106-18.34 SR SEARCH ROOM
OR 2,534,008

Patented Dec. 12, 1950 2,534,008

UNITED STATES PATENT OFFICE

2,534,008

INSECTICIDAL PAPER-COATING COMPOSITIONS

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No Drawing. Application July 10, 1947, Serial No. 760,106

1 Claim. (Cl. 106—15)

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This invention relates to new and useful improvements in insect extermination. More particularly, it relates to an improved method of incorporating residual type insecticides with fibrous sheet materials such as paper and cardboard. This invention further relates to a means for providing a diversity of paper products possessing insecticidal potency particularly against household insects such as moths, flies and mosquitoes.

Residual type insecticides are materials which exert their toxic action upon insects directly, by contact through the epidermis or some other parts, as contrasted to stomach insecticides which to be effective must be ingested. Examples of residual or contact insecticides are dichloro-diphenyl-trichloro ethane, dimethyl-diphenyl-trichloro ethane, chlorinated camphene, chlordane ($C_{10}H_6Cl_8$), benzene hexachloride and similar products. The preparation of these compounds is known in the art and therefore is not here described.

These insecticides have been applied to parent materials such as consumer paper products by spraying, immersion, impregnation and similar means usually at the site where the insecticidal activity was desired. This necessitated, in the home or office, the precautions attendant to the dispersion of any insecticide as it is in this dispersion rather than in the residual toxicity that the greater danger to humans is involved. Frequently, the solvent used as a dispersion means is often more irritable to the operator than the insecticide itself.

Finished paper products possessing insecticidal properties which do not require this dispersion step have largely been in the flypaper class rather than possessing residual insecticidal activity. Flypapers kill through their adhering actions and, therefore, are sticky to handle and unsightly. This action is unsuited for coated paper products.

Coated paper and thin cardboard are extensively used for engravings, printed labels and other high grade printing especially where attractive colors are desirable. The coating for the described purpose is usually performed directly in the paper plants where the paper is made, or in paper coating mills. The coating operation is extremely critical (see for example, Chapter 15, Witham, Sr., "Modern Pulp and Paper Making"). Slight defects in the coating render the paper unsuitable for printing and decorative purposes. Because of the stringent requirements for coated paper, the preparation of satisfactory paper coating mixtures is a complex operation. The pH of the coating mixtures is usually in the alkaline region. Since the previously mentioned organic residual insecticides are hydrolyzed in alkaline media and thus loss their effectiveness, their use in the before mentioned coating compositions is precluded.

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One of the objects of this invention is to provide paper coating compositions which impart insecticidal activity to the paper being coated. Another object of this invention is to provide a means for coating paper so that it possesses residual insecticidal activity. Still another object is to provide a diversity of useful decorative paper and cardboard articles which possess this same insecticidal activity. Other objects will become apparent from the following discussion.

It has now been found that paper can be coated so as to possess the physical characteristics essential for coated paper and simultaneously have imparted to it residual insecticidal activity. These characteristics are secured by the use of hereafter described coating compositions. The paper can then be printed and further manufactured in a variety of shapes for uses in household and office products which retain their residual insecticidal action without further treatment.

Coated paper needs to be uniformly smooth and firm to take printing well; it should readily absorb the ink and have an affinity for it; it should hold the ink pigment while the chemical penetrates and dries; it should fold well and it should be of attractive color.

Investigations disclosed that when organic contact insecticides were added to conventional coating compositions, either lack of insecticidal activity or poor coating characteristics, or both resulted. By substantially eliminating alkaline components coating compositions have been obtained that yield the desired before listed coating characteristics and residual insecticidal activity. These compositions consist of a residual type insecticide, a pigment such as clay, suspending and wetting agents, and a substantially non-alkaline defoaming agent. The use of the suspending and wetting agents was found necessary or unsatisfactory results were obtained without them. The defoaming agent is used to prevent bubble spots which would mar the paper surface. Chlorinated starch is added as a non-sticky adhesive when the printing is to follow the coating operation, which is a preferred method.

The following coating compositions, suitable for the described purpose, may be prepared in accordance with our invention. It should be

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borne in mind that these are merely examples of many types of such products.

Percent by weight

I

DDT (dichloro-diphenyl-trichloro ethane)	20
Clay	19
Suspending and wetting agents	2.5
Octyl alcohol (anti-foaming agent)	0.2
Water	50
Chlorinated starch solution (23% starch in water)	8.8

II

Toxaphene (chlorinated camphene)	10
Clay	29
Suspending and wetting agents	2.5
Water	50
Octyl alcohol	0.3
Chlorinated starch solution (25% starch in water)	8.7

III

Dimethoxy-diphenyl-trichloro ethane	24
Clay	14
Suspending and wetting agents	2.5
Water	50
Aluminum stearate	0.2
Chlorinated starch solution (23% starch in water)	9.8

IV

DDT	18
Clay	14
Dimethoxy-diphenyl-trichloro ethane	6
Suspending and wetting agents	2.5
Deodorized kerosene	0.2
Chlorinated starch solution (23% starch in water)	9.8
Water	50

V

DDT	17
Clay	18
Suspending and wetting agents	2.5
Chlordane ($C_{10}H_6Cl_8$)	3
Water	50
Octyl alcohol	0.2
Chlorinated starch solution (23% starch in water)	9.8

VI

DDT	24
Clay	14
Suspending and wetting agents	2.5
Aluminum stearate	0.1
Octyl alcohol	0.1
Chlorinated starch solution (23% starch in water)	9.8
Water	50

Other pigments may partially or wholly replace the clay. Examples are Paris white, satin white, barium sulfate, titanium pigments, precipitated chalk and other well known pigments. The product may be colored by including colored pigments or dyes. Most of the commercially available suspending and wetting agents can be used. Examples are aryl and alkyl sulphonates, alkyl sulfates, dibutyl phenoxypolyethoxy ethanol, sulfonated esters of alcohols and dibasic acids, and sulfonated fatty acid amides.

If it is desired to print on the paper before the paper coating operation, the chlorinated starch may be omitted and sized paper may be used. If printing follows coating unsized paper is used.

The solid ingredients are finely ground in a micronizer and all the ingredients are transferred to a ball mill for one to two hours. This gives a creamy paint-like slurry. The unsized paper or thin cardboard is then coated with these compositions in the conventional manner for coating paper.

The slurry is circulated throughout the conventional coating machine where the paper is dipped into the coating by means of a system of rollers and a trough. The coating is distributed evenly over the surface and its thickness is regulated by adjustable wringer-like rollers. The actual dry coating may be varied from five to twenty pounds per 3300 square feet of paper depending on the final results desired. The paper or thin cardboard may be coated on one or both sides.

After the paper is coated, it is automatically hung in festoons and hot air is blown onto the coated surface to evaporate the water, leaving a deposit of insecticidal coating. The dry coated paper is then rolled up and sent for printing and cutting.

The paper or cardboard is printed in the conventional manner in any number of colors. Paper for pictures, calendars, ornamental lampshades, moth repellent bags and similar articles made of fibrous materials can be made in the manner described.

The following examples are given to illustrate this invention.

EXAMPLE 1

3300 feet of unsized thin cardboard, .010" in thickness was coated on one side of the paper so that the actual dry coating weight was seven pounds. The organic contact insecticide ingredient in the coating composition of type I of the before listed compositions was dichloro-diphenyl-trichloro ethane. The paper was tested in the form of a lampshade four inches in diameter and 4½" tall for insecticidal activity.

EXAMPLE 2

Paper of the same initial characteristics as that used in Example 1 was coated to the same weight in the same manner as in Example 1, but the organic contact insecticides used was dimethoxy-diphenyl-trichloro ethane and the composition was of type III of the coating compositions. This product was also tested as a lampshade of the same dimensions as in Example 1.

EXAMPLE 3

3300 square feet of unsized paper, approximately .003" in thickness was coated on both sides of the paper so that the dry coating weight was seven pounds on each side. The contact insecticide was dichloro-diphenyl-trichloro ethane in a type I composition. The product was tested in the form of strips 2¼" by 18."

The following table illustrates the insecticidal activity of the products of the above examples. In each test approximately 100 flies were used.

TABLE I

Insecticidal activity of coated papers

Products of Example—	30 Mins. % Dead	60 Mins. % Dead	90 Mins. % Dead	120 Mins. % Dead	Average of—
1	7	24	36	71	10 tests.
2	21	35	58	86	2 tests.
3	12	34	49	79	4 tests.

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Coated paper prepared in the manner described by this invention retains its insecticidal activity after receiving the further processing that conventionally coated papers receive. No further application of insecticidal compounds is necessary after the paper has been coated. The paper can be fabricated into a diversity of paper products for home and office use which will possess residual insecticidal activity besides retaining their normal functions. There is no unsightly adherence of dead flies to these objects. The advantages of this invention are readily seen.

This invention has been described in preferred embodiments but it is to be understood that the examples listed are not to be construed as either limiting the invention to the products listed or to the kinds of insects to which it may be applied.

We claim:

A non-alkaline insecticidal paper coating composition consisting by weight of

	Parts
Dichloro-diphenyl-trichloro ethane	20
Clay	19
Suspending and wetting agent	2.5
Octyl alcohol	0.2
Chlorinated starch solution	8.8
Water	50

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