

UNITED STATES PATENT OFFICE

TREADWAY B. MUNROE AND ELBERT C. LATHROP, OF CHICAGO, ILLINOIS, ASSIGNORS
TO THE CELOTEX COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

PROTECTIVE TREATMENT OF FIBER PRODUCTS

No Drawing.

Application filed May 29, 1930. Serial No. 457,540.

It is, of course, well-known that termites cause damage, through many portions of the world but particularly in the tropical and subtropical portions thereof, by attacking and destroying wood used in construction. These insects in fact not only destroy wood but they will attack and destroy substantially any woody material, and among the materials which they attack are included wall-boards, building boards, insulating boards, and the like made from wood fiber or from the fiber of various forms of vegetative growth. Not only do termites attack and destroy board-like materials composed of wood fiber and various vegetative fibers, but they also attack substantially any product made up of fiber such as was mentioned, and in addition they attack and destroy paper products, cotton goods, leather, and the like.

It is the object of this invention to provide a treatment of fibrous products, particularly but not only those in board form, which through being toxic or repellent will deter attacks by termites and thereby afford protection therefrom. Particularly there is contemplated an integral treatment, of the various products, which is applied to the component fibers of fibrous material prior to its formation into the eventual products, whereby the treatment is effective throughout the body thereof. It is contemplated that this treatment may be applied to substantially any product subject to the attacks of termites, which product is manufactured in such manner that the treatment is applicable at some stage prior to the final formation of the product.

Specifically, the treatment for production against damage by termites comprises the incorporation of a termite-repellent substance to the component elements which make up the final product, the application being made in the form of an emulsion or fluid suspension from which the termite-repellent material is precipitated on the elemental sub-

stances of the product prior to the final formation into the finished product.

Various termite-repellent or toxic chemicals are available, comprising compounds of the benzene, naphthalene, and anthracene ring series in which hydrogen in the ring nucleus has been replaced by a halogen, various chlorinated phenols, hexachlorobenzol, chlorinated diphenyl compounds, and the like. These compounds may be emulsified or suspended and precipitated on the fiber from which the final product is formed, which procedure will be described specifically in connection with chlorinated naphthalene. The various compounds referred to in the following text are either insect-repellent or toxic to insects, or possibly have the effect of being both toxic and repellent, and it is to be understood that reference hereafter to a substance as being insect- or termite-repellent is intended to have the meaning that the substance is insect-repellent and/or toxic, or that it is both repellent and toxic.

Specifically, by way of example, the objects of the invention are accomplished in connection with rendering a fiber board repellent to termites by precipitating upon the fibers thereof chlorinated naphthalene prior to the formation of the fibers into the finished board. It is, of course, understood that a like process may be applied, for instance, to cotton prior to felting into a sheet of felt, to pulp prior to formation into a formed article, and is further likewise applicable in many other particular applications. While chlorinated naphthalene is specifically mentioned, the same method of application of the termite-repellent substance may be followed in the application of various materials other than chlorinated naphthalene, the only necessary characteristics of such material being that it may be emulsified or suitably suspended in a fluid and that the emulsion or suspension after being mixed with the fiber can

be broken down to precipitate the repellent material upon the fiber.

Chlorinated naphthalene, it is to be understood, is obtainable in different forms, depending chiefly the complexity of the combinations involved; that is, it may be an oily liquid comprising only mono-chloro-naphthalene and thence through a series of waxes of various properties which comprise in various proportions mixtures of mono-chloro-naphthalene, di-chloro-naphthalene, tri-chloro-naphthalene, etc.

It appears that a chloro-naphthalene comprising substantially 49% chlorine and composed of probably, di-tri-, and probably higher chlorides of chloro-naphthalene is quite efficient in repelling attacks by termites, which form of chloro-naphthalene is a moderately hard, waxy substance at ordinary temperatures. The waxy chloro-naphthalene is softened by application of heat, and there is added stearic acid and potassium hydroxide, and the whole is emulsified with water in any appropriate manner, such as by the use of a colloid mill, and thus there is produced an emulsion comprising a dispersion of chloro-naphthalene in water which may or may not be a true emulsion depending on the particle size. It is, of course, to be understood that the emulsification can be accomplished by the use of emulsifying agents other than the potassium stearate formed by the combination of the potassium hydroxide and stearic acid, and that these particular emulsifying agents are given only by way of example, and that the particular method of emulsification of the chloro-naphthalene is not essential to the invention in that any satisfactory emulsion may be used. Proportions which have been found satisfactory are 45 parts of chloro-naphthalene, 5 parts of stearic acid, 1 part of potassium hydroxide, which materials are emulsified with 225 parts of water to produce a 20% emulsion of chloro-naphthalene.

In treating board-like material formed from wood fiber or vegetative fiber with the chloro-naphthalene emulsion prior to the formation of such fibrous material into board products, the emulsion diluted to the proper consistency, depending upon the percentage desired in the finished product, is added to a relatively dilute suspension of the fibrous material, and preferably it is added prior to the final refining action to which the fiber is subjected prior to its formation into the final board product. The fiber suspension with the added emulsion then has added to it for instance rosin and alum, that is, the usual sizing chemicals; the action of the rosin and alum, particularly of the alum, being to cause a demulsification or precipitation of the suspended chloro-naphthalene which is deposited upon the fibers.

Due to the fact that the aluminum of the alum used in sizing combines with the stearic

acid of the emulsion to form an aluminum stearate which is not an emulsification agent, and due to the strong coagulating action of aluminum salts because of the high electric charge of the aluminum ion or aluminum hydroxide formed, the emulsion is therefore broken down with the resulting precipitation of the chloro-naphthalene. In the use of alum for the precipitation of the chlorinated naphthalene it has been found that a pH of about 5.5 to 6.0 is the most satisfactory for the desired precipitation, but that these limits are not at all sharply defined, and that the precipitation may be obtained either at a pH higher or lower than those given. While alum has been stated as the chemical employed to cause breaking down of the emulsion, it is to be understood that substantially any other chemical which will combine with the stearic acid or other emulsifying agent to form a compound which is not an emulsifying agent, otherwise such a substance as will break down the emulsifying agent, will satisfy the conditions necessary to cause the precipitation. The fiber on which the chloro-naphthalene has been precipitated from this emulsion is then formed into its finished form, for instance, on a board-forming machine wherein the fiber is sheeted and the white water or water in which it has been suspended is drained away. The formed sheet is properly dried to produce the finished product which will have incorporated therein, integrally throughout, the chloro-naphthalene which was in the emulsion.

Attention is directed to the fact that there is a certain amount of loss due to incomplete precipitation of the chloro-naphthalene on the fiber; that is, in general there will be a certain amount which is not demulsified, and therefore a loss of around 20% can be expected in the white water if the fiber is formed into a board on a wet board machine. Chloro-naphthalene is volatile at temperatures of 300°-400° F., and therefore in drying a fiber board integrally treated with chloro-naphthalene the temperature of drying should be held as low as practical to prevent excessive vaporization losses during the drying action and, to take care of the losses which have just been mentioned, it is essential that the original amount of chloro-naphthalene emulsion be increased proportionately in order that the final product may have the desired amount of treatment.

It is to be understood that, while the application of this integral treatment has been specifically discussed in connection with the treatment of the fiber board product, the principles which are illustrated by such treatment are generally applicable as has been heretofore stated, and that it is not the intention to limit the invention in accordance with the specific illustration of a particular

embodiment of the invention as has been given.

What is claimed is:—

1. The method of integrally treating a fibrous product wherein the fiber from which the product is formed has added thereto while in water suspension emulsified chloro-naphthalene with the subsequent addition of a demulsifying agent, whereby the chloro-naphthalene is precipitated upon the fibers. 75
2. The method of integrally applying to a sheeted fibrous product a termite repellent compound wherein there is added to the fiber, prior to formation, an emulsion of chloro-naphthalene with the subsequent addition of aluminum hydroxide, the fiber thereafter formed into the sheeted product whereby the termite repellent treatment is integrally distributed therethrough. 80
3. The method of rendering fibrous products insect-repellent by the distribution therethrough of a compound in which hydrogen in the nucleus of aromatic ring system hydrocarbons has been replaced by a member of the halogen group the compound applied to the fibers of the product by precipitation from an emulsion. 85
4. The method of introducing into a felted, board-like fiber product an insect-repellent substance wherein the insect-repellent substance is emulsified and added to pulped fibrous material, to which mixture is added a substance breaking down the emulsion, whereby the insect-repellent substance may precipitate on the fibrous material, resulting in a product which, on sheeting, has distributed therethrough the insect-repellent substance. 90
5. The method of introducing into a felted fiber product an insect-repellent substance wherein the insect-repellent substance in liquid suspension, is added to a fiber suspension to which mixture is added the substance causing flocculation, whereby the insect-repellent substance is precipitated on the fibrous material, resulting in a product which on sheeting has distributed therethrough the insect-repellent substance. 95
6. The method of introducing into a felted fibrous product a compound in which hydrogen in the nucleus of aromatic ring system phenols has been replaced by a member of the halogen group, wherein the compound in aqueous suspension is added to pulped fibrous material, there being subsequently added a flocculating agent, depositing the compound upon the pulp, whereby the resulting product has on formation the insect-repellent compound distributed therethrough. 100
7. The method of introducing into a felted fibrous product, in the course of its manufacture, an insecticide in which hydrogen in the nucleus of an aromatic ring system hydrocarbon has been replaced by a member of the halogen group, wherein a dilute emulsion of the insecticide is added to a dilute suspension of fibrous material, after which the emulsion is broken, whereby the insecticide is thrown out on the suspended fiber, which suspended fiber together with the insecticide is subsequently felted on the screen of a machine of the general type used in paper making. 105

In testimony whereof we affix our signatures. 110

TREADWAY B. MUNROE.
ELBERT C. LATHROP. 115

80

85

90

95

101

105

110

115

120

125

130