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PROTECTIVE COMPOSITION

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The present invention relates generally to the manufacture of a paper base material having specific though not limited applicability to the packaging field. More specifically the present invention relates to an improved treated paper composition which when utilized in packaging different products exhibits properties heretofore not realized in conventional packaging materials.

In the past light weight paper base material has been utilized as a wrapper for food products. Such material has generally comprised a comparatively non-porous light weight paper base coated on at least one side with an organic plastic material. Such a wrapping composition has not been found to properly fulfill the required functions of a wrapper. For example, it has been noted that in the manipulation of such a composition necessary during the wrapping step, the coating material has a tendency to crack or break from the paper and thereby form a non-continuous coating surface. Such a composition is normally too stiff for the rigid handling requirements that are present in this field. The paper wrappers upon folding do not maintain their desired form, as due to the inherent stiffness in the material the wrapper tends to return to its original shape. The reasons for using such a comparatively non-porous paper base is due to the difficulties which have heretofore accompanied the coating of a porous paper base with an organic plastic material. An extremely porous paper has been recognized to possess the desirable properties which would result in an improved wrapper, but the use of such a paper base has been found to be impractical due to the difficulties present in supplying the base with an operative coating of plastic material. It has been found that the porous nature of such a base allows a portion of the plastic to flow through the base material and is not capable of retaining the plastic to the desired extent. As a result, in order to satisfactorily coat the base it is necessary to utilize great amounts of plastic, and waste naturally follows. Not only is such a procedure wasteful, but the conventional machinery utilized is quite often affected so that the process must be halted in order to clean excess plastic from the paper rolls. Other methods have been devised to overcome these undesirable features, and such a satisfactory method is that of transferring a plastic film onto a porous base material. Such may be accomplished by depositing a plastic film on a non-porous and non-adherent material followed by the compressing of such latter material against a highly porous base whereby the plastic film is transferred and forced into the interstices of the porous paper. This operation is, of course, quite expensive and for this reason alone has not been considered of any substantial importance.

Light weight paper board has been utilized in the past for the manufacture of food cartons. It has been found generally to be satisfactory but there also are similar problems present here as in the case of a coated wrapping material. Light weight paper board is comparatively non-porous and the plastic material supplied to it primarily forms a continuous coating on its surface and

does not sufficiently impregnate the board so as to become an integral part thereof. Upon scoring different sections of a so-treated board in the manufacture of cartons it is found that the plastic coating readily peels or cracks as the case may be. This, of course, is highly undesirable as, for example, in the field of food packaging where it is quite necessary that the plastic coating be a continuous one in order to serve its purpose as an aid in food preservation. Cartons made from light weight paper board also lack vital strength in that they are readily fractured. Such fracturing occurs not only as a result of normal handling but is also quite prevalent during the filling of the carton with the product. It has also been noted that in the field of food packaging, the development of rancidity is accelerated particularly where packaging lard and shortening is concerned. The sulfites, metals, and other materials present in the paper board tend to catalyze the development of rancidity within the lard or shortening. As a result, a very unsavory and undesirable odor is produced when the carton is opened. This, of course, is highly undesirable from a commercial standpoint. Where it is possible to reduce the presence of deleterious compounds such as sulfites, metals, and so forth, the development of rancidity is greatly retarded. One manner in which such a reduction can occur is by the use of a highly porous paper base. The fineness or the non-compactness of the fibers present in such a base greatly decreases the amount of paper and therefore a lesser amount of sulfites, metals, and so forth would be found, but, as previously mentioned, the coating of such highly porous paper materials has been found to be highly impractical and therefore the use of such material has not been relied upon.

Grease-proof paper and parchment paper have been utilized as liners for lard and shortening cartons but they have also been found to lack the necessary strength and flexing properties. Under such circumstances these liners have fractured quite readily when filled with the food product. Food containers have also been manufactured entirely from plastic film material. Such containers possess excellent strength properties but the pronounced tendency of such material to stretch makes its use in handling through machinery and so forth undesirable. Also, their great expense of manufacture has rendered their use impractical from an economic standpoint.

The objects of the present invention include the production of an improved paper base material which has been impregnated and coated with an organic plastic material. Such a composition can be readily made at low cost and exhibits all of the desirable properties which are considered necessary in a material which may be used as a wrapper or from which cartons may be made. Such a composition when utilized as a wrapper for products or as a carton for packaging products exhibits properties which include those of light weight, high wet strength and non-fracturing. Such a composition may be used in the manufacture of food containers which will not have a deleterious effect on the food product.

Other objects and advantages of the present invention will become more readily apparent as the invention is hereinafter described in greater detail.

The present invention comprises the treatment of a highly porous base material with an adhesive prior to the application thereto of an organic plastic material, with the result that the properties of the porous base composition are highly improved. The resultant composition not only exhibits toughness sufficient to withstand scoring without cracking, or folding without cracking or peeling, but also is of a very light weight and has an appearance of transparency. Such material is highly flexible when compared with a composition in which a heavier non-porous paper is used as a base. A com-

position made according to the teachings of the present invention has many of the desirable characteristics of a plastic film but is more desirable in that the stretching property normally inherent in a plastic film is not present. This latter fact allows more efficient handling both of a physical and mechanical nature.

In the manufacture of such a composition, a thin, highly porous cellulosic base material, such as "Kleenex" or the like, is first treated with an adhesive. This initial treatment preferably is effected by passing the web of the highly porous base material on the paper machine through a sizer or sizing press. In applying the adhesive in this manner, conventional apparatus such as that normally found in use by paper manufacturers may be used. The adhesive-treated web is then passed over several stacks of drying rolls to enable the adhesive material to set up. The adhesive acts to make the fibers less absorbent and partially closes the interstices present in such a porous base material. By doing this the base material is made more resistant to the flow of the subsequently applied plastic and the plastic is restricted in its flow and is forced to form a continuous coating. The amount of adhesive utilized would control the degree of porosity preserved in the porous base material and generally it is not necessary to use large amounts of adhesive. Normally from 1 to 5 percent of adhesive based on the weight of the paper base is sufficient to adequately cut down the porosity of the base material so that the plastic material may be readily applied thereto. The amount of adhesive utilized is quite low when compared to the amount of plastic material required. This naturally follows due to the fact that the adhesive is used only to condition the base material so that the plastic material may be readily applied. By using a highly porous base material in combination with an adhesive it is possible to preserve in the finished product the great flexibility of the highly porous base while preparing the porous base to satisfactorily accept the impregnation and coating of plastic material.

The adhesive-treated cellulosic material is then treated with an organic plastic material which is applied by any suitable conventional method. Such a treatment may be carried out by the use of a conventional double roller coating machine which coats both sides of the base material simultaneously. Any excess of the plastic material may be removed by the use of doctor blades. Dependent upon the particular use to which the final composition is to be put, it may not be necessary to coat both sides of the porous cellulosic material. In such a case, suitable apparatus may be utilized to do this. Due to the pretreatment with adhesive the application of the plastic material is greatly aided. It has been found that with the porosity of the cellulosic base material reduced, the plastic does not impregnate the material to the extent that it goes completely through the material and forms an uneven coat on the opposite side. Not only is this disadvantage overcome, but depositing of the plastic material on the opposite roll is thereby eliminated. By overcoming this disadvantage the web is supplied with a continuous and even coat, and the continuous operation is not halted by the sticking of the web to the supporting rollers. While it is preferable normally to coat both sides of the adhesive-treated porous material, it is occasionally desirable to plastic-treat just one side. This is true where it is desired to make a food packaging material having a controlled moisture fiber transmission rate of the degree required to preserve a particular food product, such as lamb and veal carcasses. The thickness of the coat supplied to the adhesive-treated base material will normally be within the range of 0.5 to 2 mils and preferably 0.0015 inch.

The following example will serve to illustrate a form of carrying out the method for producing a coated ma-

terial suitable for the uses set forth. It is not intended that this example should be construed as to limit the invention in any particular manner.

A two-sheet thickness of "Kleenex" manufactured from sulfite wood pulp on a Fourdrinier paper-making machine was passed by means of rolls through a tank containing liquid animal glue. The adhesive-treated web was then passed over several stacks of rolls to allow the adhesive to dry. The adhesive-treated web was then passed through the rollers of a double roller coating machine having horizontal parallel rolls positioned one above the other. The bottom roll was partially submerged in a container of liquid polyethylene and coated the lower surface of the web. The upper surface of the web was coated by polyethylene fed to the upper roll by gravity from a source of liquid polyethylene positioned above this roll. Both the bottom and upper rolls had doctor blades positioned in close proximity thereto for the purpose of limiting the application of polyethylene to a thickness of approximately 1.5 mils on both sides of the web. The coated web was then passed through a stack of drying rolls maintained at a temperature of from 125-185° F. At such a temperature the polyethylene solvent was evaporated therefrom and the polyethylene coating was dried.

A coated material made in the manner as set forth in the foregoing example exhibits highly desirable properties. Such a product has preserved in it the high flexibility of the highly porous base material. This is quite advantageous over a similar material wherein the base material is formed from a hard comparatively non-porous paper stock. Plastic resins, such as polyethylene, are highly flexible in themselves and, when applied to a highly flexible porous base material, the flexibility of the resulting composition is not decreased. Such a composition also exhibits great stability. Under normal conditions existing where such a composition is used as a packaging material, the composition exhibits stability which is extremely desirable. A clear color is present which provides a highly satisfactory appearance to the material. The clear color of the base material and plastic resin also imparts the appearance of transparency to the composition. The resultant product is of a very light weight, and while it exhibits all of the desirable properties of a plastic film, it nevertheless does not stretch when it is handled under normal circumstances. Thus, such a material is extremely desirable for use as a wrapper of many different kinds of products. It may be used with a very high degree of success in the packaging of food products. Its many desirable properties allow easy handling during the wrapping operation and the final wrapped product exhibits the highly desirable appearance. The composition may be subjected to severe folding operations without exhibiting a resultant separation in the continuous plastic film either by way of cracking or chipping.

Many different types of adhesives may be utilized. Examples of such adhesives are vegetable glue, animal glue, mixtures of animal and vegetable glue, starch paste, and so forth. Generally both edible and inedible adhesives may be utilized dependent upon the final use of the product. For example, if the product is to be used as a wrapper for food products, it is necessary to incorporate therein an edible adhesive, such as gelatin. Some of the adhesives which may be used will interlock with the plastic resins. This bonding or interlocking does not take place in all instances. Certain other adhesives, while not bonding or interlocking with the plastic resin, still allow the plastic to attach to the fibers themselves. The adhesive does not necessarily stiffen the paper base. Some of the adhesives may be made to partially stiffen the base, but normally not a sufficient amount is present to bring about any considerable stiffening effect. The adhesive acts as a sizing agent and reduces the size of the interstices while making the fibers

less absorbent. This particular action of the adhesive is peculiar to the type of paper base utilized in that, by using a highly porous paper base, the fiber matting is comparatively loose and the adhesive is capable of reaching the majority of the fibers present. Any adhesive utilized may be applied in many different ways. For example, the adhesive may be applied by spraying, dipping, brushing on, and so forth. The adhesives may be in the form of solutions, emulsions, hot melts, and so forth.

Where it is desired to form a carton by utilizing laminations of the highly porous base material, it is only necessary to increase the number of sheets of the highly porous base material and allow such laminations to soak that much longer in a solution of adhesive. The adhesive not only will reduce the interstices and be absorbed in the fibers, but will also bind the laminae together to form a laminated base material. Such a laminated base material may then be coated with the desired plastic resin in the same manner as that followed wherein wrappers are produced. While a certain degree of stiffness will be supplied by the presence of the adhesive, the majority of the stiffness will be resulting from the plastic coating. This may be controlled by the amount of plasticizer utilized in the plastic resin or, in the case of polyethylene, the molecular weight of such plastic resin. With respect to polyethylene, a molecular weight of from 17,000 to 19,000 is average, but this may be raised as high as 30,000 or 35,000. By increasing the molecular weight the stiffness will be increased. Also, this may be effected by the amount of wax that is added to the polymer due to the fact that wax acts as a plasticizer with respect to polyethylene. A carton made in this manner exhibits the highly desirable properties of being capable of withstanding scoring to a much greater extent than has been heretofore possible. The scoring that is necessary to form a carton into its desired shape will not be accompanied by the cracking or peeling of the plastic coating. The carton also exhibits the other desirable characteristics present in a wrapper made in the manner as set forth above. It is of a light weight, has a good appearance, and contains a much more adherent coating than was heretofore available when a less porous paper or cardboard base was utilized.

The plastic materials which may be used are those similar to polyethylene and polyvinyl chloride. Such plastic resins have the properties of high flexibility, stability, clear color, and a melting point within the approximate range of 200° to 500° F. Any suitable plasticizer may be utilized with materials such as polyvinyl chloride to control the stiffness thereof and ultimately control the rigidity of the final product. As stated above, the well-known plasticizer for polyethylene is wax. The plastic resins may be applied from a cold solvent bath or hot melt. Acetone, certain alcohols, aldehydes, and so forth, are well-known solvents which may be used.

The adhesives and plastic resins are all well known and the manner in which any one of them may be used is also well known. It is also to be understood that any thin highly porous cellulosic material may be utilized in practicing the instant invention and that this invention is not limited to the use of "Kleenex." Any material exhibiting similar properties as those of "Kleenex" is a suitable base material, the use of which the present invention contemplates.

"Kleenex" is the recognized trade name for a light weight, thin, porous, uncompressed paper manufactured by the sulfite process and possessing a weight of from 8 to 10 pounds per ream.

It is to be understood that the words "coating" and "coated" as used throughout the specification and the appended claims mean thorough and complete impregnation of the thin, porous, cellulosic material and should

not necessarily be limited as applied to surface coating alone.

This method of initially treating a thin, porous, cellulosic material with an adhesive and thereafter coating the adhesive-treated cellulosic material with a thermoresponsive organic polymer such as polyethylene results in a food packaging material which possesses excellent and highly desirable properties. The resulting coated paper is strong and will not readily fracture. It also possesses a high wet strength, and thus food products containing substantial amounts of moisture do not weaken the material when packed or contained therein. It possesses excellent folding and bursting strength, is greaseproof, possesses excellent printing properties, and contains no metals or other ingredients which will promote rancidity of the food or have any other deleterious effect thereon. On the contrary, food products such as lard and shortening may be kept for an indefinite period of time in containers manufactured from this coated paper without danger of rancidity or spoilage.

Obviously, many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A laminated material suitable for use in packaging products comprising: laminae of highly porous non-woven cellulosic material weighing 8 to 10 pounds per ream treated with an adhesive and a plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride.

2. A laminated material suitable for use in packaging products comprising: laminae of highly porous non-woven cellulosic material weighing 8 to 10 pounds per ream treated with an adhesive and a polyethylene coating of approximately 0.5 to 2.0 mils thickness.

3. A laminated material suitable for use in packaging products comprising: laminae of highly porous non-woven cellulosic material weighing 8 to 10 pounds per ream treated with an edible adhesive and a plasticized polyethylene resin coating of approximately 0.5 to 2.0 mils thickness.

4. A laminated material suitable for use in packaging products comprising: laminae of highly porous non-woven cellulosic material weighing 8 to 10 pounds per ream treated with an edible adhesive and a polyvinyl chloride resin coating of approximately 0.5 to 2.0 mils thickness.

5. The method of making a highly flexible and strong, light weight composition suitable for use as a protective wrapper or in a laminated form as a protective carton, which comprises: treating an extremely porous paper base weighing 8 to 10 pounds per ream with an adhesive whereby the adhesive reduces the absorption properties of the fibers and reduces the size and number of interstices normally present in said base, and thereafter supplying said adhesive-treated base with a flexible plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride, whereby the remaining interstices are restricted while the inherent flexibility, light weight, and strength properties of said paper base are maintained.

6. The method of making a paper base composition suitable for use as a protective covering for food products, which comprises: treating a highly porous and flexible fibrous base material weighing 8 to 10 pounds per ream with an edible adhesive whereby the adhesive reduces the absorption properties of the fibers and reduces the size and number of interstices normally found in said base material, and thereafter supplying said adhesive-treated base material with a polyethylene coating of approximately 0.5 to 2.0 mils thickness whereby the remaining

interstices are restricted while the inherent flexibility and other desirable properties of said base material are maintained.

7. The method of making a highly flexible composition suitable for use as a protective covering for food products, which comprises: treating a highly porous cellulosic base material weighing 8 to 10 pounds per ream with an edible adhesive whereby the adhesive reduces the absorption properties of said base material and reduces the size and number of interstices normally found in said base material, and thereafter supplying said adhesive-treated base material with an organic plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride, and controlling the stiffness of said composition by regulating the amount of plasticizer present in said organic plastic resin.

8. The method of manufacturing a highly flexible paper base composition suitable for use as a protective covering for food products, which comprises: treating a highly porous cellulosic base material weighing 8 to 10 pounds per ream with an edible adhesive whereby the adhesive reduces the absorption properties of said base material and reduces the size and number of interstices normally found in said base material, drying the adhesive retained by said base material, and thereafter supplying said adhesive-treated base material with an organic plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride, whereby the remaining interstices are restricted while the inherent flexibility of said base material is maintained and the resultant stiffness of said composition is controlled by regulating the plastic properties of said organic plastic resin.

9. The method of making a suitable wrapper for food products which contain the properties of flexibility, strength, and the required degree of porosity, which comprises: treating a highly porous cellulosic base material weighing 8 to 10 pounds per ream with an edible adhesive whereby the absorption properties and porosity of said cellulosic base material are reduced, and thereafter supplying one side of said adhesive-treated cellulosic base material with an organic plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride, whereby the flexibility and strength are maintained while the porosity is further reduced.

10. In the manufacture of a protective wrapper for food products, the steps which comprise treating a highly porous cellulosic base material weighing 8 to 10 pounds per ream with an edible adhesive whereby the absorption and porosity properties of said base material are substantially reduced, drying said adhesive, supplying said adhesive-treated base material with an organic plastic resin coating of approximately 0.5 to 2.0 mils thickness, said resin selected from the group consisting of polyethylene,

plasticized polyethylene and polyvinyl chloride, and drying said coated base material by the evaporation of a solvent incorporated in the organic plastic resin.

11. A flexible wrapping material suitable for packaging comestible products which comprises: a highly porous, low-sulphite paper base weighing about 8 to 10 pounds per ream, coated with an edible adhesive to reduce the interstices of said paper and an overlying coating film of thermoplastic resin selected from the group consisting of polyethylene, plasticized polyethylene and polyvinyl chloride.

12. The wrapping material of claim 11 in which the adhesive is present in an amount of from about 1 to about 5 percent by weight of the paper base.

13. A flexible wrapping material suitable for packaging comestible products which comprises: a highly porous, low-sulphite paper base weighing about 8 to 10 pounds per ream, coated with an adhesive selected from the group consisting of animal adhesives and vegetable adhesives and an overlying coating film of polyethylene.

14. A flexible wrapping material suitable for packaging comestible products which comprises: a highly porous, low-sulphite paper base weighing about 8 to 10 pounds per ream, coated with an edible adhesive to reduce the interstices of the paper and an overlying coating film of plasticized polyethylene.

15. A flexible wrapping material suitable for packaging comestible products which comprises: a highly porous, low-sulphite paper base weighing about 8 to 10 pounds per ream, coated with an edible adhesive to reduce the interstices of said paper and an overlying coating film of polyvinyl chloride resin.

16. A flexible wrapping material suitable for packaging comestible products which comprises: a highly porous, low-sulphite paper base weighing about 8 to 10 pounds per ream, coated with an edible adhesive to reduce the interstices of said paper and an overlying coating film of polyethylene resin.

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