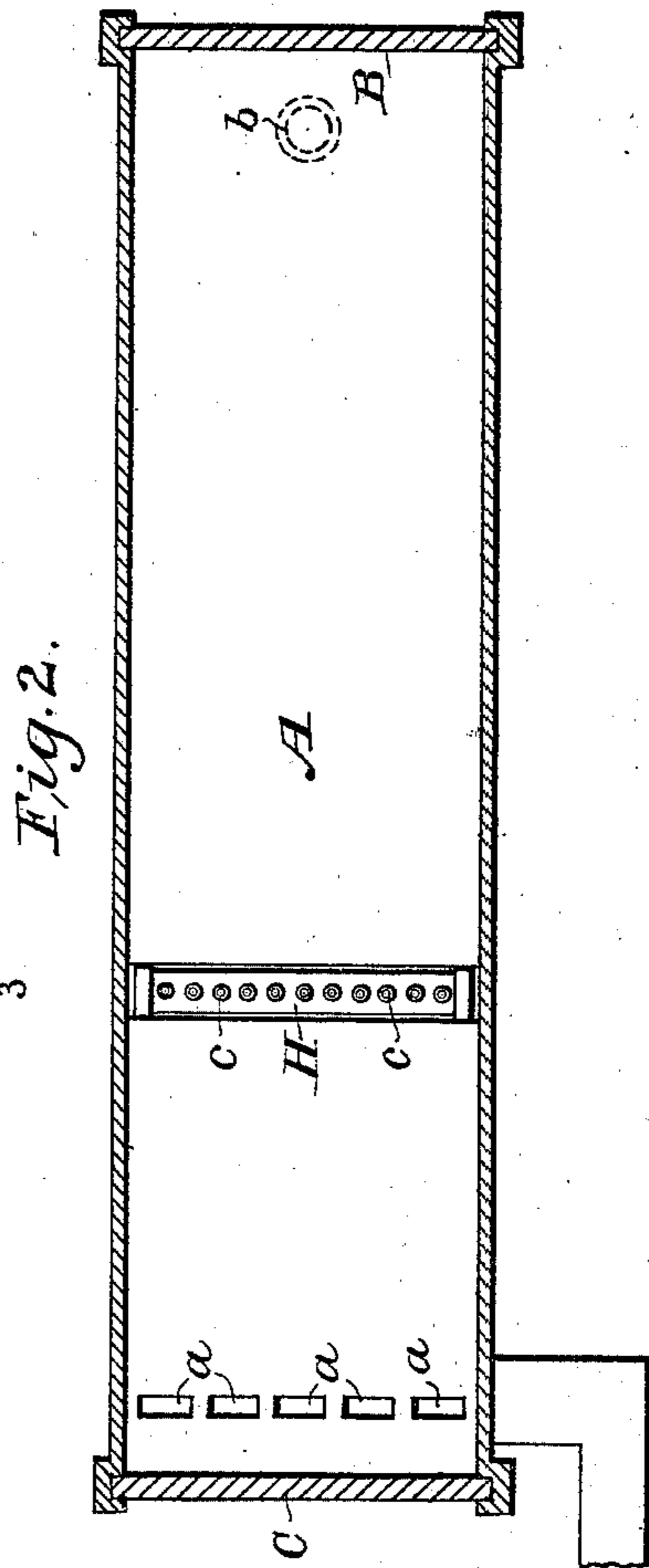
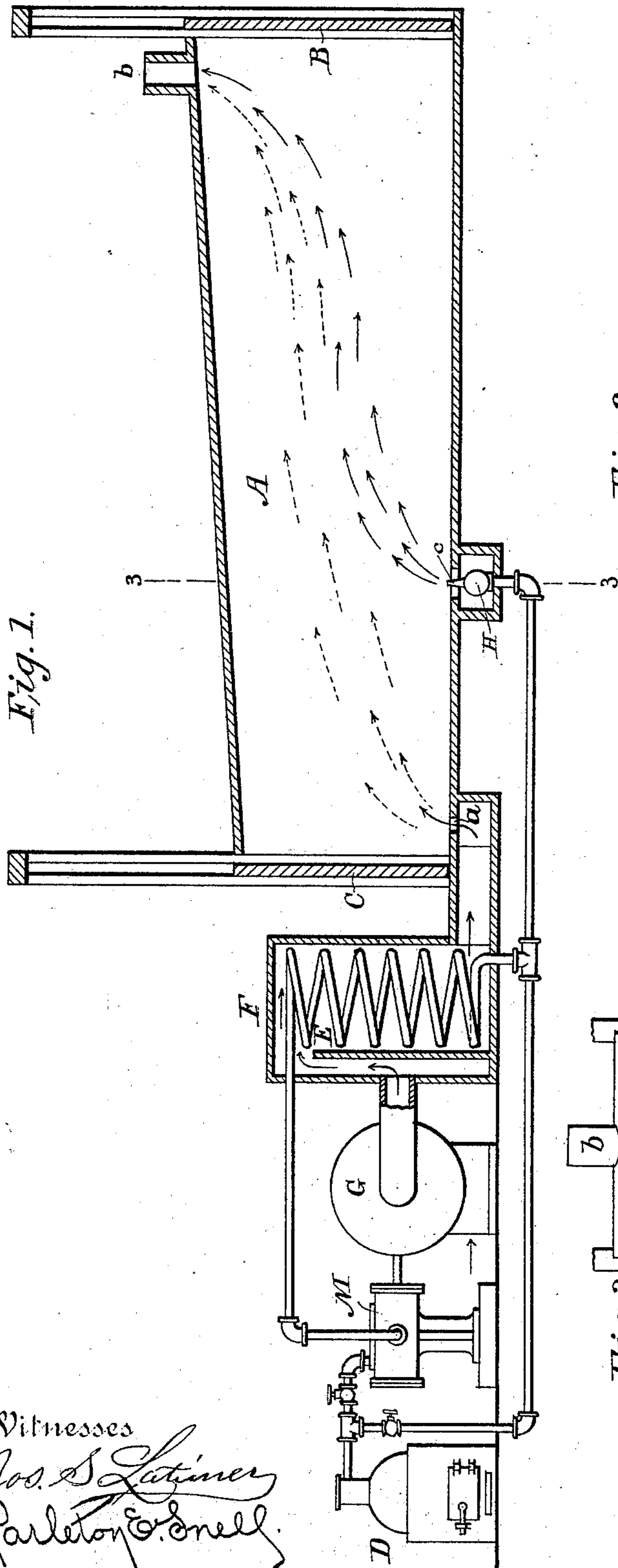


(No Model.)

G. T. SCHULTZE.  
APPARATUS FOR DRYING LUMBER.

No. 519,352.

Patented May 8, 1894.



Witnesses  
*Jos. S. Latimer*  
*Parleton & Snell*

Inventor  
*George T. Schultze*  
by *Arthur D. Brown*  
his Attorney

# UNITED STATES PATENT OFFICE.

GEORGE T. SCHULTZE, OF EVANSVILLE, INDIANA.

## APPARATUS FOR DRYING LUMBER.

SPECIFICATION forming part of Letters Patent No. 519,352, dated May 8, 1894.

Application filed November 6, 1893. Serial No. 490,074. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE T. SCHULTZE, of Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Apparatus for Drying Lumber, of which the following is a specification.

Heretofore it has been a customary and usual practice to dry lumber in a kiln wherein the lumber is admitted in its green state into one end of the drying chamber of the kiln (the entrance end being hence termed the "green end"), is advanced from time to time forwardly through the drying chamber, and is discharged when dry at the opposite end of the drying chamber (the discharge end being hence termed the "dry end"); and wherein hot air is introduced at the dry end of the drying chamber and passes through the drying chamber in a direction opposite to that in which the lumber advances and passes out at the green end of the drying chamber. The current of air through the drying chamber may be produced by natural draft, or by a suction fan or pump in connection with the air outlet, but usually and preferably the current of air is produced by a fan blower in connection with the air inlet at the dry end of the kiln, which forces the air through the kiln. The air before entering the fan blower on its way to the kiln is heated and brought to the proper hygrometric condition. The air thus enters the drying chamber hot and dry and in its passage through the same absorbs moisture from the lumber and conducts the moisture from the lumber to outside of the drying chamber. From time to time the fully dried lumber is removed from the dry end of the kiln, the partly dried lumber within the kiln is advanced toward the dry end, and green lumber is introduced at the green end, so that the drying is a progressive and continuous process. It is a frequent practice in connection with such a kiln to subject the lumber before its introduction into the drying chamber to a steaming process in a steaming chamber.

In drying hardwood lumber by this usual and known method, either with or without the preparatory steaming, the result is defective, since the wood becomes checked, honey-combed, or case-hardened, so that when

the lumber is finished its appearance is ruined and its utility is destroyed. These defects are believed to be due to the circumstance that the lumber is dried unevenly, so that the outer faces of each piece of lumber are dried before the interior part. The outer dry shell of the piece of lumber then constitutes a barrier preventing the ready escape of the interior moisture which on being vaporized swells and breaks the cellular structure and distorts the grain of the wood, so that the inner part or heart is full of crevices or cracks which are brought to the surface when the lumber is finished.

The object of the present invention is to avoid the indicated defects in hardwood lumber when thus progressively and continuously dried. The present improvements consist in a kiln provided with steam or vapor inlets located at a point intermediate between its dry and green ends, so that the steam or warm vapor is introduced into the drying chamber at a point intermediate between its green and dry ends and is thence conducted toward the green end of the chamber simultaneously with the current of air, whereby the surface of the lumber is maintained moist and green until the heart of the lumber is thoroughly dried. When the heart of the lumber is thus dried, the lumber is advanced to the dry end of the chamber between the air inlet and the steam inlet, where it is subjected to the dry air only and the surface is then dried.

The improved apparatus consists in the kiln provided with the necessary steam or vapor inlets located at a point intermediate between its dry and green ends.

The invention in its preferred embodiment is illustrated in the accompanying drawings, wherein—

Figure 1, is a diagram showing the drying chamber in vertical section. Fig. 2, is a diagram showing the drying chamber in horizontal section; and Fig. 3, is a diagram showing the drying chamber in cross-section.

A, is the drying chamber, having doors B, C, at its green and dry ends respectively for the reception and discharge of the lumber.

D, is a steam boiler which furnishes steam to steam coils E, within an air-heating chamber F. The hot-air from heating chamber F,

is forced by a fan-blower G, into the drying chamber A, through air inlets *a, a*, at the dry end of the chamber. The air passes through the drying chamber in the direction of the long dotted arrows to the air outlet flue *b*, at the green end of the drying chamber. The live steam from the boiler is used to operate the steam motor M, which drives the fan blower, and the exhaust steam from the motor may be utilized in all or a part of the coils E, for heating the air. In all of these respects, the kiln is or may be identical with the well-known kilns of the Standard Dry Kiln Company.

Any means of heating the air before its introduction into the drying chamber may be employed, and any means may be employed for maintaining a current of air throughout the drying chamber from the air inlet to the air outlet, or natural draft may be relied on. Also any of the well-known expedients may be utilized for insuring the equal distribution and circulation of the air throughout the drying chamber. It is only essential to the present invention that the air should enter the drying chamber dry and hot, and that there should be a current of the air from the air inlet at the dry end of the chamber to the air outlet at the green end thereof.

Extending crosswise of the drying chamber, preferably at the bottom thereof, and about one-third of the length thereof from the dry end, are a plurality of steam inlet orifices *c, c*, which are supplied by steam from a steam chamber H, which is supplied with steam or warm water vapor from any suitable and convenient source, such as from the boiler D, from the steam discharge end of the coils E, or elsewhere. It is only essential that the steam or vapor should enter the drying chamber between its green and dry ends. The water vapor should be warm so as not to reduce the temperature of the air in the drying chamber. The entering steam encounters the moving current of hot air so that it is carried with it toward the green end and the outlet *b*. The path of the steam is indicated by the short full line arrows. The space in the chamber between the steam inlet *c*, and the steam and air outlet *b*, is thus filled with a moving volume of warm air and vapor, so that the drying is accomplished at this end mainly by the heat and in the interior or

heart of the wood, the moist atmosphere preventing the drying of the surface of the lumber. The space, however, between the dry end of the chamber and the steam inlet is occupied by a moving volume of dry air only, so that the surface of the lumber there is dried. In this manner the lumber is dried from the inside outwardly in a thorough and efficient manner, and with rapidity as compared with the known process above referred to. In using this improved kiln, the hot air has been introduced into the drying chamber at a temperature varying from 140° to 200° Fahrenheit, and I have usually taken the steam directly from the boiler where the pressure varies from twenty to fifty pounds per square inch. The time required will depend upon the size of the lumber, its character, and whether it is fresh from the log or not. I have thoroughly seasoned green oak lumber fresh from the saw—three eighths of an inch thick in forty-eight hours, and one inch thick in eight days. One advantage of the improved kiln, which shortens the time required, is that a high degree of heat can be utilized which would otherwise ruin the lumber.

It will be understood that the lumber in the kiln is advanced progressively from time to time as heretofore, green lumber being introduced at the green end as fast as dried lumber is taken out at the dry end, so that the operation is a continuous and progressive one.

I claim as my invention—

The elongated drying chamber having a hot-air inlet at its dry end and an air outlet at its green end, and means for maintaining a longitudinal current of air within the drying chamber from the air inlet to the air outlet, in combination with an inlet to the drying chamber for steam or vapor intermediate between the air inlet and the air outlet, whereby the atmosphere at the green end of the chamber is damp, and at the dry end of the chamber is dry, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE T. SCHULTZE.

Witnesses:

PHILIP KLEIN,  
HENRY ROSENBERGER.