

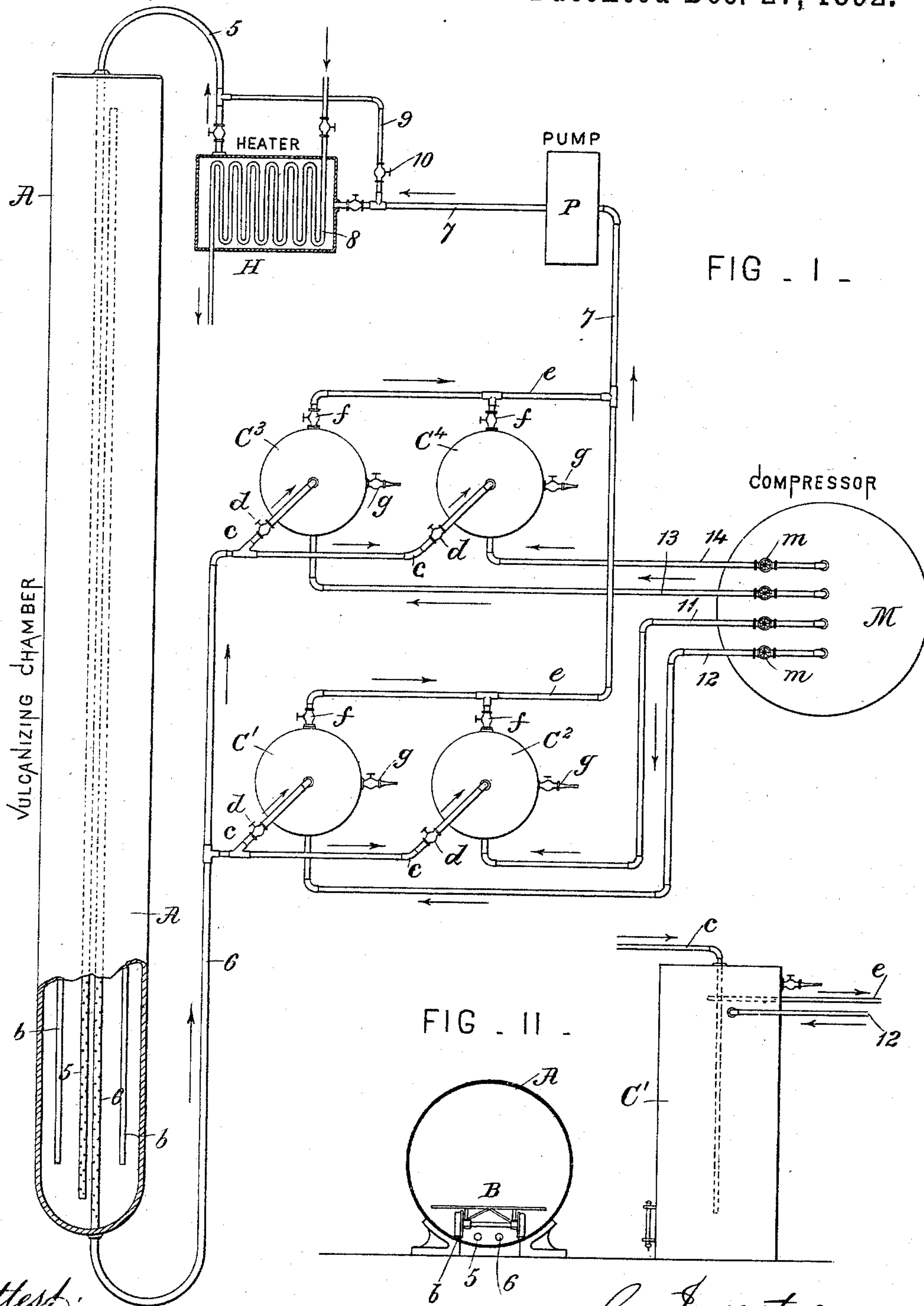
(No Model.)

S. E. HASKIN.

PROCESS OF AND APPARATUS FOR VULCANIZING WOOD.

No. 488,967.

Patented Dec. 27, 1892.



Attest:  
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# UNITED STATES PATENT OFFICE.

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## PROCESS OF AND APPARATUS FOR VULCANIZING WOOD.

SPECIFICATION forming part of Letters Patent No. 488,967, dated December 27, 1892.

Application filed March 29, 1892. Serial No. 426,933. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL E. HASKIN, of Avoca, in the county of Steuben and State of New York, have invented a new and useful  
5 Improvement in Wood Vulcanization, which improvement is fully set forth in the following specification.

This invention has reference to the preservation of wood, and particularly to that  
10 method of treatment which is known as "wood vulcanization." Such a process is described in Letters-Patent granted to me March 5, 1889, No. 399,196, and the present invention comprises certain improvements in the process  
15 and apparatus described and shown in said patent.

The process of wood vulcanization consists in subjecting the timber to a very high temperature while in a medium of such pressure  
20 as prevents vaporization of the sap, resin, or other liquid or liquefiable constituents of the wood. The principal effects of high temperature applied under these conditions are first to destroy all animal or vegetable germs of  
25 fermentation or decomposition, second to liquefy and distribute the resinous, gummy, and similar constituents uniformly throughout the wood, and to produce therein such chemical change as renders them permanent  
30 in their nature.

It is well known that various antiseptic and preservative substances are of vegetable origin, and that it is common to attempt the preservation of wood by impregnating it with  
35 substances of an antiseptic character. Whatever antiseptic or preservative substances are contained in the wood are, by the process of vulcanization, rendered active and permanently fixed in the pores and interstices there-  
40 of. The effect of the high pressure is to prevent the evaporation and escape of the volatilizable fluids, although the timber be subjected to as high a temperature as is employed in distillation to obtain pyroligneous acid  
45 and other products. Moreover, the presence of these liquids in the wood is all that preserves the fiber from ignition or charring by reason of the high temperature of the vulcanizing chamber.

50 From this explanation of the theory of the general method, the importance of the improvements hereinafter described will be

readily appreciated. In my former patent, referred to above, means are described for maintaining a circulation of the heated air, 55 and this circulation is of great importance, since good results cannot be obtained by simply keeping the timber in a heated stagnant medium. I have found, however, that it is very desirable to maintain this circulation in 60 a regular and even manner, without producing disturbance at any part of the vulcanizing chamber. Heretofore the air has been admitted into the chamber by a single pipe at one end thereof, which pipe discharged a 65 large volume of hot air upon the wood adjacent to that end, producing violent agitation at that point and concentrating there the effect of the hot air blast. The result is that charring and even ignition are apt to take 70 place. Moreover, the effect is to drive away the sap and juices from the point of impact of the air blast, resulting in a lack of uniformity in the product. A similar action takes place at the single exit orifice, where 75 the rush of air in effecting its escape produces considerable commotion in the vicinity and causes friction of the hot air currents over the surface of the timber.

One object of the present invention is to 80 avoid these objections and to produce substantial equilibrium of compression and temperature throughout all parts of the vulcanizing chamber, thus securing uniformity of treatment. 85

From what has already been stated it will be understood that if at any point the pressure fluctuates and becomes even momentarily relaxed, the timber at that point is exposed to injury by the great heat of the chamber. 90

According to the present invention these difficulties are overcome by admitting the air simultaneously to all parts of the vulcanizing chamber through a series of relatively small orifices, and by providing also a large number of exit orifices distributed in like manner throughout the length of said chamber. 95

A further object of the invention is to effect a gradual cooling down of the timber without relaxing the pressure, and without 100 setting up currents or causing fluctuations in the vulcanizing chamber. It will be understood that if an ordinary blow-off cock or valve be used to discharge the hot air at the



close of the operation, the consequent reduction of pressure would permit the highly heated vegetable juices of the timber to expand into vapor, and thus defeat the object of the treatment.

In carrying out this part of the invention, I provide for introducing, at the proper time, into the circulation, successive volumes of cold air, displacing equal quantities of the hot air, but without lowering the pressure; and this operation is repeated until the hot air is practically all drawn off and the timber cooled down below the boiling point of its liquid elements at ordinary temperature.

The preferred mode of effecting this operation is by arranging a series (two or more) of storage reservoirs of ample capacity, and connecting these with the main circulating pipe and with the air compressor, in such manner that any one or more of them can be cut out of the circulating system without affecting the latter, and by connecting the reservoir thus cut out of the circulating system with the compressor, to be charged with atmospheric air, displacing the heated air therein. When this is done the reservoir or reservoirs containing cold air, are again connected in the circulating system, and another or others cut out and charged with cold air by the compressor.

These auxiliary storage chambers or reservoirs may be utilized, during the operation of vulcanizing, to contain charges of air above the normal pressure of operating, so that at any time the pressure may be increased or maintained by connecting one of them with the circulating system. These storage reservoirs are so constructed as to act as condensers to eliminate the moisture from the compressed air, as described in my patent above mentioned.

In order that the invention may be more fully understood, I will now describe the same in connection with the accompanying drawings, which form part of this specification, premising however, that the invention is not limited to the construction and arrangement of parts therein shown.

Figure I, is a diagram illustrating the connections of the several elements of the system, and Fig. II, is a cross-section of the vulcanizing chamber, showing also one of the storage reservoirs in elevation.

The vulcanizing chamber A may be constructed as described in my patent referred to above, and provided with proper pressure and heat indicators, safety valves and other appurtenances, as therein set forth, but which it is not thought necessary to illustrate in the accompanying drawings. The cylinder A is charged with timber, as before by means of a car B, running on rails b. The heated and compressed air is admitted into the cylinder by the induction pipe 5, extending the full length of the cylinder and having apertures at short intervals. The exit or eduction pipe 6 is constructed in the same manner. These two pipes may conveniently be laid side by

side between the rails b, but it will be obvious that any other means whereby the air may be admitted and withdrawn through numerous small apertures would be within the scope of the invention.

In the drawings are shown four storage reservoirs C' C<sup>2</sup> C<sup>3</sup> C<sup>4</sup>; but their number may be greater or less. The eduction pipe 6 has a separate branch c leading to each reservoir, and each branch pipe is provided with a cock d. Each reservoir has a discharge pipe e provided with a stop cock f, and pipes e all connect with the main pipe 7, in which is located the circulating pump P. Pipe 7 leads to the heating chamber H, in which the air is heated by superheated steam conveyed to a coil 8. Any other suitable means for heating the air to the temperature required may be employed. A pipe 9 provided with a cock 10 leads from pipe 7 around the heater, and by using this pipe the heater may be cut out.

M represents the air compressor. It is provided with pipes 11, 12, 13, 14, leading respectively to the several reservoirs, each pipe being provided with a stop cock m, so that the compressor may be connected with any one or more of the reservoirs, or cut off altogether. It is evident that if cocks d and f are all open the four reservoirs will be connected in the circulating system; but during the operation of vulcanization it will not be necessary to connect more than one of these reservoirs with the circulating system, as it has only to perform the function of condensing the moisture. During this time the other reservoirs may remain charged with air under high pressure to be utilized as occasion may require. When the timber has been subjected to the action of the compressed heated air for a sufficient period of time (which time, as well as the degree of heat employed will vary with the character of the timber) the reservoir or reservoirs, at the time being in the circulating system, is or are cut off therefrom, by closing cocks d and f, leaving however a free passage through at least one of the reservoirs. Assuming that C' and C<sup>2</sup> are cut out of the circulating system, being filled with hot compressed air, their blow off cocks g will be opened, as well as cocks m in the pipes leading from the compressor, and the heated air will be displaced by air at ordinary temperature. In the meantime the main circulation continues unchecked through reservoirs C<sup>3</sup> C<sup>4</sup>, and the escape of air from reservoirs C' C<sup>2</sup> does not disturb the steadiness of the circulation. Cocks m and g of the reservoirs C' C<sup>2</sup> are now closed, and cocks d and f opened, so that the cold air in these reservoirs gradually mingles with the heated air, and while this continues the reservoirs C<sup>3</sup> C<sup>4</sup> may be cut out, and filled with cold air as above described. By alternating in this way, the temperature of the vulcanizing chamber is gradually lowered, while a uniform circulation is maintained, and the pressure also kept up. It will, however, be understood that, as the temperature falls, it will not



be necessary to maintain so high a pressure as is required during the vulcanizing operation; but the pressure may also be gradually reduced, always keeping it high enough to prevent volatilization of the liquid constituents of the wood.

By the manner herein described of admitting the air to the vulcanizing chamber and withdrawing it from the same through a number of relatively small orifices, I not only avoid the difficulties mentioned in the first part of this specification, but am able to employ, when it is desirable, a higher degree of heat than could safely be used heretofore. This is possible because of the provision for preventing fluctuations of pressure and friction of hot air over the surface of the timber.

It is to be understood that wherever "air" is referred to herein, it is intended to include equivalent aeriform fluids.

Having now fully described my said invention and the best mode in which I contemplate applying the principle thereof, what I claim and desire to secure by Letters-Patent is:—

1. In apparatus for vulcanizing wood, the combination with the chamber in which the wood is treated, of an air compressor, an air heater, an induction conduit communicating with said chamber through numerous relatively small orifices at different points in said chamber, and a suitable eduction conduit whereby heated compressed air may circulate uniformly through said chamber, substantially as described.

2. In apparatus of the character described the combination with the chamber in which the wood is treated, of an air compressor, an air heater, an induction conduit communicating with said chamber through numerous relatively small orifices, and an eduction conduit likewise communicating with said chamber through numerous small orifices, substantially as and for the purposes set forth.

3. In the art of wood vulcanization, the improvement consisting in circulating through the vulcanizing chamber, heated compressed air, and then without interrupting the circulation or relaxing the pressure introducing into the circulating system successive volumes of cold air, until the wood is cooled down below the boiling point of its liquid or liquefiable constituents, substantially as described.

4. The described process of vulcanizing wood consisting in maintaining through the vulcanizing chamber a steady circulation of heated and compressed air, and then cutting out successive volumes of the heated air and introducing in place thereof cold compressed air, constantly maintaining the circulation and pressure, substantially as set forth.

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

SAMUEL E. HASKIN.

Witnesses:

PHILIP MAURO,  
REEVE LEWIS.