

May 24, 1938.

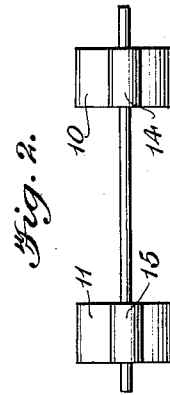
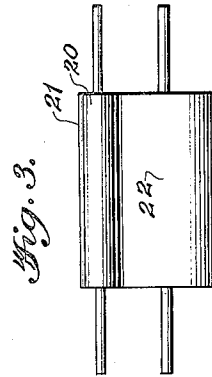
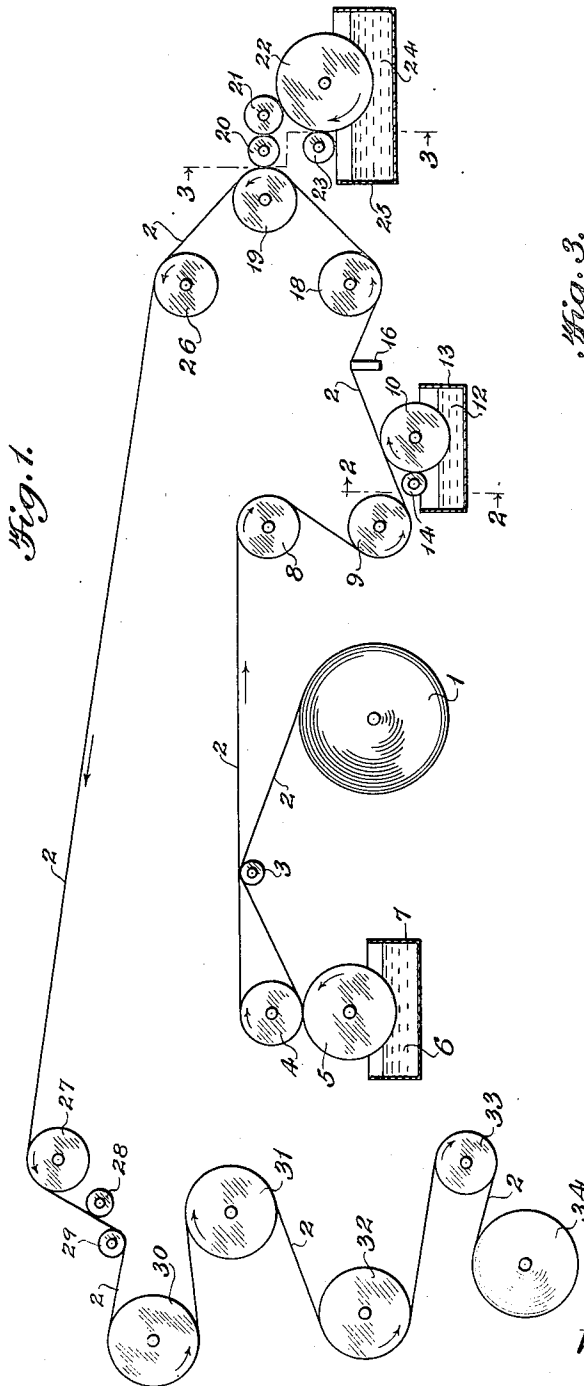
W. H. BRYCE

2,118,152

METHOD OF MANUFACTURING MOISTURE AND MOISTURE VAPORPROOF PAPERS

Filed May 8, 1935

2 Sheets-Sheet 1



Inventor
William H. Bryce.

By *William C. Lintow.*
Attorney

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W. H. BRYCE

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2 Sheets-Sheet 2

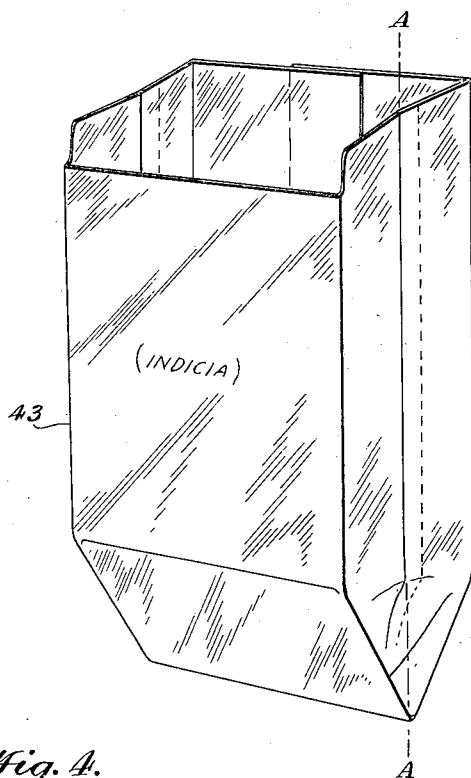


Fig. 6.

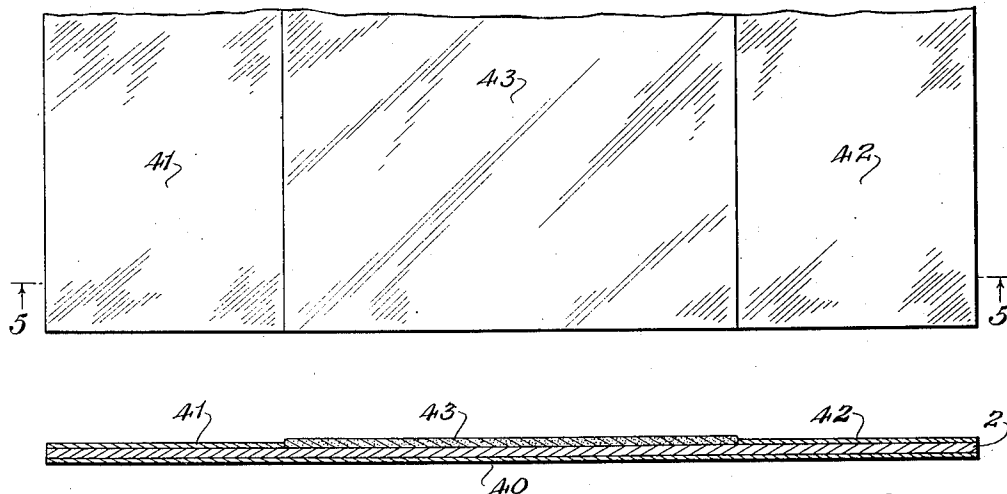


Fig. 5.

Inventor
William H. Bryce.

By William C. Linton.
Attorney

UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING MOISTURE
AND MOISTURE VAPORPROOF PAPERSWilliam H. Bryce, Memphis, Tenn., assignor to
Dixie Wax Paper Company, Dallas, Tex., a cor-
poration of Texas

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5 Claims. (Cl. 91—68)

The present invention relates to process and apparatus for treating paper to render the same water or moisture proof and also to render the same moisture vapor proof.

More particularly, the present invention relates to process and apparatus for preparing water proof and moisture vapor proof paper useful in wrapping articles of food or for making containers therefor such as bags.

The invention further relates to the production of water proof and moisture vapor proof paper and paper containers, which after production or preparation will receive ink from the plates or printing characters of a printing press in an entirely satisfactory manner and the printing upon the paper will not only be entirely satisfactory as regards permanence and adherence of the printed matter, but the printing will also stand out in improved manner.

The invention further relates to the production of water proof and moisture vapor proof containers, such as bags, which when not in use, may be stacked one upon the other in piles without sticking together or without impairment of transperance or without impairment of printed matter thereon.

The invention relates further to the production of water proof and moisture vapor proof paper which may be rolled upon itself in the form of a roll, in which the convolutions are close to each other, that is to say, in the form of a compact roll, without objectionable sticking of the paper between the closely associated convolutions.

The invention further relates to the production of water proof and moisture vapor proof paper of the kind referred to above, which, in addition to being water proof and moisture vapor proof, is also transparent, or at least transparent to such an extent that articles of food or other merchandise wrapped therewith or enclosed in containers, such as bags, formed therefrom, may be easily visible through the paper, so that the nature, quality and condition of said articles of food or other merchandise can be satisfactorily appreciated by the purchaser thereof or customers therefor.

The invention is explained in the detailed description of the drawings accompanying this description and forming a part thereof.

In the said drawings,

Fig. 1 represents a schematic showing in elevation of apparatus embodying the invention, and apparatus suitable for practicing the process.

Fig. 2 represents a view on line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 represents a view on line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 represents in plan an example of a sheet or web of water vapor proof and water proof paper prepared in accordance with the present invention.

Fig. 5 represents, greatly magnified, a section on the line 5—5 of Fig. 4, looking in the direction of the arrow, and

Fig. 6 is a perspective view of a bag made from paper prepared according to the present invention.

Referring to the drawings, in which the various rolls or rollers shown rotate in the directions indicated by arrows applied thereto, the numeral 1 indicates a roll of paper 2 which is drawn or moved continuously through the apparatus shown. The direction of the motion of the web of paper 2 at various points in the apparatus is indicated by means of arrows applied adjacent thereto. The web of paper 2 passes from the roll 1 over and in contact with the bar 3, then over and in contact with the surface of the rubber squeeze roll 4, between the latter and the steel roll 5 which runs in contact with a body of hot molten paraffin wax 6 contained in the vessel 7. The relation of the rolls 4 and 5 is such that the paper also comes in contact with the surface of the roll 5 whereby molten paraffin wax is applied to one side of the paper sheet. The length or width of the roll 5 is such that molten paraffin is applied to the whole surface of the paper coming in contact with the surface of the roll 5.

The paper passes from the roll 4 over the bar 3 and in contact with the paper passing in opposite direction on said bar. The paper 2 then passes, as shown in the drawings, over the surface of and in contact with two hot steel rolls 8 and 9. After the paper has passed from below the roll 9, it will be observed, that the surface which has been completely covered or coated with paraffin wax is now uppermost. The paper now passes over rolls or other suitable devices for applying molten paraffin to selected areas or restricted areas on the other side or up side of the paper. In the embodiment of the invention shown, the paper passing from the roll 9, passes over and in contact with two spaced steel rolls 10 and 11 which apply hot molten paraffin wax along each edge of the paper for any desired width, for example, 2 to 4 inches or more, depending upon the specific use to which the finished paper is to be used. The rolls 10 and 11 receive molten paraffin from the body of molten paraffin wax 12 contained in vessel 13. Numerals

14 and 15 designate brass squeeze rolls operating in conjunction respectively with rolls 10 and 11.

After leaving the rolls 10 and 11, the paper 2 passes over a steel scraper 16, whereupon the paper passes, as shown, in contact with the surface of two hot steel rolls 18 and 19. At the roll 19 a coating of resin of the type and kind hereinafter stated is applied on the paper in the space between the paraffin along each edge of the paper, and the said resin completely covers or coats the portion of that side of the sheet of paper which is not coated with paraffin. To this end, the rolls 20, 21, 22 and 23 are employed. The roller 22 runs in contact with the molten resin, or a composition in the form of a solution containing the resin, contained in the vessel 25, and indicated by the numeral 24. The roller 22 transfers resin or resin solution from the vessel 25 to the rolls 20 and 21, preferably composed of rubber or provided with rubber surfaces, which carry and distribute the resin as a coating upon the surface of the paper between the strips or portions of paraffin coating. The length or width of the roll 20 is such that resin is applied to that portion and side of the paper 2 which is not covered by the paraffin which was applied along the edges by the rolls 10 and 11. The rolls 20, 21 and 22 run in contact, so that resin is carried from the vessel 25 to the roll 20, which latter roll runs in contact with the paper 2 to apply the resin to the paper as hereinbefore described. The numeral 23 indicates a rubber squeeze roll.

Upon leaving the roll 19, the paper passes, as shown in the drawings, in contact, in succession, with hot steel rolls 26 and 27, brass smoothing rolls 28 and 29 and brass cooling rolls 30, 31, 32 and 33. From the cooling roll 33 the finished paper is wound or may be wound in the form of a roll 34.

The heating of rolls 8, 9, 18, 19, 26 and 27 may be accomplished in any suitable manner, as for example, by using hollow rolls through the interior of which hot liquids or gases or steam is passed. The temperature of hot rolls 8, 9 and 18 is above the melting point of the paraffin wax used. The temperature of the hot roll 19 is such as to maintain the resin at that point on the paper in fluid condition and the temperature of rolls 26 and 27 is such as to enable substantially complete evaporation of solvent associated with the resin in the travel of the paper 2 from the roll 19 to the first cooling roll 30, the distance between these rolls being sufficiently great to allow substantially complete evaporation of solvent to occur. The rolls 30, 31, 32 and 33 may be cooled by passing refrigerated brine through the interiors thereof and the cooling of the said rolls is such that the paraffin as well as the resin on the paper leaves the last cooling roll 33 substantially dry and free of tackiness. A particular advantage of the apparatus and process is that the heat in the paraffin wax on the web 2 plays an important part in the evaporation of solvent associated with the resin coating, and as a consequence, it is not necessary to employ fans to float the web or sheet or to employ a drying tower to produce this evaporation.

Fig. 4 shows a plan view, and Fig. 5 a cross section of a sheet, strip or web of paper which may be prepared utilizing the above described apparatus and process steps utilized by it. Referring to said figures, the numeral 2 indicates the sheet or strip of paper. The numeral 40 indicates the coating of paraffin wax applied completely over one side of the paper 2. The nu-

merals 41 and 42 indicate two strips of coatings of paraffin wax applied to the surface of the paper opposite to the one on which the coating 40 is applied. These coatings 41 and 42 are formed respectively by the rolls 11 and 10. Between the coatings 41 and 42, and on the same side of the paper as these coatings, is the coating of resin 43 which fills the space between the two rows or strips of paraffin coatings 41 and 42.

The paraffin wax employed within the vessels 7 and 13 may advantageously be a paraffin wax having a melting point ranging from 125 to 150° F. The resin employed with the vessel 24 is advantageously one of the coumarone or indene types of artificial resins, or mixtures thereof. For example, paracoumarone and indene resins having a melting point of 300 to 320° F., or a mixture of paracoumarone or indene resins having approximately the aforementioned melting points, are well suited for the purposes of this invention. A pale or light colored paracoumarone-indene resin with a high melting point of about 300 to 320° F. is very useful for the purposes of this invention. These artificial resins are well known and the description of their preparation and chemical composition would be out of place in this description. These resins serve very advantageously for the purposes of this invention because they are resistant to water, brine, soap and alkalis, and in addition, they are practically neutral or non-acid bodies of no appreciable or objectionable odor. These resins may be used as such in the vessel 25 and brought to a fluid or molten condition by the application of heat to the vessel 25 or to its contents. However, it has been found advantageous to employ the aforementioned artificial resin or resins in the vessel 25 in the form of a solution or mixture in toluene or other volatile solvent for the resin. For example, it has been found that in the vessel 25 may be placed a solution or mixture having the following composition: 4 pounds of the resin to each one gallon of toluene. To this mixture or solution may be added a small proportion of paraffin wax (M. P. 125-150° F.) for example about 5 per cent, and when paraffin wax is added, it is advantageous to also add a small proportion of tricresyl phosphate or butyl stearate, for example, 5 to 10 per cent, to promote stable blending of the paraffin wax with the resins. The temperature of the materials used within the vessel 25 must be such that the materials therein are in a fluid and homogeneous condition, and temperatures above atmospheric temperatures should be employed in the case of those mixtures of solid substances and solvents which upon intimate mixture do not remain in a homogeneous liquid condition at atmospheric temperatures. It is advantageous to maintain the mixture of resin, toluene, paraffin wax and blending agent in the vessel 25 hot while the paper is being run through the apparatus. However, where the above described solution of resin is employed, heating of the vessel 25 or its contents may be dispensed with, because the rolls 20 and 21, may be caused to become warm enough in actual operation to sufficiently heat the resin solution thereon. This heating of the rolls 20 and 21 may be accomplished by properly controlling the temperature of roll 19, taking into account also heat developed in rolls 20 and 21 by friction. Heat will be transferred from roll 19 to rolls 20 and 21.

The paper 2 may be of any desired width or kind. For example, the paper 2 to be treated ac-

5 cording to the present invention may be of a transparent kind known as glassine, or it may be semi-transparent or non-transparent. The invention is readily applied to thin glassine paper.
10 Also, the invention may be applied to paper which has been previously waxed with paraffin wax on both sides or only on one side, so that in the former event the waxing by rolls 5, 10 and 11 may be omitted and in the latter event the wax-
15 ing by roll 5 may be omitted. The paper may be completely coated on both sides with paraffin wax in the apparatus shown by substituting for the rolls 10 and 11 a roll of the same longitudinal dimensions as roll 5, whereupon the paper carry-
20 ing the hot coatings of paraffin is passed between the rolls 19 and 20 where a coating of resin is applied as a central band or strip of the desired width. Thereafter a hardening of the wax occurs and the resin mixes with the wax, producing
25 an opaque appearance that is sometimes of advantage in the packaging of some food products. Such an opaque appearance can also be obtained by adding 25 to 50% of paraffin wax to the resin solution previously described, with sufficient
30 amount of tri-cresyl phosphate or butyl stearate to promote stable blending of the paraffin wax in the solution.

The coating 40 of paraffin wax and the coatings 41 and 42 of paraffin wax may be first applied
35 to the paper 2 in one machine and the resin coating 43 may be applied thereafter to the paper 2 in another machine. Similarly, the resin coating 43 may be first applied in one machine and the paraffin wax coatings 40, 41 and 42 applied there-
40 after in another machine. Also a central coating or band 43 of resin may be applied to one side of the paper 2, after which the paper may be run through the apparatus shown in Figures 1, 2 and 3 with the surface of the paper carrying the resin
45 coating in contact with the waxing roll 5, so that a wax coating is applied to the whole of said surface over the resin thereon, and another band 43 of resin applied on the opposite side of the paper together with the bands or strips 41 and 42
50 of paraffin. In this latter case there will occur two coatings of resin, one on one side of the sheet and the other on the opposite side of the sheet and registering with each other. This latter method of preparing the paper greatly adds to
55 transparency in preparing transparent paper, due to the fact that the strip of paper has resin on both sides of the sheet in the center. When a resin coating is applied to both sides of the paper, as heretofore described, it is preferable to
60 make the coatings 41 and 42 of paraffin wax somewhat heavy or thick to enable proper self-sealing of loaves of bread, packages of food or cartons that are run through ordinary wrapping and heat sealing machines. The apparatus
65 shown in Figures 1, 2 and 3 may be used to apply coatings 40, 41 and 42 of paraffin wax and coating 43 of resin to ordinary waxing sulphite paper, or the coatings 40, 41 and 42 of paraffin wax may be omitted from the paper and only a wide strip
70 of resin coating applied to the paper. The resin coating in these latter two instances is applied on the part of the web or sheet that is to be printed, whereby the inks are retained on the surface, the paper made much more glossy and brilliant and the use of less ink possible in printing,
75 since the resin coating prevents absorption of the ink by the paper. In any of the foregoing manners of treating paper, it is understood that the paper may carry or have applied to it any suitable printed matter before the various coatings

are applied to the paper, and where the paper is printed upon before coating, it is advantageous to dust or sift upon the wet or moist ink of the printed matter a little dry powdered resin of the kinds heretofore described in order to prevent
5 offsetting on the back of the sheet or sheets of paper when they are stacked or wound in rolls. This powder sticks to the ink, holds the print away from adjacent sheets of paper, and is gradually dissolved by the linseed varnishes in the
10 ink, and any of it that is not dissolved by the ink is either dissolved or washed off by the wax in the coating of the paper as hereinbefore described.

When fresh articles of food, such as rolls, Vienna bread, and other articles of food liberat-
15 ing water vapor are wrapped in moisture vapor proof paper produced from coating of the paper with wax according to processes known heretofore or placed in bags made of such paper, and left for several hours, the water vapor or gas formed
20 inside the package has a tendency to cause the surface of the wrapper or bag to acquire a rough, mottled, or cockled appearance as if it had been rained on. However, when such articles of food are wrapped in paper prepared according to the
25 present invention or placed in bags made of such paper with the part of the paper coated with resin forming the front, and preferably the exterior face of the package or bag, the mottled or cockled appearance heretofore described, in most
30 cases, is almost entirely eliminated, and in many cases is completely eliminated from the front face of the package or bag. That is to say, the portions of the paper which have been treated with
35 resin in most cases almost entirely resist, and in many cases completely resist, the mottling or cockling effect of water vapor within the package. The stiffening effect caused by the provision of a strip of resin, or a resin coating, down
40 the face of a transparent paper bag also enables a much more plastic and transparent paper to be used for the purpose of packaging fresh food. Also, the present invention permits the use of
45 lighter weight paper for the production of moisture vapor proof bags that have to stand up on their bottoms. In the production of bags from paper prepared in accordance with the present
50 invention, the paper is so folded in forming the bag that the surface coated with the resin forms at least the front face of the bag and preferably the front face and parts of each side of the bag
55 adjacent the front face. Such a bag is shown in perspective in Fig. 6. The strip of resin coating appears at the face 43 of the bag and extends over on each side of the bag to a point preferably beyond the central longitudinal axis A-A of
60 each side of the bag, so that there is a strip of resin coating on each side of the bag adjacent the resin coated face.

Another advantage of the present invention
65 consists in that lighter weight sheets of paper are rendered thoroughly practical in the manufacture of moisture vapor proof paper bags, without the necessity of slowing the speed of bag forming machines as was necessary heretofore
70 where ordinary waxing of light weight paper was employed. Ordinary waxing of a web of paper, as heretofore performed, causes softening of the sheet, which fact rendered it a difficult matter to make speed on bag forming machines operat-
75 ing on light weight waxed paper.

The provision of a coating of high melting point resin in the form of a strip upon the waxed paper relieves the tendency of waxed paper to stick together in hot weather or in hot bakeries or

hot food factories. This is an important consideration when it is considered that when waxed papers stick together due to heat or pressure, or both, and then pulled apart, a very poor opaque finish is left or produced on both of the sheets. These objections are eliminated in the waxed papers prepared according to the present invention in which a coating of a resin of high melting point is placed on the paper in the form of a strip of sufficient thickness to carry the pressure of the paper when it is wound into rolls or cut into sheets and stacked, and the resin strip also has a tendency to permit the formation of a thin cushion of air between the layers of the rolled or stacked paper.

In addition to the above advantages produced by the present invention, the resin finish on the face of a package, or upon the face of a bag, formed with paper treated in accordance with the present invention, improves the appearance of the food products contained therein, and dust does not stick or adhere thereon to the same extent as upon a waxed surface.

In actual use the printing is applied to the resin coating on the paper, and preferably articles are so wrapped with the paper that the part coated with resin forms the portion of the package, or the principal portion, of the package through which the goods are viewed when transparent paper is produced or used. Similarly, the surface which has been coated with resin is advantageously used as the front of bags or other containers. The resin surface is placed on the outside of the package or container, but it is to be understood that the resin surface may be placed within the package or bag.

The waxed bands or strips 41 and 42 along the edges of the paper enable these edges or parts, when overlapped, to be heat sealed when the paper is formed into containers or wrapped about articles in container forming machines or wrapping and heat sealing machines. Fig. 6 shows a bag in which the bands or strips 41 and 42 are overlapped and heat sealed, that is to say, sealed by the application of heat.

By the use of a solvent that is soluble in water, such as alcohol, acetone, or other water-soluble organic solvents, which are miscible with hydrocarbons of the benzene or paraffin series, the strip that is coated with resin can be made opaque by the blushing effect of the solvent on the resin, and in this way alternating strips of transparent or opaque effects can be obtained which adds to the attractiveness of the paper and of some bags formed therefrom.

I claim:—

1. The process of preparing moisture vapor

proof paper which comprises coating one side of said paper with wax, coating the opposite side of said paper with wax only along opposite edges and coating said paper with resinous material between said last mentioned wax coatings.

2. Moisture vapor proof paper comprising a sheet of paper coated on one side with wax, the opposite side of said sheet being coated with wax along opposite edges and the said opposite side of said sheet being coated with resinous material between the wax coatings thereon.

3. The process of coating paper which comprises applying a molten wax to one side of said paper, applying heat to said so treated paper, thereafter coating the opposite side of said paper with a molten wax only along opposite edges to form heat sealing portions along said opposite edges, again applying heat to said paper, applying a coating of a solution of a resinous material in a volatile solvent between said heat sealing portions and on the same side of the paper as said heat sealing portions, allowing solvent to evaporate from the said coating of solution of resinous material and then cooling the so treated paper.

4. The process of coating paper which comprises applying a molten wax to one side of said paper, applying heat to said so treated paper, thereafter coating the opposite side of said paper with a molten wax only along opposite edges to form heat sealing portions along said opposite edges, again applying heat to said paper, applying a coating of a solution of resinous material in a volatile solvent between said heat sealing portions and on the same side of the paper as said heat sealing portions and again applying heat to said paper, allowing solvent to evaporate from the said coating of solution of resinous material, and then cooling the said so treated paper.

5. The process of coating paper which comprises applying a molten wax to one side of said paper, applying heat to said so treated paper, thereafter coating the opposite side of said paper with a molten wax only along opposite edges to form heat sealing portions along said opposite edges, again applying heat to said paper, applying a coating of a hot solution of resinous material in a volatile solvent between said heat sealing portions and on the same side of the paper as said heat sealing portions and again applying heat to said paper, allowing solvent to evaporate from the said coating of solution of resinous material, thereafter heating and smoothing the so treated paper, and then cooling the so treated paper.

WILLIAM H. BRYCE.