

Aug. 22, 1933.

G. G. HEGHINIAN
IMPREGNATION PROCESS

1,923,726

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Fig. 1.

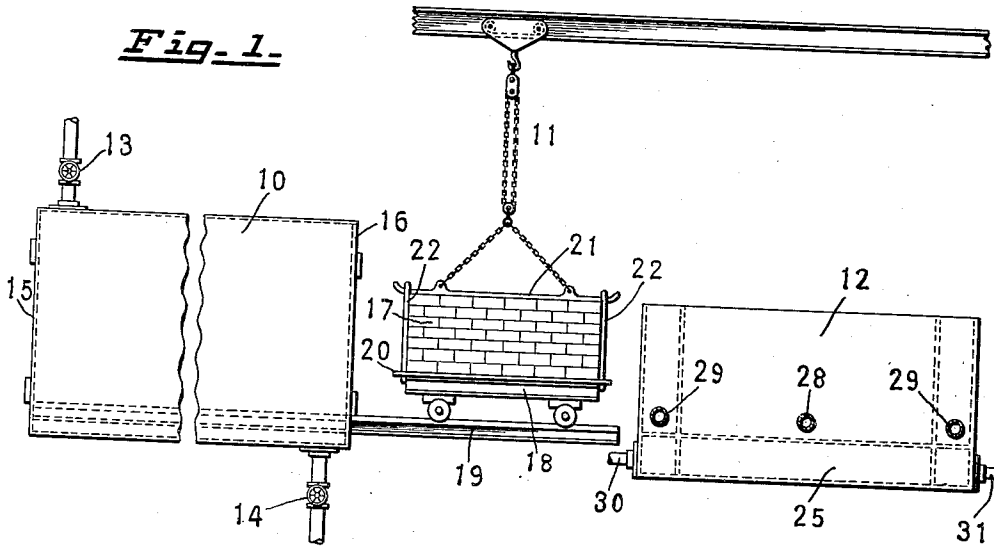


Fig. 2.

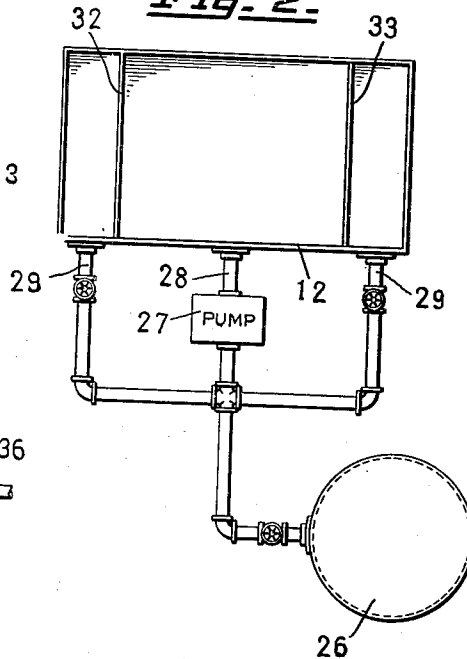


Fig. 4.

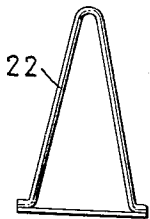


Fig. 3.

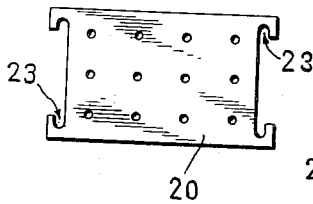
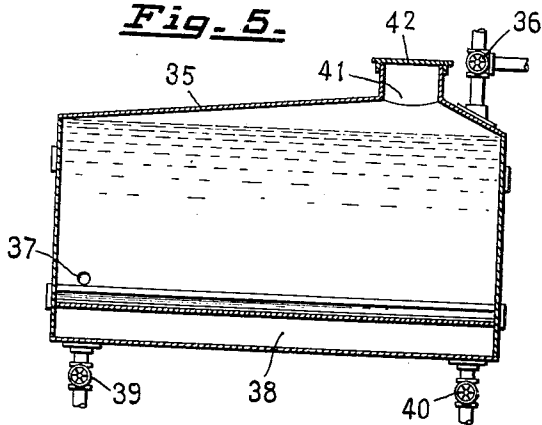


Fig. 5.



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UNITED STATES PATENT OFFICE

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IMPREGNATION PROCESS

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1 Claim. (Cl. 91—70)

My invention relates particularly to methods of impregnating building materials with liquids for the purpose of rendering them waterproof, fireproof and the like. Practically all materials such as brick and wood are more or less porous and normally contain air which must be displaced to make room for the impregnating compound. According to my invention I prepare the material for impregnation by first subjecting it to steam for a considerable time and then immersing the material in a hot bath of the impregnating compound and leaving it there until the steam and any condensation produced has been entirely driven off, then withdrawing the material while it is still hot and allowing it to dry outside the impregnating bath.

Various forms of apparatus may be used for carrying out this process depending upon the shape and character of the material to be treated.

Fig. 1 shows diagrammatically a side view of one arrangement of apparatus for carrying out my invention including a steam chamber, a carrier for the material and an impregnating tank.

Fig. 2 is a plan view showing an impregnating tank.

Fig. 3 is a plan view of a platform for carrying the material.

Fig. 4 is a detail view of one of the pick-up parts of the carrier.

Fig. 5 is a longitudinal sectional view of a modified treating vessel.

The principal parts of the apparatus of Fig. 1 the steam chamber 10, carrier 11 and impregnating tank 12 are all arranged of suitable construction and size to accommodate the material which it is desired to treat.

The steam chamber has an inlet 13 and an outlet 14 and its ends 15 and 16 may be removable or provided with doors for entrance and exit.

In the drawing I have shown the material to be treated as a mass of brick 17. The carrier has a flat car 18 adapted to run on tracks 19. The platform 20 is adapted to rest on the flat car and hold the material to be treated. The carrier has a suitable longitudinal bar 21 with detachable pick-ups 22 adapted to readily interlock with the notched ends 23 of the platform 20 so that the load may be conveniently raised and lowered and readily disconnected when desired.

The impregnating tank is provided with chamber 25 in the bottom through which a heating liquid, supplied by a tank (not shown), circulates by means of an inlet 30 and outlet 31, which form part of a circulating system (not shown).

A reservoir 26 containing the impregnating

liquid is provided and by means of a circulating system including a pump 27 supplies the tank 12 through pipes 28 and 29.

Of course the tank 12 can be filled or emptied by pump 27 or otherwise.

Partitions or baffles 32 and 33 may be employed in the tank to produce the desired separation or circulation.

The material to be impregnated is first placed in the steam chamber and subjected to treatment for several hours, the time depending on the kind of material, the size of the separate elements, and the temperature and pressure of the steam. For treating materials such as sand-lime brick, a temperature of about 210° F. is desirable. When the steam is first turned on, the temperature being higher than the temperature of the material, some condensation takes place but gradually the steam heats the material and permeates the body, or pores of the material from the surface of the material toward the core so that the material becomes saturated and drives out all the air. This steam treatment is preferably continued for several hours after which the steam inlet pipe is closed and the outlet opened so as to drain the moisture of condensation.

The steamed material is then immediately transferred to the impregnating tank in which the liquid is preferably at a temperature of say 225° to 250° F. This temperature is maintained for a considerable period of time until all of the moisture in the material is evaporated at which time the impregnating liquid rushes in to take the place of the water which has been driven out in the form of steam.

The impregnating liquid may then be allowed to cool somewhat but not sufficiently to solidify to any extent. When the material has been sufficiently impregnated and while it is still hot, it is withdrawn from the tank and allowed to cool outside so that any excess of the impregnating liquid will continue to be drawn into the pores of the material as it cools leaving the exterior substantially clean and free of any excess liquid. This method insures not only a clean and attractive product but gives a maximum penetration with a minimum amount of expense. The degree of impregnation may be controlled by regulating the time and the temperature of the successive steps.

The valves 13 and 14 may be of the conventional three-way type so that either of them can be used as an inlet and at other times as an outlet.

The bottom outlet 14 may be used as a steam

inlet after the drawing or draining of condensed water from the cylinder 10 is complete. Dry steam blown through inlet 14 and out of pipe 13 will clear out remaining air and facilitate the

5 impregnation with impregnating liquid.

With apparatus of the type shown in Fig. 5, the vessel 35 is provided with an inlet at the top, with a three-way valve 36 for controlling the admission of steam for the steaming operation and the admission of liquid for the impregnating operation. The vessel may be drained through the outlet 37. A heater 38 is provided at the bottom with an inlet 39 and an outlet 40 for heating liquid. One end of the vessel as at 41 may be higher than the other and provided with a man-hole or hand-hole cover 42 which can be opened to allow the escape of steam and air.

The material is placed in this receptacle and the steam turned on for the necessary period of time. When the steam cycle has been completed the inlet valve at the top is turned on so that impregnated liquid can enter and fill up the reservoir to the necessary level while the steam and air is being allowed to escape through the man-hole. The reservoir is then heated to keep the liquid at the desired temperature preferably below 300° F. and usually between 225 and 250° F. The temperature is then lowered to about 200° F. and held there for say fifteen to thirty minutes. The liquid is then drained out of the reservoir and the material taken out of the chamber is fully or partly impregnated as desired.

Although the impregnation will usually be carried out at atmospheric pressure it should be understood that I do not consider that my invention would be avoided should it be found desirable for any particular purpose to reduce or increase the pressure on the impregnating liquid below or above that of atmosphere at sea level and in fact this condition of reduced pressure would of course exist if the process was carried out at a higher altitude. The reduction or increase of pressure may expedite the cycle of impregnation in some cases but I do not consider it necessary for ordinary circumstances. Although this process is particularly applicable to the treatment of materials such as bricks and timber, which materials are quite difficult to impregnate

by usual processes, I have found that the general process is also applicable to other materials because the steam appears to have the faculty of softening and breaking up particles which by ordinary processes are merely coated on the outside by impregnating compounds.

In fact materials containing clay and sawdust particles are quite well adapted to treatment by my process. This is especially true where the impregnating compound is more or less heavy or viscous like asphalt.

An alternative method includes heating the material to be heated until all the water occupying the cells, pores or cavities is turned into steam. On account of the fact that the steam occupies a vastly greater space than the water from which it is made, a great deal of the water will thus be driven off. The impregnating compound is then let into the chamber or the material is placed in the compound at a temperature at or below the temperature of the material (say, at 180 to 200° F.) so that the steam begins to condense and the compound is thus drawn in by the greatly reduced pressure. This can be carried on in the chamber shown and described above. This materially shortens the time for treatment.

In case it is desired to impregnate only one face of a block or object, only that face or part need be treated with the moistening agent (water or steam) then immersed in the impregnating liquid to such depths as may be desired and the next steps carried on so that the impregnating liquid will replace the moistening agent.

It will be understood that minor changes in the steps of my improved process might be resorted to without departing from the principle of the invention.

I claim:

A process of impregnating porous building material, which comprises first subjecting the same to steam treatment, at a temperature and for a time sufficient to replace air in the cells, pores or cavities with steam, through condensation and vaporization as the material is gradually heated, then immersing it immediately in an open tank, into an impregnating liquid bath having a lower temperature than the boiling point of water.

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