

(No Model.)

2 Sheets—Sheet 1.

C. HOWARD.

PROCESS OF AND APPARATUS FOR SATURATING WOOD.

No. 557,271.

Patented Mar. 31, 1896.

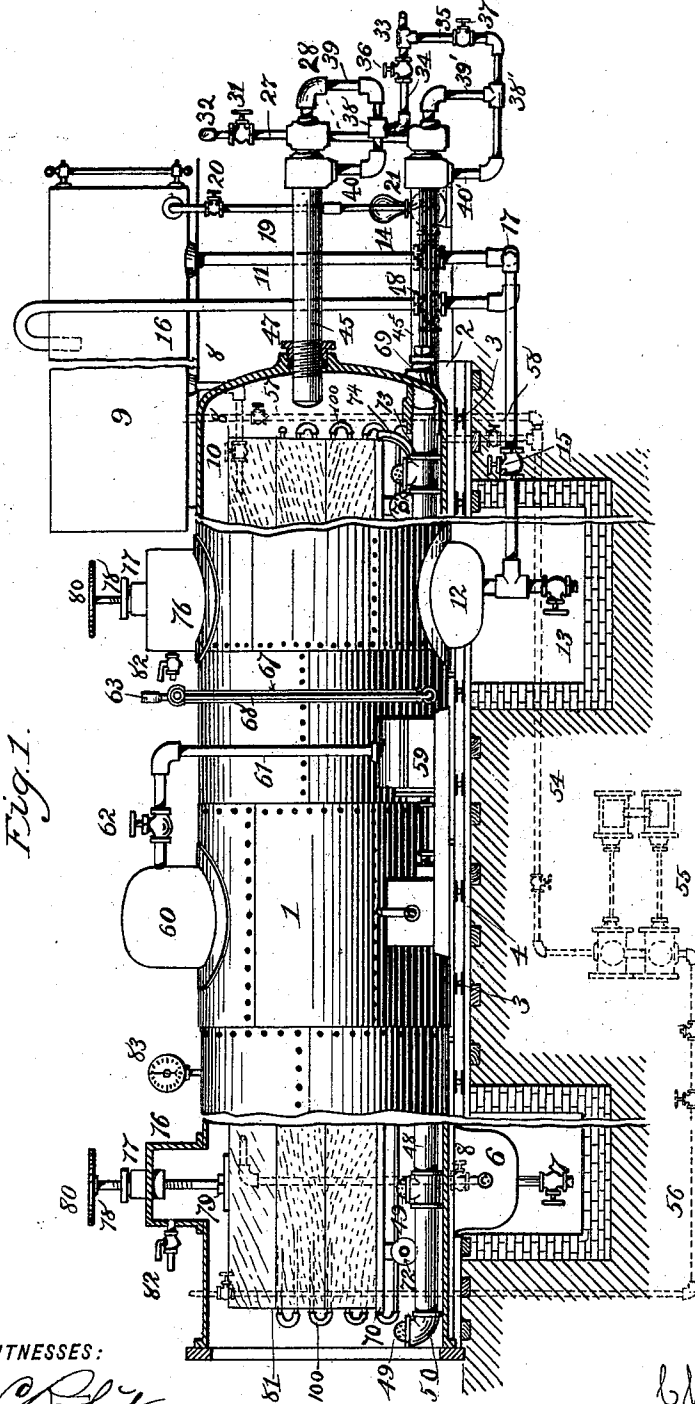


Fig. 1.

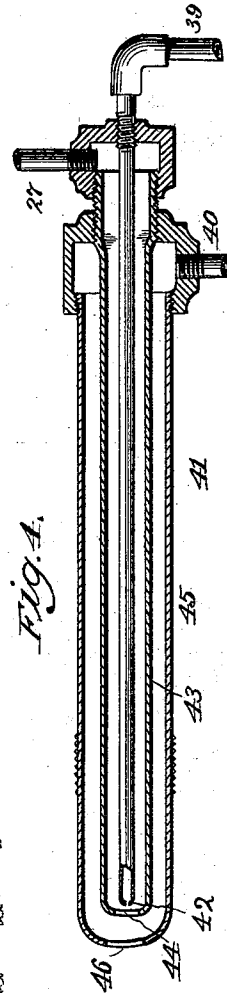


Fig. 4.

WITNESSES:

Edward C. Rowland.
E. D. Wright

INVENTOR

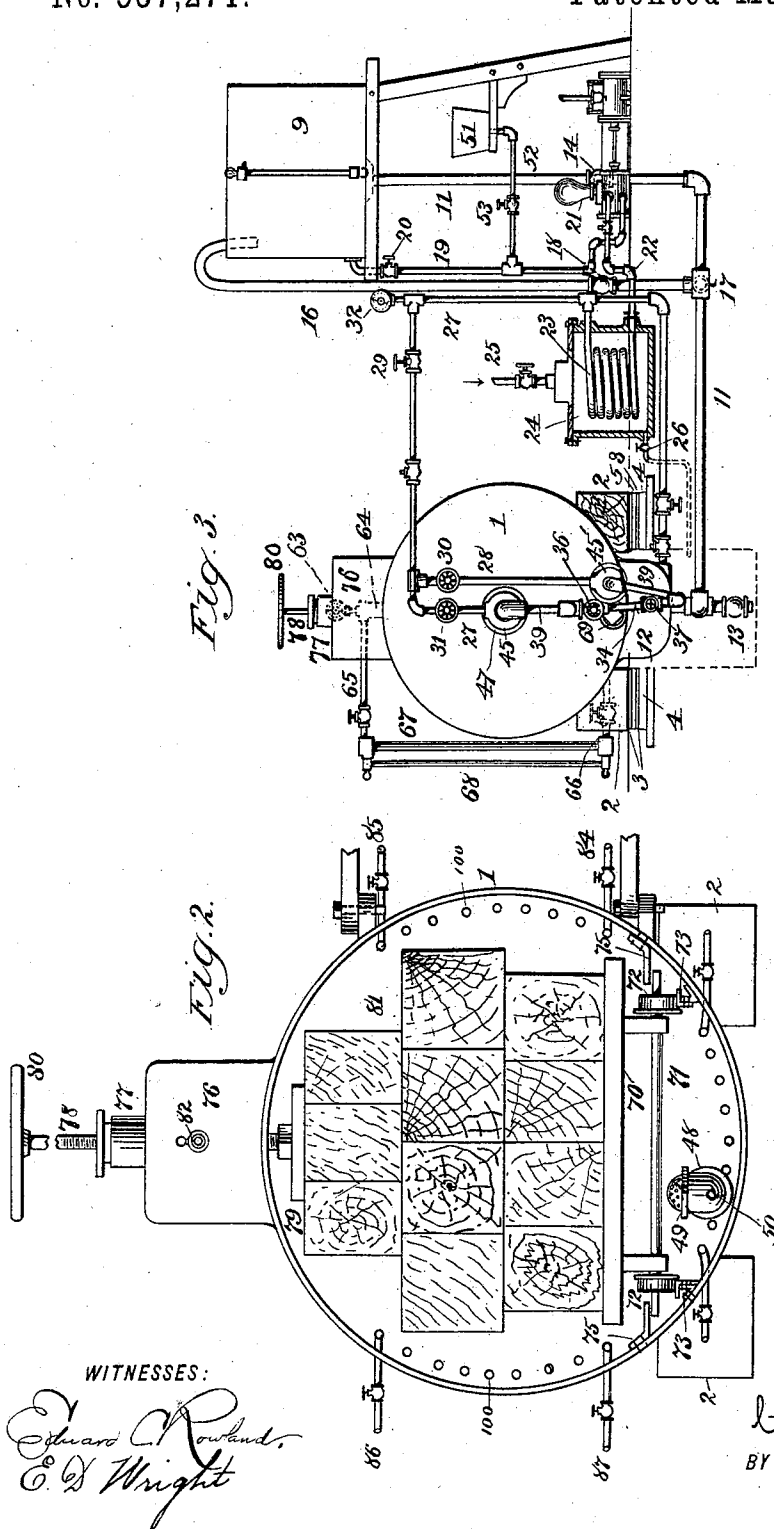
Charles Howard.

BY

A. M. Pence.

ATTORNEY.

C. HOWARD.
PROCESS OF AND APPARATUS FOR SATURATING WOOD.
No. 557,271. Patented Mar. 31, 1896.



WITNESSES:

Edward C. Rowland,
C. D. Wright

INVENTOR

Charles Howard
BY *A. M. Pierce,*

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES HOWARD, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR SATURATING WOOD.

SPECIFICATION forming part of Letters Patent No. 557,271, dated March 31, 1896.

Application filed July 19, 1895. Serial No. 556,441. (No model.)

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 a new and useful Improvement in Apparatus for and Methods of Treating Wood, of which the following is a specification.

My invention relates especially to the art of treating timber, lumber, and wood in any form in such a manner as to render it non-inflammable or fireproof or to preserve it from attack by moisture, &c., and has for its object the provision of an apparatus for and method of carrying my invention into effect. To attain the desired end, my invention consists, essentially, in certain novel and useful combinations or arrangements of parts and peculiarities of construction and methods of operation, all of which will be hereinafter first fully described, and then pointed out in the claims.

In the accompanying drawings, forming a part hereof, Figure 1 is a side elevation and partial section of an apparatus designed to carry out my invention. Fig. 2 is an enlarged end elevation with the front of the cylinder removed, looking from the left of Fig. 1. Fig. 3 is an end elevation of my apparatus, looking from the right of Fig. 1. Fig. 4 is an enlarged longitudinal sectional view of the superheating spraying apparatus.

Like numerals of reference, wherever they occur, indicate corresponding parts in all the figures.

1 is a metal cylinder made of any desired diameter and length. This cylinder is supported at the front end by timbers 2, which are fixed in position. To the right of the vertical broken line in Fig. 1 the supporting-timbers are divided or cut into sections, and bear metal plates 3 fixed to their lower faces. Beneath the timbers 2 are planks 4, supported upon sleepers, said planks also bearing metal plates 3. The upper and lower plates are separated by means of rollers 5. This construction and arrangement holds the front portion of the cylinder against movement, while permitting a free longitudinal movement of the remaining portion of the cylinder when expanding or contracting by reason of the changes of temperature caused by alternate heating and cooling.

6 is a pocket at the bottom of the front portion of the cylinder 1, provided with a drain-valve 7. Leading from this pocket 6 is a pipe 8, conducting to the bottom of a tank 9, for holding the solution or fluid with which it is designed to treat the wood.

10 is a valve in the pipe 8.

11 is a pipe leading from the bottom of the tank 9 to a pocket 12, fixed to the under side of the cylinder 1.

13 is a drain-valve at the bottom of the pocket 12.

14 and 15 are valves placed in the pipe 11. 16 is a pipe connected to the pipe 11 by a T 17 and curving over the top of the solution-tank. It is provided with a valve 18.

Leading from the tank 9 is a pipe 19, provided with a valve 20 and communicating with a pump 21. From the pump 21 a pipe 22 leads to a coil 23 within a heating-chamber 24, provided with a steam-supply 25 and exhaust 26. From the coil 23 a pipe 27 passes to superheating and spraying devices, said pipe having a branch 28. (Particularly shown in Fig. 3.)

29, 30, and 31 are valves for regulating the flow from the pump 21.

32 is a pressure-gage mounted upon the pipe 27.

33 is a steam-pipe leading from any desired source of supply.

34 and 35 are branches from the pipe 33, leading, respectively, to the two spraying devices and provided with regulating-valves 36 and 37. The steam-pipes 34 and 35 lead each to a T 38 38', from which branch pipes 39 39' and 40 40', said last-mentioned pipes being connected to the superheating and spraying devices for supplying steam and liquid to the cylinder 1. The construction and arrangement of this superheater and sprayer will be best understood by reference to Fig. 4 of the drawings. Pipe 39 communicates with a central tube 41, having a constricted opening 42 at its inner extremity. Surrounding this tube 41 is a liquid-tube 43, arranged to receive its supply through a pipe 27. The liquid-tube is open at 44. Outside of this liquid-tube is a steam-pipe 45, supplied through the branch pipe 40 and open at 46.

The form of atomizer or spraying device just described, wherein the liquid-tube 43 is

arranged within a steam-pipe 45 and has in turn a steam-pipe 41 arranged within it, the openings from the said pipes and tubes being close together, is particularly advantageous in a construction in which the liquid is forced through the atomizer under pressure, because with the ordinary arrangement of spraying device difficulty is found in thoroughly breaking up and atomizing the stream of liquid, whereas in the form of atomizer or spraying device which I have devised the desired result is effectively accomplished.

The pipe 45 passes through a boss 47 into the cylinder 1. The pipe 45' of the lower spraying device passes into the cylinder near its bottom and is connected to a longitudinal pipe 48, provided at intervals throughout its length with spraying-nozzles 49.

50 is a drain-tube at the end of the pipe 48. 51 is a tank for holding treating liquid of greater strength than that contained in the tank 9.

52 is a pipe provided with a regulating-valve 53, said pipe leading from the tank 51 to the pipe 19, which supplies the pump 21.

Connected to the bottom of the cylinder 1, and shown in dotted lines in Fig. 1, is a pipe 54, communicating with a pump 55. From this pump leads a pipe 56, entering the cylinder 1 at the top. A branch pipe 57 leads from the tank 9 to the pipe 54, and the connection to the bottom of the tank 1 may be cut out when desired by means of a valve 58.

59 is an air-pump connected to a dome 60 upon the cylinder 1 by a pipe 61, wherein is a valve 62. This pump is employed for creating a vacuum or pressure within the cylinder at pleasure and as required.

63 is a pressure-gage mounted upon a pipe 64, from which extends a tube 65, communicating with a column 67, having a tube 66 leading back into the bottom of the cylinder.

68 is a sight-glass connected to the column 67.

69 is a hand-hole located at the bottom of the cylinder 1 for reaching the interior of the cylinder for attaching a rope to the car in drawing it into the cylinder or for any other use.

70 is a car supported upon axles 71, bearing wheels 72, which run upon rails 73, fixed to the sides of the cylinder. The inner ends of the rails 73 are turned upward, as at 74, to limit the inward movement of the car when it is drawn or pushed into place in the cylinder. The outer extremities of the car-axles 71 project beyond the wheels and pass beneath bracket-rails 75, secured to the inner walls of the cylinder, preventing the raising or floating of the car.

76 are domes mounted upon the top of the cylinder 1, each dome being provided with a stuffing-box 77, through which passes a screw 78, bearing upon its lower end a disk 79 and upon its upper extremity a manipulating hand-wheel 80. The object of this arrangement is to firmly hold the wood or timber 81 carried by the car in place, preventing its

floating when surrounded by the impregnating liquid.

82 are blow-off cocks for releasing air, &c., from the domes 76.

83 is a vacuum-gage.

84 and 85 are steam-pipes leading from any convenient source of supply to coils 100 within the cylinder 1 for the purpose of heating said cylinder and its contents, said coils being preferably arranged upon opposite sides of the cylinder and close to the shell thereof.

86 and 87 are exhaust-pipes leading from the coils.

When constructed and arranged in accordance with the foregoing description, the operation of my apparatus is as follows: The wood to be treated is placed in position within the cylinder, which is tightly sealed. By means of the air-pump 59 a vacuum is formed within the cylinder. Steam is now admitted to the coils within the cylinder, and the heating of the wood will vaporize the moisture contained therein, breaking the vacuum and creating a pressure. The water and fluid products of this treatment will flow into the pockets 6 and 12 at the bottom of the cylinder, and may be drawn off through the valves 7 and 13. A vacuum is again obtained in the cylinder and the pump 21 is started, forcing the treating fluid through the upper superheating-sprayer alone, or through the lower superheating-sprayer as well, superheated steam being supplied from any convenient point. It will be observed that steam passes through the inner tube 41 and the outer pipe 45, while the fluid is supplied to and passes through the annular conduit formed by the pipe 43, the steam and fluid combining and escaping through the constricted opening at the outlet of the device. The result of this peculiar construction and arrangement is that the steam heats the fluid to a very high degree and forces it into the cylinder in a sprayed or atomized condition thoroughly commingled with the steam. It will be observed that the pump 21 is combined with the spraying device, so that the treating or wood-saturating liquid is positively forced into and through the spraying device under pressure by the pump and that the injecting action of the steam alone is not depended upon to carry the treating fluid into the cylinder. By increasing or diminishing the pressure produced by the pump a greater or less relative amount of the treating fluid is carried into the cylinder along with the steam. As the wood to be saturated is hot and is in a partial vacuum, the sprayed or atomized treating or saturating compound or material readily passes into the pores and is absorbed by the wood, the vacuum is broken, and the steam and atomized saturating materials are forced into the cylinder until a pressure of five to forty pounds, as required, is obtained, causing a thorough impregnation of the wood. Under certain circumstances and for certain purposes the next step is to shut off the steam

and fluid supplying the superheater and sprayer and pass steam through the heating-coils in the cylinder, drawing off the condensation and maintaining the heat until the wood is thoroughly dried. This will drive off the aqueous vapors, leaving the solid portions of the preserving and fireproofing material in the wood and upon the surface thereof, producing in a few hours an article which will effectually resist the action of the elements, either fire or moisture or decay, in accordance with the treating material employed.

After the action of the superheater and sprayer has been stopped the cylinder and its contents are allowed to cool, which will create a partial vacuum. This vacuum is broken by forcing air or steam into the cylinder, and the condensation is drawn off. Again a vacuum is obtained, which is allowed to stand until the air is exhausted from the wood. Then solution is admitted to the cylinder until it is completely filled, when pressure is applied by means of the pumps, this pressure being from fifty to two hundred pounds, in accordance with the kind of wood being treated. Heat is applied by means of the steam-coils within the cylinder. In order to insure a proper distribution of the heated fluid, it is caused to circulate through the cylinder by means of the pump 55. When the wood has been sufficiently impregnated, the fluid is driven out of the cylinder and the wood is dried, as hereinabove described.

In expelling the fluid from the cylinder the pump 59 is employed, and by forcing air into the dome 60 the fluid will be driven out of the cylinder through the pipe 16 back into the tank 9. When the superheating-sprayers are in use, the fluid is supplied thereto from the tank 51, as it will be diluted by the steam; but when the cylinder is to be filled with fluid it is taken from the tank 9.

The particular fireproofing and preserving material employed for the saturating of the wood is not an essential feature of this present invention. As an example of such materials which may be employed I would name

phosphate of ammonia and sulfate of ammonia when used in about the proportions mentioned in United States Patent No. 503,867 of August 8, 1892, to Lina Schuler.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In an apparatus for saturating wood, the combination of a car for the reception of the wood to be treated having axles which project beyond the wheels, and a cylinder provided with rails for the support of the car-wheels, and with fixed projecting bracket-rails arranged so as to project immediately over the projecting ends of the car-axles, substantially as set forth.

2. In an apparatus for saturating wood, the combination of a car having axles which project beyond the wheels, a cylinder provided with rails for the car-wheels, and with fixed bracket-rails arranged immediately above the projecting ends of the car-axles, and the steam-pipes, 100, arranged upon opposite sides of the cylinder and close to the shell thereof, substantially as set forth.

3. The combination of an inclosing cylinder having domes, 76, at its top, depressible holding-plates arranged to be moved either into the said domes or into the body of the cylinder, and means for raising and lowering the said plates from the exterior of the cylinder, substantially as set forth.

4. The herein-described method of saturating wood, which consists in inclosing the same within a receptacle, creating a partial vacuum therein, applying heat, and breaking the said vacuum, blowing off the steam and gases arising from the wood, delivering into the receptacle in an atomized condition the wood-saturating material, condensing the vapors, flooding the wood with a saturating liquid, and finally drawing off said liquid, and drying the wood, substantially as set forth.

CHARLES HOWARD.

Witnesses:

A. M. PIERCE,
E. D. WRIGHT.