

(No Model.)

C. HOWARD.
METHOD OF VULCANIZING WOOD.

No. 520,597.

Patented May 29, 1894.

Fig. 1.

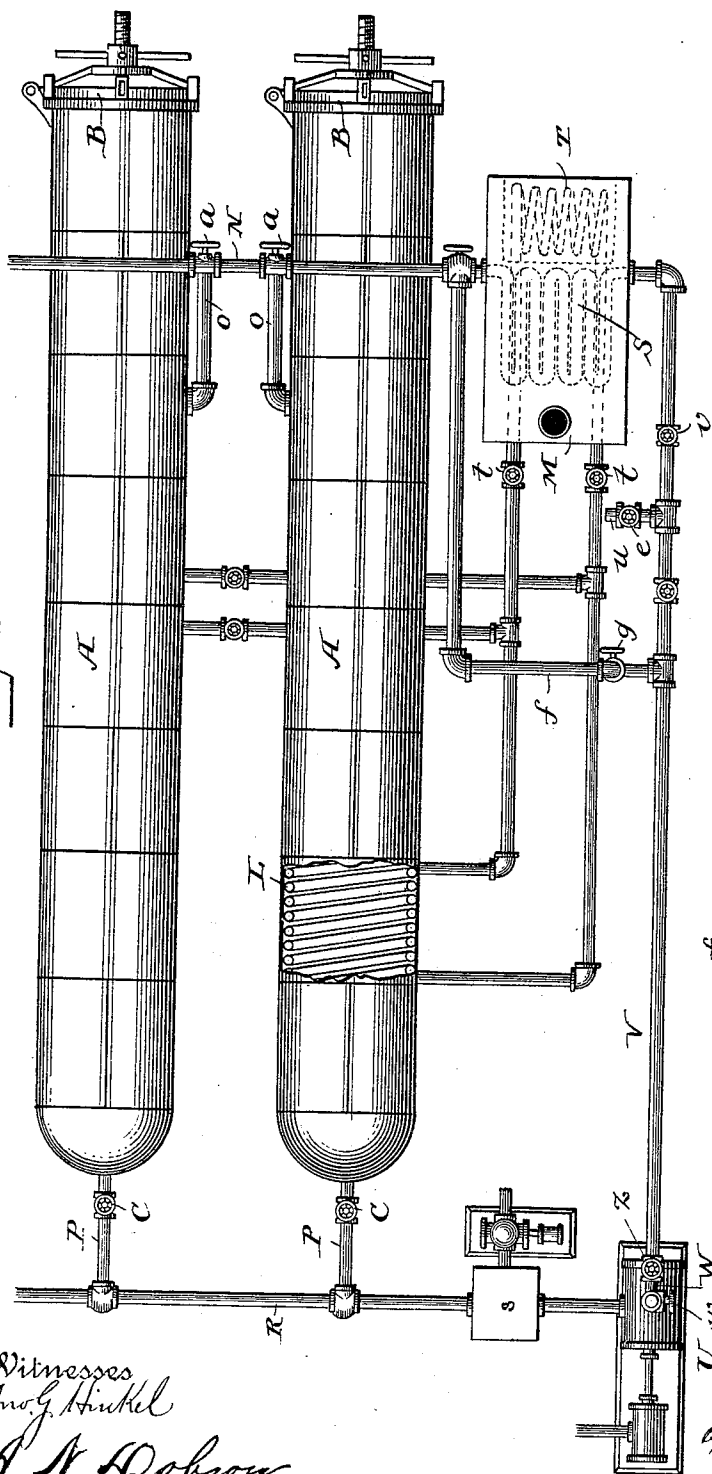
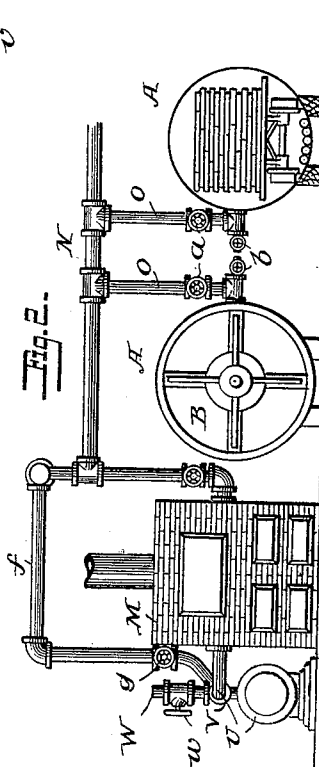


Fig. 2.



Witnesses
Jno. G. Hinkel
A. N. Robinson

Inventor
Charles Howard
Forster & Freeman
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES HOWARD, OF NEW YORK, N. Y.

METHOD OF VULCANIZING WOOD.

SPECIFICATION forming part of Letters Patent No. 520,597, dated May 29, 1894.

Application filed January 9, 1893. Serial No. 475,835. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES HOWARD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Methods of Curing Wood, of which the following is a specification.

The object of my invention is to cure or vulcanize wood; that is, to so treat the same as to solidify to as great an extent as possible the resinous and other matters within the wood rendering it hard and impervious, and less liable to be deleteriously affected by heat and moisture, and to this end I treat the green lumber, either in logs or cut, as fully set forth hereinafter and through the medium of any suitable apparatus, such for instance as that illustrated in the accompanying drawings, which show sufficient of such apparatus to permit my improvement to be fully understood, and in which—

Figure 1 is a plan view illustrating said apparatus; Fig. 2 an end view showing the right hand cylinder in section the heating pipe in this instance being shown as extending from end to end of the tank, instead of a coiled pipe, as shown in Fig. 1.

In said drawings A, A, represent tanks or other suitable receptacles, capable of being sealed and withstanding a pressure of two or more atmospheres provided with removable doors B, at one end and if desired with rails for trucks shown as circular in one tank and longitudinal in the other and upon which to deposit the material to be treated. Within each tank is a coiled pipe L, which connects with a superheating coil T, in a furnace M, supplied with steam from any suitable source, not shown, the parts being so arranged that when desired a current of superheated steam may be caused to flow through the pipes L, to heat the latter, the tank and its contents, said current being regulated by valves *t, t*.

An air pump U communicates through pipes R, P, P, with each of the receptacles A, the pipes P, P, being provided with cocks C, and with the discharge pipe W, of said pump communicates a pipe V which extends to a heating coil S, in the furnace M, and from said coil extends a pipe N, from which branch pipes O, O, lead to and communicate with the receptacles A, A, suitable valves *a, a*,

serving to cut off communication when desired. The discharge pipe of the pump U, is provided with a relief valve *w*, which will open under sufficient pressure and the pipe V, is provided with valves *z*, and *v*, and communicates with an air inlet pipe *u*, provided with a valve *e*. A condenser of any suitable character between the pipes P and the pump U, and a by pass pipe *f*, provided with a valve *g*, extends from the pipe V, to the pipe N, as shown.

When it is desired to cure or vulcanize wood or other material the said material is placed in the receptacle A, through the open door at one end, the said receptacles being cold and the valves being closed so as to prevent the passage of any fluid to the receptacles or to the heating coils. After all the material is introduced the receptacles are closed, the valves C, C, are opened and the pump U, is put in operation to exhaust the air from the receptacles until the material therein is relieved of pressure to secure a vacuum of the desired extent. The valves C, may then be closed after which the valves *t*, are opened to permit the heating fluid to circulate through the pipes L, whereby the contents of the receptacles are heated. After the material has been heated to a uniform extent and as long as it is desired, or during such heating the pump U may again be put in operation and the valves C, opened so as to withdraw the gases and moisture resulting from the heating of the wood and maintain the vacuum or further reduce the pressure, which is preferably at all times below the atmospheric pressure. Any moisture withdrawn by the action of the pump is condensed in the condenser *s*, and so long as the valves *v, e*, are closed the air withdrawn from the receptacles will be expelled through the outlet pipe of the pump, owing to the pressure imparted to the valve *w*. If the heated material after thus being subjected to a low pressure or vacuum for a long time should be suddenly removed from the receptacles or if cold air at atmospheric pressure was suddenly introduced, the action would be extremely injurious, tending to break the cells and fibers of the material. To prevent such results I introduce cold air gradually into the receptacles, cutting off the flow through the heating coils L, and carrying the air through

the receptacles and over the material and gradually reducing the vacuum until the material is cooled to below 200° Fahrenheit and the pressure is substantially that of the atmosphere. By this means not only do I prevent the breaking down of the cells and fracturing of the fibers of the wood or other material, but I also render more dense and solid the resinous and other matters contained within the pores of the wood and render them less liable to be acted upon by changes of temperature or by moisture. These desired operations may be effected by so manipulating the valves of the apparatus above described as to permit a limited but gradually increasing proportion of cold air to flow into the pipe N, during the operations of the pump U, and after closing the valves *t*.

b, is a vent valve for controlling the entrance of air to and its escape from the chambers. Thus, the valves *a*, *a*, and *g* being opened and the valve *v*, being closed, the valve *e*, is turned to a limited extent when the external air will pass through the pipe *u* and pipes V, *f*, N and O, to the chambers and will be withdrawn through the pipes P and R, but owing to the limited extent to which the valve *e*, is opened the vacuum will be continued in the receptacles A, A, and this condition will be maintained until the material is cold, after which the vacuum is gradually reduced by opening the valve *e*, to a greater extent from time to time, or the valve *e*, may be manipulated so as to gradually open the same during the cooling operation.

It is sometimes necessary to pass hot air directly into the chambers in which case the valves *z* *v* *a*, are opened and the valve *g*, closed when the air that has been drawn from the chambers by the pump U and dried will be returned through the pipe V and heated in the coil S, and then flow through the pipe N, into the chambers. Or, the valve *g* and valve *z* may be closed and the valve *e*, opened

when the air will flow in through the pipe *u*, and coil S, to the pipes N and O. In some cases this treatment of the material with hot air may be employed in connection with the treatment in the receptacles under a vacuum and either after or simultaneously with the heating by means of the coils L, the material being subsequently gradually cooled and the pressure gradually increased to atmospheric pressure as before described.

Without limiting myself to the precise operations herein specified for treating the material under vacuum and heat, I claim as my invention—

1. The method of curing or vulcanizing lumber and other materials, which consists in subjecting the material to heat while under a vacuum, and then circulating cold air over the material and gradually reducing the vacuum, until the pressure is that of the atmosphere substantially as set forth.

2. The method of curing or vulcanizing lumber and other materials, consisting in heating the same while under a vacuum and then gradually reducing the temperature and reducing the vacuum, until the pressure is that of the atmosphere substantially as set forth.

3. The method of curing lumber and other materials, consisting in first exhausting the air to secure a vacuum of any desired degree, then heating the material while maintaining the vacuum, and then introducing cold air to cool the material while still maintaining a vacuum, and finally reducing the vacuum gradually until the pressure is that of the atmosphere, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES HOWARD.

Witnesses:

CHARLES E. FOSTER,
ALLE N. DOBSON.