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L. M. APPLGATE

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VACUUM APPARATUS FOR IMPREGNATING FLOORS

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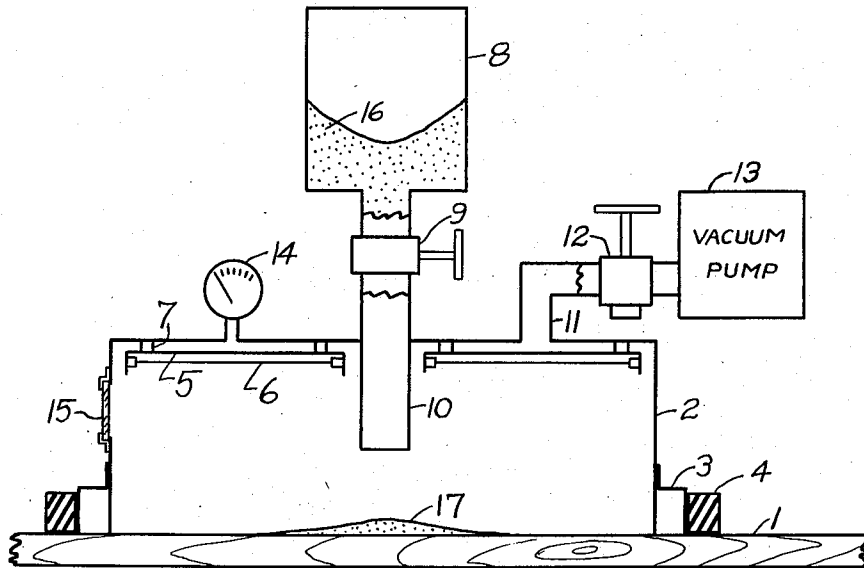


FIG I

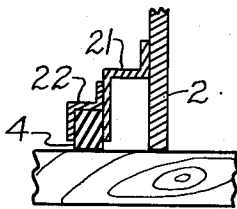


FIG II

Lindsay M. Applegate
INVENTOR.

BY

UNITED STATES PATENT OFFICE

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VACUUM APPARATUS FOR IMPREGNATING FLOORS

Lindsay M. Applegate, Portland, Oreg.

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5 Claims. (Cl. 91-18)

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This invention relates to the treatment of surfaces of porous materials such as wooden floors.

It has long been known in this art that porous materials such as wood can be impregnated with various materials such as drying oils, plastics, waxes, and others with consequent improvement in hardness, strength and finish. Floors have long been treated with varnishes, waxes, and other materials to accomplish such improvement. In using various compounds for impregnation of wood or other porous structural materials heat and, when feasible, pressure have been utilized in different ways. There has never however, prior to my present invention been a system for as effective treatment of surfaces like floors as was desired.

This invention has as its principal objective the impregnating of surfaces such as floors with compounds whose most effective application requires both heat and pressure. Another objective is the impregnation of large horizontal surfaces in sections eventually covering a large surface without disturbing its structure. Another objective is the flexible control of heat and pressure in the application of impregnating compounds on the surfaces of floors and the like. Still another objective is to provide a system permitting the use, at will, of solids or liquids for impregnation of horizontal surfaces. Another objective is to provide a special sealing arrangement for isolating the interior of mechanism of my invention from the pressure of the surrounding air while subjecting a surface, under treatment, to selected conditions of temperature and pressure.

This invention is described in the specification following with reference to the accompanying drawings:

Figure I, an elevation, sectioned in the principal parts, showing one practical form of embodiment, and

Figure II, a detail of a form of seal alternative to the corresponding part of Figure I.

In Figure I, my invention is shown in position for treating a level floor 1, presumably of wood or a similar porous structural material. A chamber 2 preferably metal, open at the bottom, sits on the floor. Around the periphery of chamber 2 there is an enclosing ring 3, preferably metal also, and on the outside of ring 3, a sealing ring 4 of soft rubber or of similar material. Inside chamber 2 an electric heater, preferably comprising a reflector 5 and heating conductors 6 is situated to direct heat onto the floor 1 below. Reflector 5 is supported in the top of chamber 2

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by attachments 7. Above the chamber and communicating with the interior thereof is a hopper 8, a valve 9 and a delivery tube 10. A connection 11 is made to a three-way valve 12 and a vacuum pump 13. A vacuum gauge 14 and an observation window 15 are optional.

In the operation of this system, the pressure and temperature are carried through a cycle determined by the characteristics of the material being treated and the compound being used for impregnation. A typical cycle of operation is as follows: Valve 9 is closed and valve 12 is set for exhausting air from chamber 2 by vacuum pump 13. The pressure is reduced as far as is practicable or economical with commercially available pumps, preferably to a vacuum of at least 25 inches of mercury.

Power is applied to heater 6 and heat is thereby radiated to that portion of floor 1 covered by chamber 2. The heat causes the moisture in that part of floor 1 under chamber 2 to evaporate and also causes the air in the pores of the floor material to expand and to escape more rapidly. When the surface of the floor has been heated to the melting point of the compound used for impregnation, valve 9 is opened sufficiently to admit a specified quantity of impregnating compound 16 contained in hopper 8. The impregnating compound is deposited on the floor in a pile 17 where it melts and distributes itself over the entire area of the floor under chamber 2. When the compound on the floor is sufficiently melted and distributed and time has been allowed for the withdrawal from the floor of as much air and water as is commercially practicable, valve 12 is shifted to shut off vacuum pump 13 and to admit air to chamber 2. The pressure of air on the melted compound on the floor forces it into the pores of the floor material thereby impregnating it to an appreciable depth.

When the machine is in operation, the lower edge, at the periphery of chamber 2, sits solidly on the floor 1, making a tight contact therewith but not usually providing an airtight seal. Rubber sealing ring 4 could be attached directly to the edge of chamber 2 but the impregnating compound would then get on the edge of the rubber seal causing it to stick to the floor and to become less effective due to the adherent compound. This is the reason for using outside ring 3 to which rubber ring 4 is attached. The space between the edge of chamber 2 and ring 3 largely isolates ring 3 and rubber ring 4 from the compound. The edge of ring 3 is made coplanar with

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that of chamber 2 so both these edges sit solidly on a level floor.

The sealing arrangement shown in Figure II is alternative to that shown in Figure I. In Figure II, the side or edge 2 of the chamber is as described before. Instead of an outer ring 3 as in Figure I, a ring 21 is attached to the side 2 of the chamber.

Ring 21 is made so that when the edge 2 of the chamber is on a level surface 1, ring 21 does not quite touch surface 1. Ring 21 is spaced a distance of the order of an inch from the edge of chamber 2. Attached to ring 21 is a second ring 22 forming a channel to hold the rubber ring or gasket 4. Rings 21 and 22 can of course be made as a channel in one piece. Rubber gasket 4 is made large enough so that on a level surface, when the edge of chamber 2 is on the surface, gasket 4 is compressed and distorted to conform closely to the configuration of surface 1.

There are many variations possible in the details of structure of this invention and in its use. Instead of using impregnating compound of a solid (powdered) form, it may equally well be liquid so far as the operation is concerned and in some ways it is more convenient. Solid material can be pre-melted if desired by the introduction of heat into hopper 8. The distribution of the impregnating compound can be, as shown in the drawing, through tube 10 or by any other arrangement of tubes desired. A plurality of hoppers and valves can also be used. Chamber 2 can be made either circular or rectangular. It should be designed with sufficient strength to withstand the full load of atmospheric pressure on the chamber sides and top.

In order to accomplish good sealing conditions under rubber ring 4, the surface of floor 1 should be reasonably smooth and free from cracks. The depth of impregnation of the floor will depend upon the porosity of the floor material, the viscosity of the impregnating compound, the temperature applied, the degree of vacuum accomplished and the time given for the compound to enter the pores of the floor material. The chamber is moved from place to place over the floor to accomplish treatment of the entire floor area.

Vacuum pump 13 can be modified or supplemented to provide pressure inside chamber 2 as well as conditions of partial vacuum. To be effective under pressure, however, chamber 2 has to be sufficiently heavy to provide sealing when the lift of the internal pressure becomes appreciable. For easy portability the additional weight is inconvenient. For most practical conditions of operation, a condition of as little pressure inside the porous material of the floor 1 is desirable. Then when the atmospheric pressure is applied over the top of the melted impregnating material 17 on the floor, the less than atmospheric pressure inside the material of the floor 1, draws the impregnating material 17 down into the openings and pores of the material of the floor 1.

I claim:

1. Means for impregnating floors comprising a chamber with an open bottom, a sealing ring around the bottom of said chamber, heating means in said chamber, means for admitting impregnating compound to said chamber, and depositing said compound on said floor and means

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for exhausting and readmitting air in said chamber.

2. In means for impregnating floors, the combination of an open-bottomed chamber evacuating means, means for admitting and depositing impregnating compound on said floor, and a seal around the edge of said chamber, said seal comprising the edge of the chamber in contact with the floor, a rigid ring attached to said chamber the edge of said ring being substantially coplanar with the edge of said chamber, and spaced therefrom and an external ring of yielding material attached to the outer side of said rigid ring for close sealing to said floor.

3. In means for impregnating floors, the combination of an open-bottomed chamber evacuating means, means for admitting and depositing impregnating compound on said floor, and a seal around the edge of said chamber, said seal comprising the edge of the chamber in contact with the floor, a rigid channel holding a ring of yielding material attached to and spaced from the said chamber edge and of dimensions and configuration to compress said yielding ring and to force it to conform to the surface of said floor when the said edge of the chamber is in contact with the floor.

4. In means for impregnating flat porous materials, the combination of an open-bottomed chamber, means for admitting impregnating compound to said chamber, means for exhausting from and readmitting air into said chamber, electric heating means in said chamber, and a seal around the periphery of said chamber, the seal comprising the edge of said chamber and a ring of yielding material supported in an annular channel at a convenient distance from and hermetically connected to said chamber, said annular channel being spaced back from the plane containing the edge of said chamber so that when said chamber is pressed down on a flat surface by atmospheric pressure, said ring of yielding material is compressed to a predetermined deflection, the deflection being limited by the edge of the chamber coming into contact with the flat surface thereby preventing further deflection.

5. A device for impregnating floors comprising an open bottomed chamber, a flexible seal around the lower periphery of said chamber, means for evacuating said chamber, means for heating the area of floor under said chamber by radiation of heat produced within said chamber, means for introducing impregnating material into said chamber when the pressure therein has been reduced to less than atmospheric pressure, and means for readmitting air to said chamber after the introduction of said impregnating material.

LINDSAY M. APPLEGATE.

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