

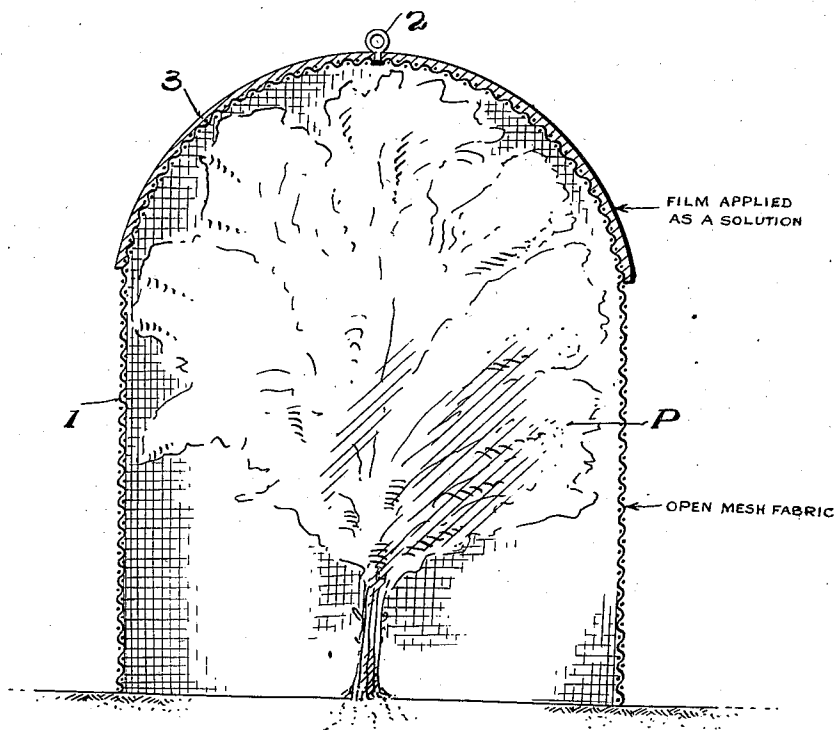
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PROTECTIVE COVERING FOR TREES

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PROTECTIVE COVERING FOR TREES

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15 Claims. (Cl. 47-21)

This invention relates to methods and means for protecting trees, shrubs, and other plants, and relates to protective coverings of the type described in the copending application, Serial No. 143,584, filed May 19, 1937.

As explained in the above mentioned application, trees, shrubs and similar vegetable growths may be protected from unseasonable climatic changes by enclosing the tree or shrub to be protected in a celloveil, that is, an enclosing envelope comprised of a mantle section made up of light-permeable plastic film and an integral or detachable perforated or open mesh veil. As there explained, the mantle must be transparent to a major portion of the visible spectrum and must be resistant to the action of weather. The mantle serves also as a support for the veil section which later may be, in effect, a continuation of the material of which the mantle is composed. It was further explained in the prior application that the mantle and veil should be so designed so as not to interfere with the proper ventilation of the tree, and for this purpose the mantle section may be perforated to secure such ventilation as well as to insure the drainage of accumulated rain water.

It has now been found that if the interstices in the veil are temporarily plugged or filled up, a marked degree of protection against unseasonable cold snaps is insured. It has been found, for example, that water vapor tends to condense on and fill up these interstices or meshes and thus accentuate the protective effect of the celloveil unit. Under incipient freezing conditions, such water freezes to form a protective film of low conductivity.

As a result of further study and experimentation, it has been found that when a celloveil structure of the type described in the earlier application is utilized, the protective effect may optionally and periodically be increased by applying a film-forming spray to the veil section so as to fill up the interstices of the veil to thus produce a thin protective surface over either the veil or any predetermined portions of it. As will later be seen, the composition of the spraying material may be such that it decomposes in a relatively short period of time and thus exerts the protective effect only over the critical periods of low temperature. Since the additional film-forming material or spray is in the form of a liquid, it may readily be applied either from the outside or the inside of the veil and/or mantle and similarly may be applied to any desired sections of the protective unit.

In order more clearly to explain the invention a simple, typical, physical embodiment is shown in the single figure of the accompanying drawing.

As shown in the drawing, a veil 1 of a meshed or open fabric is utilized. This, as shown, is of sufficient size to enclose the plant P to be protected. To enable easy application, the mantle may be formed with the staple 2 at the top by means of which the mantle may be lowered down over the plant. For the protection of larger plants, such as trees and the like, the mantle may be associated with an umbrella-like supporting structure. In accordance with the invention, after the mantle has been applied in place, a protection film 3 is established on the mantle by spraying or otherwise depositing thereon a film-forming solution of a type more particularly to be described. This filming solution may be applied over any predetermined section of the mantle and as later explained may periodically be renewed.

With the given concept in mind, it will be appreciated that the spraying material may include a wide range of different specific compositions. In fact, as already noted, under incipient freezing conditions, a water spray alone suffices as a temporary protection against a cold snap. The ice which forms provides a film of low conductivity and thus protects the plant.

Improved results are secured with film-forming sprays of a more durable and controllable character. As will be appreciated, it is advisable to apply the spray prior to the approach of freezing weather. For this purpose, the spray material should be of such a character as to develop a film which presents a low heat transmission and which is permanent under moist air for a minimum period of several days. It will be understood that the roughened surface of the veil, as well as the apertures or perforations, often present in the mantle, present satisfactory points of adhesion for the spray.

In one form of the invention, the transitory protective effect described may be secured by applying to the veil section, and if desired to the mantle section, of the celloveil an aqueous solution containing less than one per cent. of gelatin and soap sufficient to lower the surface tension of such a solution and provide the desired wetability. Such a solution yields a thin tenuous adherent film within the period of a few minutes and one which is constant for several days. Similarly, aqueous solutions of albumen serve excellently for such spray material. It

will be understood, of course, that the spray material may be either in the form of a solution, emulsion or colloidal suspension. In general with aqueous solutions and emulsions, it is advisable to add small quantities of proteins, such as glue, gelatin, albumen, casein, and polypeptides (condensation products of amino acids) to increase the life of the film.

Of particular utility for the present purposes are the condensation products of alcohols and alcohol-acids and similar compounds. Thus, cellulose derivatives such as ethyl cellulose and cellulose acetate provide films which are highly transparent to light and quite resistant to weathering. These substances may be dissolved in suitable solvents and extendors and applied as a spray in the known manner.

Yet again, the condensation products of unsaturated hydrocarbons and their derivatives which attain textile properties, are of marked resistance to weathering and may be employed. Similarly, polymeric isoprene and butadiene and their derivatives, in suitable vehicles, may be employed.

As noted above, the invention comprehends the concept of providing a transient or evanescent protective film on the celloveil. For this purpose, substances may be included in the spray which accelerate disintegration of the ultimate films. For this purpose, materials may be incorporated in the spray solutions which tend to mechanically or chemically disrupt the film without impairment of the celloveil matrix or base. Thus, compounds of relatively high volatility, compounds of marked solubility, as well as hygroscopicity, may be incorporated in the spray solution. Similarly, compounds which oxidize in contact with air to thus disrupt the film may be utilized.

Among such substances which serve effectively as disruptive agents are the cyclic hydrocarbons and their derivatives, particularly the terpenes. These, with their oxygenated products, serve excellently for the purpose at hand. For example, bornyl chloride and camphene, produced from alpha-pinene, may be employed. These substances are characterized by a marked volatility and serve effectively as film disintegrating media. Bornylene (produced from pinene) is likewise useful as a disruptive agent, since through oxidation it is converted to borneol and camphor, the latter vaporizing readily in the atmosphere. Among the aromatic compounds, naphthalene and such substances as para-dichlorobenzene present a volatility sufficiently high for the purposes at hand. Likewise, aliphatic compounds such as chloral hydrate and metaldehyde may be utilized. Again, carbohydrates such as levulose, which present marked hygroscopic characteristics, may be incorporated in the film. Oils, fats and wax, even essential oils, may be used for the production of the film. When such waxy or similar substances which yield a residue which is not readily removed by weather conditions are employed, it is advisable to complete the removal of these by applying a suitable detergent solution.

It is particularly to be observed at this point that although it is necessary to construct a considerable portion of the celloveil of light-permeable material, it is not altogether essential that the spray substances be permeable to light, so long as they do not remain on the celloveil for an excessive length of time. It will be understood that the effect of rain, moisture and weathering

will remove the last vestige of such spray film within a period of several days.

An important characteristic of the spraying material is its ease of filming or spreading over the interstices of the celloveil. For this function, the mucilaginous nature of the spray material becomes of importance. Hence, it is necessary to select a spray which not only has the desired spreading characteristics but also one which presents a suitable adhesion for the celloveil. This adhesive material may be of any suitable type and may consist of natural gums, such as gum arabic, gum tragacanth, and agar agar. Suitable commercial adhesives, such as dextrine, or the starch adhesives produced by treating starch with alkalis, may likewise be employed. Such carbohydrates, though highly adhesive, are slowly washed away by rain. While preferred adhesives have been mentioned, it will be understood that any adhesive, soluble in the solution which is to be employed, may be utilized. Higher dispersion may be given to the spray material by the addition of more varied products. Even the addition of materials such as bentonite, is found to be satisfactory under most conditions.

It will be understood that the type of film-producing compounds largely determine the character of the solvent or diluent to be used, as well as the characteristics of the ultimate film itself. Long chain fatty substances, with end solubility in water, such for example as stearic, palmitic and similar acids, as well as compounds such as lauryl, stearyl or palmityl alkali sulphates, require a sufficient concentration of water in the spray and under proper aqueous concentrations, lead to highly packed, long chain molecules on the surface of the coherent film. Small amounts of substances like glycerol or other high boiling polyatomic alcohols add flexibility to the films and function beneficially in aiding in disintegration by rain.

As illustrative of a simple embodiment of the invention, an aqueous spray solution may be produced by adding one part by weight of each gelatin, bornyl chloride, sodium stearate and glycerol. Such film-forming compounds may be admixed with water so as to give a 1% solution. When such solution is sprayed by suitable means upon the veil section, or the veil and mantle sections of a celloveil, it is found that the interstices are filmed over to provide a temporary protective coating.

Again, an effective spray solution may be used which comprises 50 parts of acetone and 50 parts of water, to which is added 1% by weight of film-forming materials, made up of equal parts of cellulose acetate, bornylene and lauryl sodium sulphate.

It will be found in practice that when an amorphous film is deposited on a celloveil, a number of the interstices will remain uncovered. This is advantageous in that it permits the circulation of air and likewise allows the continuous respiration of the shrub or tree under almost normal conditions. It will be understood that to control this circulation and respiration, certain small sections of the celloveil may be left unsprayed and hence unfilmed.

It will be understood that the film-forming sprays of the type described herein are adapted to be applied to any of the types of envelopes or celloveils described in the copending application. When the meteorological conditions so indicate, the celloveil of a given area, such as an orchard, may be provided with a substantially continuous

and temporary thermal insulating surface. For this purpose, the spray material may be forced from any suitable pressure system and applied to the veil section or, if desired, to each the veil and the mantle section of each unit. As the solvent or vehicle evaporates, the thin tenuous evanescent film is formed, thus, in effect, completely enclosing the tree or shrub in a heat insulating jacket or canopy. Due to the composition of the filming material, as well as the action of the wind and rain, in a short period of time the film automatically disintegrates and falls away from the veil fabric thus again presenting the original open mesh structure, permitting the desired free circulation of air and pollination.

While preferred embodiments of the invention have been described, it will be understood that these are given merely as illustrative of any similarly functioning materials which may quickly be applied to the protective celloveil to protect against sudden cold snaps and which, without further labor, are automatically removed by reason of the natural weathering and consequent disintegration of the film.

I claim:

1. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes, which comprises, establishing an envelope of meshed structure about the tree, and applying to the envelope a film-forming solution to form a protective coating on the envelope.

2. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes, which comprises, covering the plant with an envelope composed of a meshed fabric and applying to the envelope a film-forming solution to form a protective coating on the envelope.

3. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes, which comprises, enveloping the tree in a celloveil and applying a film-forming solution to the celloveil to form a thin protective coating thereon.

4. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes which comprises, enclosing the tree to be protected in an envelope of meshed fabric and applying to the envelope a film-forming solution to form a protective surface on the envelope, such solution containing materials which accelerate the disintegration of the resulting filmed surface.

5. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes, which comprises, enclosing the tree to be protected in an envelope of meshed fabric, and applying to the envelope a film-forming solution adapted to form a protective filmed surface on the envelope, such film containing a sufficient amount of a volatile material to insure the disintegration of the formed film after a predetermined period of time.

6. A method of protecting trees, shrubs, and

the like, against unseasonable temperature changes which comprises, enveloping the tree in a celloveil and spraying a protein-containing, film-forming solution on the celloveil to form a protective coating thereon.

7. A method of protecting trees, shrubs, and the like against unseasonable temperature changes which comprises, enveloping the tree in a celloveil and spraying a carbohydrate containing, film-forming solution on the celloveil to form a protective surface thereon.

8. A method of protecting trees, shrubs, and the like against unseasonable temperature changes which comprises, enveloping the tree in a celloveil and spraying the celloveil with a film-forming solution containing a cellulose ester so as to form a thin protective coating on the celloveil.

9. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes which comprises, enveloping the tree in a celloveil and spraying the celloveil with a film-forming solution containing cellulose acetate.

10. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes which comprises, enveloping the tree in a celloveil and spraying the celloveil with a film-forming, gelatin containing solution.

11. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes which comprises, enclosing the tree to be protected in an envelope composed of a meshed fabric and applying to the envelope a film-forming solution which upon evaporation is adapted to form a protective surface on the envelope, such surface containing a material of marked hygroscopicity and adapted to accelerate disintegration of the formed film surface.

12. A method of protecting trees, shrubs, and the like, against unseasonable temperature changes which comprises, enveloping the tree in a celloveil, and spraying the celloveil with a film-forming solution containing cellulose acetate and a volatile solvent therefor, together with a material of sufficient volatility to markedly accelerate disintegration of the resulting film.

13. A protective unit for trees, shrubs, and the like, comprising an envelope composed at least in part of meshed fabric, the interstices of which are closed with a thin evanescent protein-containing film.

14. A protective unit for trees, shrubs, and the like, comprising an envelope composed at least in part of meshed fabric, the interstices of which are closed with a thin evanescent carbohydrate containing film.

15. A protective unit for trees, shrubs, and the like, comprising an envelope composed at least in part of meshed fabric, the interstices of which are closed with a thin evanescent film of a cellulose ester.

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