Dec. 9, 1941. A. FARKAS 2,265,522

METHOD FOR IMPREGNATING WRAPPING MATERIALS

Filed Feb. 24, 1939

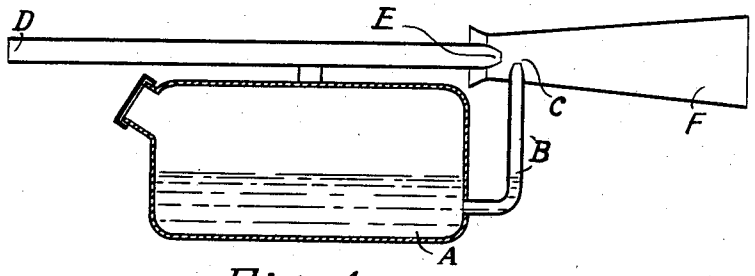

Fig. 1

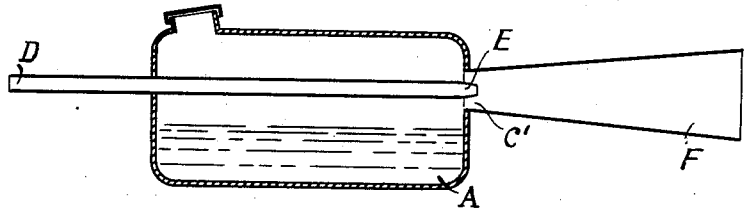

Fig. 2

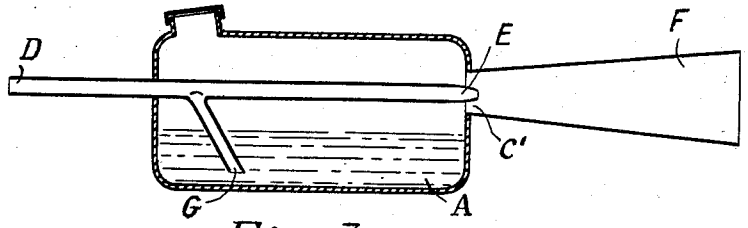

Fig. 3

Adalbert Farkas

INVENTOR.

BY

his ATTORNEY

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METHOD FOR IMPREGNATING WRAPPING MATERIALS

Adalbert Farkas, Latrobe, Pa.

Application February 24, 1939, Serial No. 258,169
In Palestine March 12, 1938

5 Claims. (Cl. 91—70)

This invention relates to the impregnation of paper, cloth or similar materials (all of them referred to hereinafter as "paper") with chemicals, and particularly to the manufacture of impregnated wrapping materials for the storage and transport of fruit, vegetable and the like perishable goods. The term "impregnation" is meant to cover the application of the substances in view to paper, irrespective of the depth down to which they penetrate into the latter.

Hitherto, paper has been impregnated with chemicals by immersion either in the substance itself or in a dispersion thereof in a more or less volatile solvent or dispersing agent, or, alternatively, by spraying the impregnating agent or its dispersion on to the paper.

These impregnating methods have the drawback that uncontrolled and in most cases too large quantities of the impregnating agent are absorbed by the paper and collect thereon in a state of low dispersion in which the agent does not display its full efficiency.

Moreover, where the impregnating agent was diluted by the solvent, the treated material has to be subjected to the action of heat or a current of air for evaporating the solvent, and the latter is lost, especially when an organic solvent is employed. In addition, and particularly in connection with the impregnation of paper proper, the mechanical strength of the latter is reduced consequent upon wetting.

These drawbacks are eliminated by the present invention.

According to this invention, the impregnating agent is at least temporarily gasified prior to its impinging on the paper. The gas is diluted with an inert gas (which may comprise any suitable mixture of one or more gases, air, steam, in any desired combination), and the resulting mixture is projected on to the paper.

In this way, an intimate mixture of the inert gas and the impregnating agent is secured, and consequently a uniform distribution of the substance on the material to be impregnated or treated is obtained in a state of high dispersion, even though the agent may condense or solidify before it actually contacts with the paper.

The gasification of the substance may be effected prior to, during, or after bringing the inert gas into contact therewith.

The invention can suitably be carried out by means of gas ejectors combined with gasifying vessels. Three types of such apparatuses are diagrammatically shown, by way of example only, in the accompanying drawing in Figs. 1, 2 and 3 respectively.

The apparatus shown in Fig. 1 has a heating vessel A, for the impregnating agent, an outlet B in the form of a rising tube narrowing at its head into a jet C; an inlet pipe D for the inert gas, ending in a nozzle E in the near neighbourhood of the jet C; and a mixing tube F. The vessel A, pipe D and tube F are adapted to be heated independently from each other by any suitable heating means.

On heating the substance in the vessel A and letting a current of gas flow through pipe D, the hot impregnating agent is aspirated through jet C, and a gas mixture can be formed in tube F.

The apparatuses shown in Figs. 2 and 3 differ from that according to Fig. 1 thereby that the nozzles for the inert gas and the impregnating gas are arranged concentrically, the latter consisting of a simple annular outlet C' from the heating vessel through which the gas inlet pipe D is conducted. These apparatuses are especially suitable for substances having a sufficiently high vapour pressure (say 10 millimetres of mercury or more) at temperatures at which they do not decompose or change.

In these apparatuses, the impregnating agent is heated in vessel A to a temperature which ensures a sufficiently high vapour pressure. A current of gas is introduced into vessel A through tube D, the end of which forms a nozzle E. The gaseous impregnating agent is blown by the current of inert gas into tube F even if the current of inert gas has no occasion to get saturated with the gasified impregnating agent.

In the apparatus shown in Fig. 3, a part of the current of inert gas is blown through the impregnating agent to be gasified in vessel A through the side tube G branching off from the tube D. The amount of inert gas bubbling through the substance can be regulated by a choke (not shown) arranged either in the tube D or in the branch G. The purpose of blowing inert gas through the substance to be gasified is firstly to facilitate the evaporation on the surface of the substance, by avoiding overheating phenomena and by removing superficial films of impurities from the surface of the substance which would be apt to prevent the free evaporation; and secondly, to supplement the jet action by producing a current of inert gas saturated with the gaseous impregnating agent.

In all these cases, the concentration of the impregnating agent in the mixture, and its state of aggregation, will depend on the size and ar-

rangement of the jets, on the viscosity and surface tension of the liquid in A, and on the velocity of the stream of inert gas flowing through pipe D. The viscosity and surface tension of the liquid in A can be conveniently varied by altering the temperature of the liquid in A.

The articles of the impregnating agent carried by the stream of inert gas will remain for some time in the gaseous state. If the temperature of the inert gas and/or of tube F falls below the melting point of the agent, then the particles can solidify and form a fine smoke or dust, and if it remains above the melting point but is not high enough to maintain the agent in the gaseous state, then the particles condense so as to form a liquid spray or fog. Thus, it is possible to vary the amount, the state of aggregation and the size of particles of the agent finally leaving the tube F by varying the individual temperatures in A, D and F.

For the impregnation, the paper passes in front of the gasifying apparatuses which are arranged in such a way as to cover the whole width of the paper, and to impregnate it either on one side or on both. The apparatuses are placed near enough to the paper to avoid excessive formation of smoke. In order to make the impregnating substance penetrate more thoroughly into the paper, one may use a pair of cylinders through which the material passes after having been exposed to the gasifying apparatuses. The cylinders are advantageously heated above the melting point of the agent. The moving speed of the paper is regulated so as to allow the desired amount of the impregnating substance to be deposited thereon. In this way, even the most minute quantities of a substance can be applied in an exactly reproducible manner, or alternatively, the paper can be provided with a complete layer of the impregnating substance, depending on the requirements.

In order to minimize the formation of smoke in the process of impregnation, the air can be sucked away from the neighborhood of the atomizers by means of suitable exhausters. The excess of impregnating substance can be recovered from the smoke or spray by passing the air through filters or condensers.

The described method can also be used for impregnating paper with two or more chemicals when the effect of the impregnating substance is to be supplemented, promoted, stabilized or otherwise affected by the admixture of further chemicals. An impregnation with two or more chemicals is obtained by exposing paper either to the mixture obtained by gasifying a mixture of two or more chemicals, or consecutively or simultaneously to the vapors or sprays of two or more chemicals gasified in separate apparatuses.

The described methods of impregnation are applicable for the impregnation of paper, cloth or similar materials with certain volatile chemicals for the prevention of fungal rotting of oranges wrapped or packed in these materials (Tomkins, Report of the Food Investigation Board for 1935, page 129). Diphenyl is one of the chemicals having efficient fungicidal action. The melting point of diphenyl is 70° C. and its vapour pressure is 10 to 760 millimetres of mercury in the temperature range 120 to 255° C.; consequently, the impregnation of wrapping paper or of sacks for oranges can be conveniently carried out by one of the described methods. In this example, the fungicidal action can be stabilized by applying a composite impregnating layer of fungicide and paraffin wax, or the like, the latter preventing premature evaporation of the fungicide.

I claim:

1. Method of preparing preservative wrappers for citrus fruit, comprising gasifying diphenyl at least temporarily, causing the diphenyl to mix with an inert gaseous medium, and projecting a mixture of diphenyl and the said gaseous medium on to the wrapping material.

2. Method of preparing preservative wrappers for citrus fruit, comprising gasifying diphenyl at least temporarily, causing the diphenyl gas to mix with an inert gaseous medium during the gasification, and projecting a mixture of diphenyl and the said gaseous medium on to the wrapping material.

3. Method of preparing preservative wrappers for citrus fruit, comprising gasifying diphenyl at least temporarily, causing the diphenyl gas to mix with an inert gaseous medium after gasification, and projecting a mixture of diphenyl and the said gaseous medium on to the wrapping material.

4. Method of preparing preservative wrappers for citrus fruit, comprising gasifying diphenyl at least temporarily, causing the diphenyl gas to mix with an inert gaseous medium, and projecting a mixture of diphenyl and the said gaseous medium on to one side of the wrapping material.

5. Method of preparing preservative wrappers for citrus fruit, comprising gasifying diphenyl at least temporarily, causing the diphenyl gas to mix with an inert gaseous medium, and projecting a mixture of diphenyl and the said gaseous medium on both sides of the wrapping material.

ADALBERT FARKAS.