PROCESS FOR PRODUCING WRAPPING MATERIAL AND CASTING MOLDS

Filed Nov. 27, 1956

G - OUTER COATING, WATER IMPERMEABLE
b - PAPER
c - SWOLLEN WATER-INSOLUBLE LAYER OF ALGINIC COMPOUND

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PROCESS FOR PRODUCING WRAPPING MATERIAL AND CASTING MOLDS

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Application November 27, 1956, Serial No. 624,648

Claims priority, application Germany November 30, 1955

2 Claims. (Cl. 117—5.1)

It is known to produce wrapping materials, particularly for sticky masses and such masses, which upon rise in temperature become softened by applying to a support, such as paper, wood, metal or fibers, a layer of a soluble derivative of algic acid and converting that layer, before it has dried, into a jelly-like, swollen mass by treatment with a precipitating salt, eg. calcium chloride. The masses to be wrapped are bitumens, tur products, resins, synthetic resins, waxes, putties, adhesives and pastes of all kinds.

Technically, the process may be carried out by dipping the support, eg. burlap sacks, in an alginate solution and treating the sacks, while still wet, with calcium chloride solution. The sack thus impregnated, can be filled with molten bitumen of high temperature without any part of the bitumen permeating through the sack.

After the contents have cooled down, a block of bitumen may be obtained, for instance by cutting open the sack and removing it without the bitumen adhering thereto.

However, it has been found that this process incurs considerable difficulties when it is desired to replace the sacks of burlap material, or the like, by paper bags which are considerably more economical; in that case, the removal of the wrapping material is far less easy. The same difficulties are encountered if instead of burlap sacks, cardboard drums are used for being filled with bitumen and the like.

It has now been discovered, quite unexpectedly, that bitumens and similar masses may be filled into cardboard drums, paper bags and similar wrapping materials, without incurring the above mentioned difficulties, when the wrapping materials are provided, in addition to a layer of swollen algic acid at the surface facing the goods, with another layer separated therefrom by paper or paper-like material, facing away from the goods, said last mentioned layer being of negligible permeability for water and steam. The process according to the invention is therefore characterized by providing on paper or the like material, on the one hand a swollen but water-insoluble layer of algic acid or its derivatives and separated from that layer by the paper a layer of a material of negligible permeability for water and steam. In the following such a material will be called "practically impermeable." In this way it has been found that it is possible, contrary to expectations, that goods, may be wrapped for which the wrapping mentioned in the beginning, are quite useless; such goods are e.g. hot fatty acids when they solidify upon cooling.

The new process may likewise be used to great advantage in making molds for casting synthetics, such as phenol resins, polyester resins, epoxide resins and the like. The molds are made of paper or the like, and are lined with a layer of paper impregnated according to the above process. In the mold, the alginate layer should be the one coming into contact with the material to be cast.

The layer of negligible permeability for water and steam may consist of different materials as long as they fulfill the above mentioned conditions. Materials made on the basis of synthetics have proved very satisfactory. Of these materials, polyethylene, which can be easily spread on flat material such as paper, is very well suited.

The economy in the use of polyethylene layers can be increased by the use of mixtures of polyethylene with paraffins such as the brands of paraffin known as "Mikrowachs." Other polymer substances may also be used for the layer as long as they are impermeable for water and steam or practically impermeable. In this respect, e.g. polyvinyl chloride, chlorinated rubber, poly styrene, polyvinylidene chloride, and many co-polymers of these compounds are useful products. Of the latter, a product known in the art as "Huesler Emulsion" is a co-polymer of styrene and butadiene.

Instead of the practically impermeable layer made out of synthetic material, layers of bitumens may be applied with good success. This mode of operation is particularly economical when paper bags are used. When bitumen is used as coating layer, it should only be considered that bitumen sometimes migrates in paper, and the usefulness of paper bags would thereby be impaired. It is therefore advisable to use paper bags, impregnated with a bitumen layer, only in such cases when a storage of the empty bags is not intended for any considerable length of time.

It has been found advantageous to apply the practically impermeable layer in such a manner onto the paper which is provided on the other side with an alginate layer, that an intimate anchorage in the paper will occur; this can be done for instance by "hot-sealing" or gluing. When for the preparation of the wrapping materials several layers of paper are used, which are only slightly joined to each other, the use of the new process for preparing of paper bags, for instance, is considerably decreased when one layer of paper is provided with the impermeable layer, and the other one only loosely joined thereto with the alginate layer. Such an application is therefore not generally useful.

The application of a swollen water-insoluble layer of algic acid or its derivatives on paper or paper-like material may occur in several ways, which are generally known. The best known operating method consists in treating the paper with a water-soluble compound of algic acid and converting the impregnating or coating layer into an insoluble derivative, by a subsequent treatment. Water-soluble compounds are, particularly, the alkali metal salts and ammonium salts, of algic acid. Conversion into an insoluble derivative can be effected by solutions containing earth alkali or heavy metal salts. We may name the salts, e.g. of calcium, barium, strontium, zinc, copper, aluminum, cadmium, cobalt, chromium, nickel, and manganese. It is advantageous to use hygroscopic salts such as calcium chloride. If non-hygroscopic salts are used, it is advisable for the preparation of a swollen alginate layer, to add to the alginate solution such hygroscopic substances as glycerol, glycol, and the like. Furthermore, it is possible to convert the impregnating or coating layers into insoluble derivatives of algic acid by subsequent treatment with dissolved or gaseous acids. Another way to proceed is to impregnate the paper or paper-like material first with the solution of a precipitating agent, such as calcium chloride, thereinafter to spray the material so treated with a water-soluble alginate solution. Finally, it is also possible to treat the paper with a solution containing derivatives of algic acid, nitrogen-containing compounds, which form soluble complex compounds, such as ammonia, aliphatic amines, and such metal salts which are soluble in the complex forming compound and which will yield insoluble metal alginates with algic acids and its deriva-
tives. In this operation the complex-forming compound is removed, e.g. by use of heat.

To the alginate solution may be added besides the above-mentioned hydroscopic substances, such compounds which will promote especially the plasticity and elasticity, such as starch, of any desired state of degradation, so-called soluble starch, dextrin, water-soluble cellulose ether, vegetable gum, tragacanth, degradation products of proteins and the like, and pigments, if desired.

In order to reduce the effect of undesired heat radiation and to bring about a more rapid cooling, metal powders may be added to the alginate solution, such as aluminum or copper, which act by giving off heat by radiation.

A particular use of the process according to the invention which is of economical importance, is the manufacture of paper bags. For this purpose, strong paper may be coated on one side with a water impermeable layer such as polyethylene. This can be effected for instance by treatment with a suitable dispersion or solution, but preferably by applying a foil. When the latter method of operation is used, hot-sealing brings about a good and secure joining between the paper and the impermeable layer. Another way of proceeding in order to obtain material useful for further processing, is to apply upon the paper polyethylene from a suitable device by pouring the polyethylene between two layers of paper, so that the resulting sheet will consist of two layers of paper with a polyethylene layer in between.

The materials obtained by one of the above mentioned or similar processes is then made into sacks. This is done by using one or more sheets of paper, some of which may have impermeable coatings and others without such coatings. It is necessary that the surface, however, which carries the impermeable layer is not the inner side of the sack. The inner side is then coated by one of the methods described with a swollen but water-insoluble layer of alginate. This is done in practice by pouring the sacks, or dipping them, dipping them into or spraying them successively with alginate solution, and alkaline earth or heavy metal solutions. As already set forth, it is advantageous to proceed with wrapping materials having several sheets of paper so that the innermost sheet of paper is provided with the impermeable layer at the side of the sack facing away from the goods. It has proved expedient to secure the presence of a swollen alginate layer to apply the alginate layer shortly before the wrappings are to be used.

A paper-bag, thus impregnated, can be filled with pitch, bitumen, or fatty acids which are solid at room temperature, or similar materials without their permeating the bag even in hot molten state. After cooling and solidifying of the mass, the paper bag can be cut open and removed without any material adhering thereto, though the wrapping is used for sticky masses such as bitumen or pitch.

The manner described for the impregnation of large paper bags may be similarly applied to paper drums, or small paper wrappings or cardboard boxes, if desired.

The invention will now be described more fully in several examples, but it should be understood that these are given by way of illustration and not of limitation and that many changes in the details can be made without departing from the spirit of the invention.

**Example 1**

A bag made of ordinary Kraft paper weighing 70 gms., coated on the outside with a polyethylene layer (thickness 30 g./sq. m., water permeability 2 g./sq. m. in 24 hours) is flushed or sprayed at the inner side with a 1-2% sodium alginate solution, so that the entire inner side of the paper is moistened by alginate solution. After excess of that solution has drained off, the moistened surface is flushed or sprayed with a 30% calcium chloride solution, until an even continuous swollen film of calcium alginate is obtained at the inner paper surface. After the excess calcium chloride solution has drained off, the bag may be filled with a liquid bituminous mass melted at 120° C. without the bitumen permeating the wrapping material. After the mass has cooled down and become solid, the paper bag may be torn open and removed from the bitumen neatly without sticking.

This example may be likewise applied to large paper sacks to be filled with 50-70 kgs. of bitumen; in this case several layers of paper have to be used, of which the innermost has to be treated as described in the example.

**Example 2**

A cardboard drum of about 10 liters capacity, coated on the outside with impermeable polyvinylidene (thickness of layer 50 g./sq. m., water permeability 1 g./sq. m. in 24 hours) is coated on the inside with swollen calcium alginate film as described in Example 1. Into this container, bituminous masses are filled having a temperature of 100° C. After cooling, the cardboard can be cut open and removed without sticking to the block of bitumen.

**Example 3**

A paper web of ordinary Kraft paper weighing 90 g., coated on one side with a mixture of polyethylene-paraffin (thickness of layer 30 g./sq. m., permeability for water 2 g./sq. m. in 24 hours) is soaked or sprayed at the other side with 20% calcium chloride solution, until the paper is evenly moistened. From the paper thus pre-treated, a multi-layer paper sack is made, care being taken that the side impregnated with the calcium chloride solution will be the inner side of the sack. Before bitumen is filled into the sack, the latter is sprayed with a 1-2% sodium alginate solution and allowed to stand for a few minutes. After excess, unprecipitated alginate solution has dripped off, molten bitumin of 120° C. is filled in. After cooling, the paper can be torn off and removed from the solid bitumen block without sticking.

**Example 4**

Ordinary Kraft paper of about 90 g. weight, was coated on one side with a layer of bitumen, having a thickness of 70 g./sq. m. The coated paper had an impermeability of 7 g./sq. m. under normal conditions. The paper was used for making a multiple-layer paper bag with the free (uncoated) side facing the goods to be wrapped. Before filling in a hot molten mass of bitumen, this bag was treated at the inside with a 1% aqueous solution of sodium alginate and after a few minutes, with a 30% aqueous solution of calcium chloride. After cooling the contents, the paper bag could be removed without sticking to the bituminous mass.

**Example 5**

A sack made according to Example 1 is filled with about 500 cc. of a casting resin of epoxy-polyester base together with a conventional amine hardener. After the reaction has set in, which will take a few minutes, the contents warm up to 60-80° C. The resin will be completely hardened after 5-6 hours. The wrapping can then be removed without sticking to the hardened resin.

A paper bag according to the invention as described in the first paragraph of Example 1 is diagrammatically illustrated in the accompanying drawing, but it should again be understood that this illustration is given by way of example only, and that many changes in the details can be made without departing from the spirit of the present invention.

In the above described manner, casting molds may likewise be made which are lined at the inside with a paper having an inside coating of a swollen alginate film and an outside layer which is likewise impermeable.

Casting resins may be poured so as to form planar articles, when, as a supporting base, paper prepared ac-
cording to the invention is used. After hardening, the resin plates can easily be removed from the paper.

In the claims, the expression “paper-like material” is intended to include wrapping paper of any kind and cardboard or pasteboard generally used in wrapping and shipping articles, and for similar purposes.

What we claim is:

1. A wrapping material, being non-adhering to sticky masses, which consists of paper which has been coated, on the side facing said sticky masses, with a swollen water-insoluble layer of a substance selected from the group consisting of alginic acid and an alginate, and on the other side with a water-impermeable substance selected from the group consisting of polyethylene and bitumen.

2. A casting mold being non-adhering to sticky masses, which consists of paper which has been coated, on the side facing said sticky masses with a swollen water-insoluble layer of a substance selected from the group consisting of alginic acid and an alginate, and on the other side with a water-impermeable substance selected from the group consisting of polyethylene and bitumen.

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