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WRAPPING MATERIAL AND METHOD OF MAKING

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FIG. 1

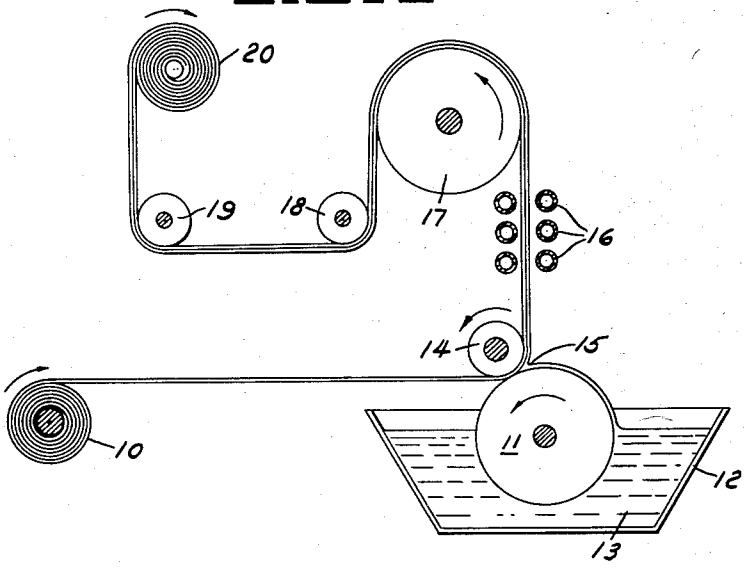
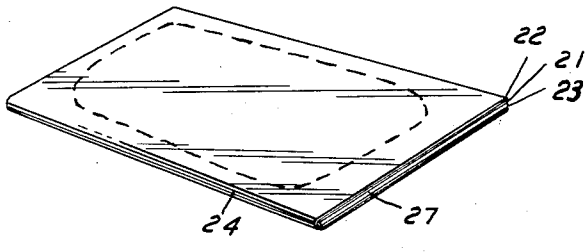


FIG. 2



FIG. 3



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WRAPPING MATERIAL AND METHOD OF MAKING

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2 Claims. (Cl. 117—155)

This invention relates to a wrapping material and method of making especially adapted to protect the articles wrapped against mold infection, and more particularly to a laminated wrapping material wherein one coating is formed of a temporary cohesive material, which material not only permits quick sealing of the laminated wrapping material but also in itself carries a fungicide.

Prior to the present invention it has been common to impregnate wrapping papers directly with a fungicide, one example of this being shown in the patent to Mispley et al. No. 2,173,453, dated September 19, 1939, wherein tissue paper is impregnated with diphenyl. These fungicide treated papers have been fairly satisfactory as preservative wraps where the time of preservation has been relatively short, and where it has been attempted to increase the strength of the fungicide in the paper to retain the effectiveness of the preservative chemical difficulty has been experienced where the strong chemical directly contacts the wrapped material such as fruit.

We have found that wrapping papers, adapted to be effective against mold infection for relatively long periods of time, can be formed by mixing the fungicide chemical with an aqueous dispersion of rubber, applying this mixture of fungicide and rubber to one surface of a wrapping paper, which wrapping paper may have various degrees of moistureproofness, and after the application of this rubber to the paper, setting up the rubber to a point wherein the water has been removed but the deposited rubber film is cohesive to itself and is substantially dry to the touch and substantially non-tacky. By combining the fungicide chemical directly with the aqueous dispersion of rubber or latex, we have found that the deposited rubber film, for all practical purposes, seals the fungicide inside the package formed by the wrapping paper.

Another object of this invention is the provision of a method of producing a wrapping material having one surface formed of a cohesive of self-adhering material in which a fungicide of high vapor pressure is suspended whereby to release the fungicide vapors gradually and over a long period of time. For best results the fungicide should be one of high volatility but we have found that high volatile fungicides are not readily soluble and tend to coagulate latex. We have found that by compounding a latex having a pH of 5.5 to 7 that it is possible to get the high volatile fungicides into solution in the latex.

The moisture-vaporproofness of the wrapping paper will vary in accordance with the article to be packaged and preserved and in order to seal in a fungicide of high vapor pressure we prefer to use a wrapping material the outer layers of which would be formed of polyethylene coated paper, Saran coated paper, or foil coated paper, all of which papers are standard in the industry. In some cases the paper should be plain and of a relatively low moisture-vaporproofness, but in all cases the combined aqueous dispersion of rubber and fungicide should be of such composition that the dried latex film will adhere tenaciously to the paper on one side but there should be substantially no adhesion between the dried latex film and fungicide and the other side of the paper or Saran, or polyethylene, or foil, as the case may be; in other words, the complete laminated wrapping material should be capable of being rolled up so as to keep out the air and preserve its original fabricated condition and thus allow the roll of wrapping material to be unrolled at any time

to make its cohesive surface readily and instantly operative for the forming of packages.

Other objects and advantages of the invention will be readily apparent from the following description and accompanying drawings wherein:

Figure 1 is a diagrammatic elevational view of a paper coating apparatus and showing the method of applying the latex and fungicide film to a paper sheet.

Figure 2 is an enlarged cross sectional view of the finished wrapping paper.

Figure 3 is a perspective view showing an article sealed within a folded over sheet of latex fungicide coated paper.

Referring especially to Figure 1, **10** designates a roll of paper to be coated, this paper being of the same type and generally coated in the same manner as set forth in the patent to Jennings No. 2,432,074 of December 2, 1947. However, normally, we prefer to use a paper having greater moisture-vaporproofness, in which case we can, for example, use forty pound paper laminated with a one mil coating of polyethylene, fifty pound kraft paper laminated with a 1.5 mil coating of Saran, or forty pound kraft paper laminated to a .0005 aluminum foil. In practice we have found that the kraft paper to which the latex fungicide mix is applied may vary from twenty-five to fifty pound kraft paper and provide a wrapping paper easy to manipulate.

The paper travels from the roll **10** in a generally horizontal direction to the coating roll **11**, preferably made of polished metal, and partiallv submerged in a trough **12** containing the latex fungicide bath **13**. The paper coated side of the wrapping material is held in contact with the coating roll **11** by a smaller roll **14**. There are three important factors with respect to this coating mechanism which cooperate to provide a smooth uniform latex fungicide coating.

(1) The coating roll turns in the direction opposite that in which the paper is moving;

(2) The rate of rotation of the coating roll is faster than the rate at which the paper moves, preferably about twice as fast, and

(3) The position at which the paper leaves the coating roll is substantially at a right angle to the horizontal position at which it contacts the roll **11** and is somewhat off-center (to the left in Figure 1 with respect to the vertical center line of the coating roll).

This arrangement of parts provides a pocket **15** formed in the angle between the vertically moving paper and the coating roll. Because of its relatively high speed and the direction in which the coating roll **11** moves, an excess of latex fungicide is maintained in the pocket **15**, thus assuring an ample supply at all times and insuring a controlled uniform coating.

The concentration of the latex bath is determined by the thickness of the film to be deposited, and we find that concentrations from 20% to 40% solids are satisfactory depending on the ultimate use to which the paper is to be put. The latex is first compounded so as to provide a latex with a pH of approximately 7, preferably with a pH someplace between 5.5 to 7. To the latex mix is added a highly volatile fungicide, one which has been found satisfactory in use is trichlorophenol, the commercial form of which is manufactured and sold by the Dow Chemical Company under the name Dowicide 2S. While the percentage of fungicide used in each mix will vary in accordance with the wrapping material and material to be wrapped, good results can be obtained by using a latex having 35% solids, forty pound kraft paper coated with 1.5 mils of Saran, said latex including 2% of its solid weight of trichlorophenol. It will be understood that because of the suspension of the fungicide in the deposited latex film that much higher concentrations of fungicide may be used without danger to the material wrapped because of contact; in other words, because the fungicide is suspended throughout the latex the vapors will be released gradually in small efficacious amounts.

In normal operations, wrapping material utilizing Saran coated paper would require less concentration of the fungicide in the latex because of the higher moisture-vaporproofness of the Saran coated paper. For polyethylene

coated paper a suggested mixture would be a concentration of highly volatile fungicide of approximately 3% of the dry weight of the latex, and for plain kraft paper a highly volatile fungicide of a concentration of approximately 5% of the solid content weight of the latex. Other fungicides that may be mixed with the latex are

Dowicide B—a sodium salt of trichlorophenol
Dowicide 1—phenylphenol
Dowicide A—a sodium salt of phenylphenol
Dowicide 6—tetrachlorophenol
Dowicide F—a sodium salt of tetrachlorophenol

After the paper or the paper side of the wrapping material is coated, it may be passed over an adjacent heating element **16**, which may be steam coils or an electric element, and then passed, with its coated side exposed, over a heated drum **17**. The element **16** and the drum **17** remove substantially all the moisture from the latex fungicide mix. The paper then passes under guide rolls **18** and **19** and is wound, with the latex fungicide film innermost, into a roll **20**.

The factors of time and temperature are most important in conditioning the latex coated surface before the paper is rolled. The main point is that substantially all the moisture should be removed before the paper is rolled, but the heat applied, and the time the latexed surface is exposed to the air should be just short of that required to "cure" the latex. This leaves the rubber surface in such a condition that when it is unrolled, the latexed surface will be self-adherent when contacted with itself and forms a homogeneous rubber mass which cannot be again separated to its original form. Generally speaking the heat applied should not exceed the boiling point of water, namely 212° F. although this should not be construed a strict limitation, for the exact temperature will be determined by the nature of the latex compound used. Likewise, the time of exposure to the air before winding should be less than that required to "cure" the latex. The ordinary paper coating machine runs at a speed fast enough to prevent "curing" of the latex.

When the coated roll is completed the deposited rubber film and fungicide is protected from the atmosphere so that no further curing takes place, and when the sheet is unrolled the deposited rubber surface is in such condition that when pressed upon itself the rubber is self-sealing and forms a homogeneous body which cannot be separated from itself; although this rubber fungicide coating is cohesive it does not adhere to other dissimilar surfaces and will leave no deposit when it is removed from a surface to which it has been applied, or around which it has been wrapped, for protective purposes.

As shown in Figure 2 the final product wrapping paper preferably consists of an inner layer **21** of paper which is coated on one side with polyethylene, Saran or foil **22** and on the other side with a cohesive layer formed of a film **23** of deposited rubber having fungicide particles suspended therein.

When desired to wrap articles such as shoes, clothing, food, etc., with our wrapping material, a sheet of latex may be unrolled from the roll **20** and sheared to the desired length. The materials to be wrapped are placed in the center of the sheared off piece of paper on top of the latex fungicide coating. The paper is then folded over upon itself as shown at **24**, and the edges lined up as at **25** and these contacting edges then firmly pressed together completely around the packaged article or articles. Thus the article is not only sealed against dust and moisture from the outside but is protected against infection or contamination from mold by the release of controlled amounts of fungicide vapors over long periods of time. The sealed edges of the package being cohesive will make the package tamperproof in that such sealed edges must be destroyed before access can be had to the contents of the package.

The storage of the wrapping material in the form of a roll as at **20** or in multiple layers held in close relationship, preserves the cohesive nature of the latex as well as the fungicide; the storing of the roll **20** in a cool room will also help preserve the fungicide in its normal suspension in the latex coating, or until the fungicide is enclosed within a sealed container in the form of a package such as shown in Figure 3.

The terms "latex," "aqueous dispersions of rubber," and "rubber" as used in the specification and claims are intended to cover both natural and synthetic materials or combinations of natural and synthetic materials, as well as compounds or mixtures of natural or synthetic latices with other ingredients which may be added to impart stability, fluidity, viscosity and other desirable features to the coating bath, provided that the resultant film is substantially non-tacky and has the property of self-adhesion.

It will be understood that in some cases it would be desirable to mix a highly volatile fungicide and a fungicide of lower volatility with the latex. For instance, a fungicide chemical and the salt of that chemical; for instance Dowicide 2S — trichlorophenol, and Dowicide B — trichlorophenol salt. Such a combined mixture would result in a deposited latex layer having a suspended fungicide which would result in fast vaporization and slow vaporization. It also will be understood that other vaporizable chemicals could be mixed with the latex giving a deposited latex film having suspended therein various vapor phase inhibitors of the dicyclohexylammonium nitrite type.

What we claim is:

1. As a new article of manufacture a sheet of self-sealing wrapping paper comprising a thin flexible paper base having on the entire area of one side thereof only an exposed substantially impervious layer for purposes of moistureproofing the sheet, and on the entire area of its other side an exposed coating consisting essentially of a film of rubber deposited from an aqueous latex dispersion containing about 20% to 40% solids at about pH 5.5 to pH 7.0 and about 2% to 5%, based on dry weight of the latex, of a highly volatile phenolic fungicide dispersed throughout said rubber film, said last mentioned coating being cohesive, substantially dry and non-tacky and adapted to stick only to itself and, when portions thereof are brought into engagement with one another by pressure during the wrapping operations, to have such portions adhere to each other by cohesion, and serving to assist the impervious layer in rendering the sheet moistureproof.

2. The method of producing a preservative paper wrapper having the capacity to resist disintegration by contact with moisture, to be self-sealing and also to retain and control the effectiveness of the preservative chemical for a relatively long period of time, which method comprises preparing a mixture of about a 20% to 40% solids dispersion of latex and a highly volatile phenolic fungicide, the fungicide in such mixture amounting to approximately 2% to 5% of the dry weight of the latex, and the latex being at about pH 5.5 to pH 7.0 coating the paper side of a substantially impervious paper sheet uniformly with said latex fungicide mixture and removing the water from said latex fungicide mixture to form a substantially dry cohesive coating.

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