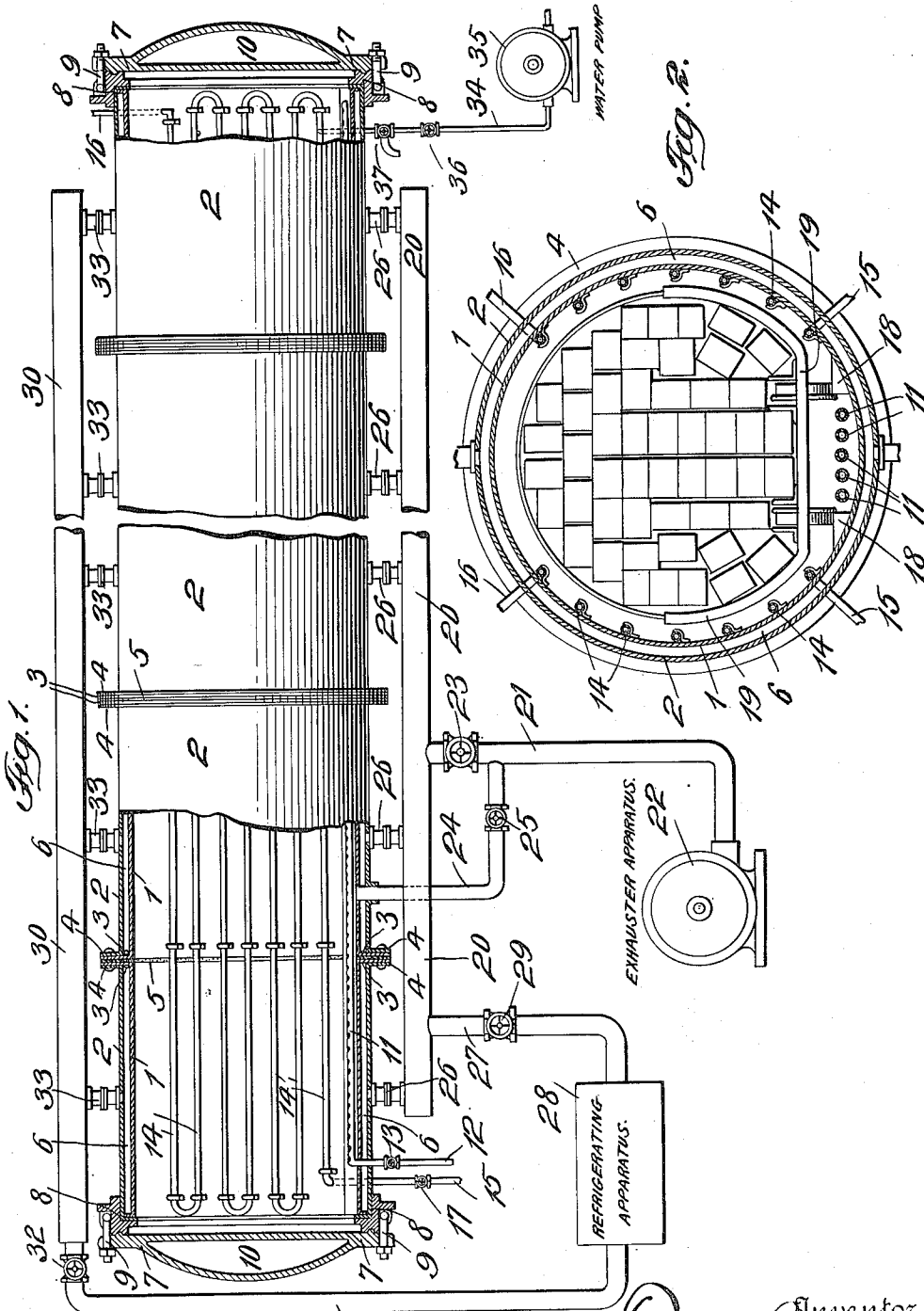


F. A. PALEN.
 APPARATUS FOR TREATING WOOD.
 APPLICATION FILED AUG. 3, 1912.

1,062,184.

Patented May 20, 1913.



Witnesses:
Edw. M. Humpal
Lillian S. James

Inventor
Frank A. Palen
 By his Attorneys
Carroll, Burrows & Mullellie

UNITED STATES PATENT OFFICE.

FRANK A. PALEN, OF NEW YORK, N. Y.

APPARATUS FOR TREATING WOOD.

1,062,184.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed August 3, 1912. Serial No. 713,095.

To all whom it may concern:

Be it known that I, FRANK A. PALEN, a citizen of the United States, residing at New York city, county of New York, State of New York, have invented certain new and useful Improvements in Apparatus for Treating Wood, of which the following is a full, clear, and exact description.

This invention relates to an apparatus for use in treating woods or analogous substances wherein it is necessary to subject the material to certain treatments within a closed casing necessitating the maintenance of a heated interior during a period of operation and requiring a cooling of this interior during a later period. This casing is constructed and arranged so that it may be utilized as an insulating medium during the portion of the treatment necessitating the maintenance of heat within the casing, and may be afterward used as a refrigerating medium to cool the interior of the casing and its contents, or vice versa. Broadly stated, therefore, the apparatus is designed to afford a container which may be insulated against heat or cold, and which may also be utilized as a positive cooling agent for material on its interior.

The apparatus constituting my invention, while of general use where such conditions exist and must be filled, is of especial advantage when used in connection with certain processes of treating wood to indurate the same and I am illustrating it as especially equipped for such a process.

Preliminary to a description of the specific form of apparatus which I preferably employ, I think it best to prepare the way by a general exposition of a particular process of indurating or "vulcanizing" wood to which the apparatus is applicable.

This process, broadly, consists, in first placing the wood in a closed receptacle as a cylinder; withdrawing the air from the interior of the cylinder and from the wood cells; admitting moist heat into the interior of the cylinder to penetrate through and uniformly heat the wood cells, killing organic matter and heating the wood uniformly to such a high temperature as to volatilize the volatile resins and terpenes and to liquefy and distribute the heavier resins, terpenes, etc., uniformly throughout the wood cells; cutting off the supply of moist heat when

this point has been reached; introducing dry heat into the interior of the cylinder and exhausting the air, vapors and moisture from the interior, thus serving to dry out the wood, the suction of the exhaust producing a progressive drying from the interior outward and tending to hold the resins etc. uniformly distributed. The interior of the cylinder is cooled off and the resins which are uniformly distributed throughout the wood cells become set.

By the use of my apparatus in connection with such a process, the heating step can be accomplished without dissipation of heat to the exterior of the cylinder (and therefore in a minimum time), and the cooling step can be quickly accomplished thereafter and in a minimum length of time. By thus greatly minimizing the time required for the heating and cooling steps, the capacity of a plant is greatly increased—which, it must be admitted, is a great desideratum.

A preferable embodiment of the apparatus is shown in the accompanying drawings in which—

Figure 1 is a view in side elevation, partly in section, of a cylinder and connections constructed in accordance with my invention. Fig. 2 is a transverse vertical section through the cylinder.

Referring to the drawings by numerals, 1 indicates a plurality of longitudinally alined sections forming the interior shell of a container tube or cylinder, and 2 a plurality of concentric sections forming the exterior shell of the cylinder. The inner and outer shell sections at their abutting ends are formed with annular flanges 3 and 4 respectively between which are inserted packing rings 5 of asbestos or other insulating material, the abutting flanged ends of the inner and outer shell sections being riveted together to form a series of separate longitudinally alined sections, each section having an annular air space 6 between its inner and outer shells separate and distinct from the corresponding air space in adjacent sections. The form of section joint described while desirable, is only illustrative, the construction of the cylinder not being dependent upon any special form of section joint. In practice these cylinders are of such great length that it is impossible commercially to form them of a

single section of shell. This sectional form of cylinder is not only desirable for this reason, but has the added advantage that if one section becomes inoperative through
 5 puncture, leakage, etc., the efficiency of the entire apparatus is not destroyed as will more clearly be seen later.

At the front and rear ends of the cylinder are heads 7 forming doors which are
 10 suitably hinged and have air tight connections with head rings 8 secured to the front and rear ends of the cylinder. These head rings 8 carry a plurality of pivoted locking bolts 9 which are adapted to engage
 15 in notches formed in the edges of the door heads 7 to clamp these heads tightly against the head rings 8 and make the cylinder air tight. The specific construction of door joint and head ring is immaterial and not
 20 part of the present invention, being merely illustrative of an air tight hinged door construction. These heads 7 however, are preferably cast with a hollow space 10 therein serving to insulate the ends of the cylinder.

A plurality of steam coils 11 extend longitudinally of the interior of the cylinder at its base and are perforated to admit moist steam into the interior of the cylinder. These coils have a supply pipe connection 12
 30 extending through the shells of a cylinder section to the exterior of the cylinder and connected to a suitable source of steam supply. A valve 13 is located in this pipe and permits control of the supply of moist steam
 35 to the interior of the cylinder. A plurality of closed steam coils 14, preferably arranged in two sets, extend longitudinally of the interior of the cylinder and are suitably supported from the interior shell sections, each
 40 set having an inlet pipe 15, and an outlet pipe 16 both communicating with a suitable source of steam supply, the inlet pipe 15 having a controlling valve 17 therein.

Upon the interior of the cylinder and extending longitudinally thereof are mounted
 45 spaced rails 18 forming tracks for wheeled lumber cars or trucks 19 which, when a door head 7 has been moved to open position, may be run into the interior of the cylinder on these tracks.

From the foregoing description taken in connection with the process which I have heretofore outlined, it will be obvious that the lumber to be treated is loaded upon
 55 trucks 19 and run into the interior of the cylinder whose open end or head is then closed and made air tight and the indurating or "vulcanizing process" started.

Extending longitudinally of the exterior
 60 of the cylinder and, for illustration, at its underside, is an exhaust trunk 20 having a connecting pipe 21 extending therefrom and in operative connection with a suitable exhauster apparatus, such as a vacuum pump
 65 22. A valve 23 is located in this pipe 21 to

control the action of the exhauster apparatus. From this connecting pipe 21 at a point between its controlling valve and the pump 22 an exhaust pipe 24 extends to the cylinder and through the inner and outer shells of one of the sections thereof to communicate with the interior of the cylinder. This pipe also is provided with a controlling valve 25 so that the connection of the interior of the cylinder with the suction apparatus may be made or cut off at will. From the exhaust trunk 20 extends a plurality of branch exhaust pipes 26 connecting the trunk 20 with the spaces between the inner and outer shells of each section of the cylinder.

27 denotes a refrigerant supply pipe in communication with the exhaust 20 and extending to a suitable source of refrigerant supply, such as, a refrigerating apparatus 28. This pipe is also provided with a control valve 29 so that the supply of the refrigerant may be turned on or cut off as desired. From the opposite side of the cylinder to that on which the exhaust trunk 20 is located, a refrigerant trunk 30 is located and extends longitudinally and exteriorly of the cylinder. From this trunk 30 extends a pipe 31 connected to part of the refrigerant apparatus. This pipe 31 preferably has a controlling valve 32 located therein. From the refrigerant trunk 30 extends a plurality of branch refrigerant pipes 33 one of each of said pipes communicating with the space between the inner and outer shells of each section of the cylinder in the same manner as the branch exhaust pipes 26. All of the junctions of the refrigerant and exhaust pipes with the shells of the cylinder are made air tight and are packed so that there is no possibility of leakage. A cold water pipe 34 may be connected to one end of each set of closed coils, a water pump 35 being connected with these pipes 34 to force cold water through the closed coils, the pipes 34 being provided with controlling valves 36 to turn on or cut off the supply of water, and with drip cocks 37 for draining the water from the coils.

With the foregoing structure in mind the process of treating wood which I have heretofore described, may be carried out as follows: Assuming that the loaded lumber cars have been run into the cylinder and the open door thereof has been tightly closed, the valve 25 is opened, thereby putting the interior of the cylinder in connection with the vacuum pump and withdrawing the air from the interior of the cylinder and from the cells of the wood structure. When a vacuum has been established the valve 25 is closed and live steam is admitted to the perforated pipe 11 to issue into the interior of the cylinder to penetrate into all the cells and raise their temperature uniformly to the desired point.

Prior to starting this heating step the valve 23 is opened to put the series of annular air spaces 6 in communication with the exhausting apparatus, so that a vacuum can be established between the inner and outer shells of the cylinder sections which vacuum, aided by the hollow doors insulates the interior of the cylinder and prevents radiation of heat therefrom, or transmission of cold thereto, this vacuum being maintained throughout this part of the heating operation.

When the desired point of steam heat and saturation has been attained in the wood, the supply of moist steam heat is cut off and dry heat introduced into the cylinder through the closed coils 14, the valve 25 being opened to exhaust the steam and other vapors from the interior of the cylinder as the wood is "drying out." When the wood is being "dried out" the valve 23 is closed to cut out the exhausting apparatus from communication with the spaces 6 and the valves 29 and 32 are opened. This will, through trunks 20 and 30, connect the air spaces 6 between the shell sections with the refrigerating apparatus 28 so that a refrigerant is drawn around between the shells of the various sections of the cylinder, the circulation of this refrigerant serving to quickly reduce the interior temperature while the wood is "drying out" and bring it to a point where the lumber trucks with their loads may be withdrawn through either of the doors 7 into the open air without injuring the treated lumber. Or as an auxiliary to this refrigerant action, the heat may be cut off from the coils 14 and cold water forced through these coils through pipe 34.

From the foregoing it will be seen that I have devised an apparatus which is very effective in permitting the rapid attainment of high temperatures within a closed cylinder but which may be as readily utilized to quickly cool the heated interior of said cylinder to a point where the product of the treatment may be removed with safety, thereby greatly increasing the capacity of the cylinder. Prior to my invention, it has been customary to use a single shell cylinder having an exterior insulating covering of asbestos or the like. This construction, while it serves to aid in quickly accomplishing the heating step of the process, blocks and absolutely prevents the quick cooling of the interior of the cylinder, which is the next step of the process.

While I have described my apparatus as used in connection with a particular process to which it is particularly well fitted, I desire it understood that such apparatus is not limited to use with this process only, but may be utilized wherever such general conditions exist and must be met.

While I have described and illustrated a particular embodiment of my invention, various structural modifications thereof are possible within the spirit of the invention and the scope of the appended claims.

What I claim is:—

1. In wood-treating apparatus, in combination, a closed container having inner and outer spaced shells, an exhauster apparatus, valve-controlled connections between said apparatus and the space between said shells, a refrigerating apparatus and valve controlled connections between said refrigerating apparatus and said space.

2. In wood-treating apparatus, in combination, a closed container having inner and outer spaced shells, an exhauster apparatus, valve-controlled connections between said apparatus and the space between said shells, valve controlled connections between said exhauster apparatus and the interior of said container, a refrigerating apparatus and valve controlled connections between said refrigerating apparatus and said space.

3. In wood-treating apparatus, in combination, a closed cylinder having inner and outer spaced shells, an exhauster apparatus, valve controlled connections between said apparatus and the space between said shells, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said space whereby an insulating vacuum may be produced in said space and whereby a refrigerant may be introduced into said space, alternately.

4. In wood-treating apparatus, in combination, a closed cylinder having inner and outer spaced shells, an exhauster apparatus, valve controlled connections between said apparatus and the space between said shells, separate valve controlled connections between said exhauster apparatus and the interior of said cylinder, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said space.

5. In wood-treating apparatus, in combination, a container having inner and outer spaced shells and having end heads in air tight connection with the ends of said shells and formed with insulating spaces therein, an exhauster apparatus, valve controlled connections between said apparatus and the space between said shells, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said space.

6. In wood-treating apparatus, in combination, a container having inner and outer spaced shells and having end heads in air tight connection with the ends of said shells and formed with insulating spaces therein, said end heads being hinged and forming doors for the ends of said container, an exhauster apparatus, valve controlled connections between said exhauster apparatus and the interior of said container, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said space.

tions between said apparatus and the space between said shells, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said space.

7. In wood-treating apparatus, in combination, a closed container comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, valve controlled connections between said exhauster apparatus and the space between the inner and outer shells of each section, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and the spaces between the shells of each of said sections.

8. In wood-treating apparatus, in combination, a closed cylinder comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, valve controlled connections between said exhauster apparatus and the space between the inner and outer shells of each section, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said spaces whereby an insulating vacuum may be produced in said space of each section and whereby a refrigerant may be introduced into said spaces, alternately.

9. In wood-treating apparatus, in combination, a closed cylinder comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, valve controlled connections between said exhauster apparatus and the space between the inner and outer shells of each section, valve controlled connections between said exhausted apparatus and the interior of said cylinder, a refrigerating apparatus, and valve controlled connections between said refrigerating apparatus and said spaces whereby said exhauster apparatus may be connected with the interior of said cylinder and whereby an insulating vacuum may be produced in the spaces between said shells alternately with the introduction of a refrigerant therein.

10. In wood-treating apparatus, in combination, a closed cylinder comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, an exhaust trunk extending longitudinally of the exterior of the cylinder, valve controlled connections between said exhaust trunk and said exhauster

apparatus, branch connections between said exhaust trunk and the space between the inner and outer shells of each section, a refrigerating apparatus, a connection between said refrigerating apparatus and said exhaust trunk, a refrigerant trunk extending longitudinally of the exterior of the cylinder and opposed to said exhaust trunk, connections between said refrigerating apparatus and said refrigerant trunk, branch refrigerant connections between said refrigerant trunk and the space between the inner and outer shells of each section, and valve means for controlling the passage of said refrigerant through said shell spaces.

11. In wood-treating apparatus, in combination, a closed cylinder comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, an exhaust trunk extending longitudinally of the exterior of the cylinder, valve controlled connections between said exhaust trunk and said exhauster apparatus, valve controlled connection between said exhauster apparatus and the interior of said cylinder, branch connections between said exhaust trunk and the space between the inner and outer shells of each section, a refrigerating apparatus, a connection between said refrigerating apparatus and said exhaust trunk, a refrigerant trunk extending longitudinally of the exterior of the cylinder and opposed to said exhaust trunk, connections between said refrigerating apparatus and said refrigerant trunk, branch refrigerant connections between said refrigerant trunk and the space between the inner and outer shells of each section, and valve means for controlling the passage of said refrigerant through said shell spaces, and heating means extending into the interior of the cylinder.

12. In wood-treating apparatus in combination, a closed cylinder comprising a plurality of longitudinally alined and connected sections, each section having inner and outer spaced shells forming independent air spaces between the shells of each section, an exhauster apparatus, an exhaust trunk extending longitudinally of the exterior of the cylinder, valve controlled connections between said exhaust trunk and said exhauster apparatus, valve controlled connection between said exhauster apparatus and the interior of said cylinder, branch connections between said exhaust trunk and the space between the inner and outer shells of each section, a refrigerating apparatus, a connection between said refrigerating apparatus and said exhaust trunk, a refrigerant trunk extending longitudinally of the exterior of the cylinder and opposed to said exhaust trunk, connections between said refrigerat-

ing apparatus and said refrigerant trunk,
branch refrigerant connections between said
refrigerant trunk and the space between the
inner and outer shells of each section, and
5 valve means for controlling the passage of
said refrigerant through said shell spaces,
heating means extending into the interior of

the cylinder, and means for introducing a
cooling medium into the interior of the cyl-
inder.

FRANK A. PALEN.

Witnesses:

HENDERSON F. HILL,
R. C. MITCHELL.