

PATENT SPECIFICATION

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Singapore
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(71) We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, of Imperial Chemical House, Millbank, London, S.W.1, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to hot melt adhesives which are particularly useful as the heat sealable material which is applied to packaging film, in particular thermoplastic film used in wrapping machines in a process in which discrete patterns of heat sealable material are printed onto successive sections of a continuous web. In these machines one pattern is printed onto each section of the web that is to form one wrapper and this section is severed from the web and folded to form that wrapper.

According to the present invention we provide the use as a heat sealable material in a wrapping machine of the type in which a series of patterns of the heat sealable material is printed onto a continuous web of thermoplastic film which is being fed to the wrapping station of the machine where it is heat sealed around an article to form a package, of a normally solid composition which melts below 150°C, preferably below 110°C, has a melt viscosity at application temperature of between 0.1 and 100 poise, has an open-time as hereinafter defined of preferably less than two seconds, and is heat sealable at a temperature below the melting point of the packaging film to produce a seal of strength (as hereinafter defined) greater than 150 gram/inch, said composition containing from 10% to 40% preferably 25% to 35% by weight of a copolymer of ethylene and vinyl acetate, containing from 15% to 40% by weight of vinyl acetate and having a melt flow index as measured by A.S.T.M. D 1238-65T of between 1 and 1000, from 60% to 10% by weight of a wax or mixture of waxes, and from 20% to 50% by weight of

tackifying resin together with a heat stabiliser and/or antioxidant.

By "normally solid" we mean that the composition is solid at room temperature and has virtually no surface tack at that temperature.

The seal strength is the force that is required to separate two pieces of the coated film after they have been pressed together at 130°C for two seconds using a sealing pressure of five pounds per square inch.

The heat sealable material should contain heat stabilisers and/or antioxidants to prevent the materials from decomposing at the elevated temperature at which they are coated onto the film and the temperature at which the seal is effected; generally the antioxidant is used in an amount between 0.01 and 0.1% by weight of the composition and we have found that 0.05% is a particularly suitable amount. The wax is preferably used in an amount of from 25 to 35% by weight of the composition and may be a single wax or a mixture of waxes, paraffin wax having a melting point between 100 and 150°F is particularly suitable and may be blended with other waxes such as candrillila wax or beeswax. A small amount of a microcrystalline wax may also be included. Suitable tackifying resins include wood rosin, terpene resins, chlorinated paraffins, hydrocarbon resins and derivatives thereof and polymers or copolymers of styrene. The amount of tackifying resin employed is preferably from 30 to 50% by weight of the composition.

The amount of vinyl acetate in the ethylene-vinyl acetate copolymer is preferably from 24 to 35% by weight of the copolymer.

The heat sealable materials should have a melt viscosity at application temperature of between 0.1 and 100 poise, preferably between 1 and 20 poise. The application temperature is the temperature to which the heat sealable material is heated when it is applied to the packaging film which is being

[Price 25p]

used on the wrapping machine. Generally the heat sealable material is retained in a bath and is transferred to the film by a roller which dips into the bath and carries material from the bath to the film. The application temperature is the temperature to which the heat sealable material is heated in the bath, if necessary the roller itself may be heated to prevent the heat sealable material solidifying thereon.

We have found that the heat sealable materials of this invention are particularly effective when used on the wrapping machines described in the Complete Specification of our British Patent No. 1,220,754 and that when they are so used, satisfactory packages may be produced over extended runs of the machine. The machines of our British Patent No. 1,220,754 and the heat sealable materials of the present invention are particularly useful when wrapping articles in polypropylene film, especially biaxially oriented polypropylene film. In these machines the web of material passes over a printing roller, which dips into a bath of fluid heat sealable material and prints a pattern of the heat sealable material on the film. The film then passes through nip rollers to a knife where it is cut into the lengths which are to form one wrapper. It is therefore important that the heat sealable material on the film should not be sticky when the film passes through the nip rollers. Thus, we prefer that the "open time" of the heat sealable material should be as low as possible, preferably less than 1.5 seconds and certainly no more than two seconds. The "open time" is the time that the heat sealable material remains tacky after it has been applied to the film, during which the coated surface of the film is exposed at room temperature, and is the maximum time elapsing between the moment the adhesive is applied and the last moment at which a satisfactory seal may be formed without reheating the heat sealable material.

These packaging techniques together with the use of the specific adhesives of the present invention have the advantage that they enable uncoated film to be used to wrap articles and it is only necessary to apply a coating of the heat sealable material along the zones of the film where the seal is to be effected. Hitherto film coated over its entire surface has generally been used and this is unnecessarily expensive as a large amount of the coating material must be used.

The present invention is illustrated but in no way limited by reference to the accompanying Example.

Cigarette packets were wrapped in biaxially oriented polypropylene film on an apparatus of the type described and illustrated in the Complete Specification of our British Patent No. 1,220,754. A composition containing the

following components was used as the heat sealable material

30% by weight of Paraffin wax having a melting point of 140°F,

30% by weight of a copolymer of ethylene and vinyl acetate containing 28% by weight of vinyl acetate and having a melt flow index of 400,

39.95% by weight of a wood rosin ester having a ring and ball softening point of 90°C and

0.05% of Butylated Hydroxy Toluene as stabiliser.

The composition was maintained at 100°C in the coating bath and was readily transferred from the bath to the film. The coating dried very quickly on the film, which was travelling at about 150 feet/minute and was not tacky after the coated film had travelled two feet. When the film was sealed around the packet by applying a pressure of 5 p.s.i. for two seconds at 130°C along the coated zones, the seals produced had a seal strength of about 300 gram/inch.

WHAT WE CLAIM IS:—

1. The use as a heat sealable material in a wrapping machine of the type in which a series of patterns of the heat sealable material is printed onto a continuous web of thermoplastic film which is being fed to the wrapping station of the machine where it is heat sealed around an article to form a package, of a normally solid composition which melts below 150°C, preferably below 110°C, has a melt viscosity at application temperature of between 0.1 and 100 poise, has an open-time as hereinbefore defined of preferably less than two seconds and is heat sealable at a temperature below the melting point of the packing film to produce a seal of strength (as hereinbefore defined) greater than 150 gram/inch, said composition containing from 10% to 40% by weight of a copolymer of ethylene and vinyl acetate containing from 15% to 40% by weight of vinyl acetate and having a melt flow index as measured by A.S.T.M. D 1238-65T of between 1 and 1000, from 60% to 10% by weight of a wax or mixture of waxes and from 20% to 50% by weight of a tackifying resin together with a heat stabiliser and/or antioxidant.

2. The use of a heat sealable material according to claim 1 containing from 25% to 35% by weight of the copolymer of ethylene and vinyl acetate.

3. The use of a heat sealable material according to claim 1 or claim 2 in which the copolymer of ethylene and vinyl acetate contains from 24% to 35% by weight of vinyl acetate.

4. The use of a heat sealable material according to any of claims 1 to 3 containing

used on the wrapping machine. Generally the heat sealable material is retained in a bath and is transferred to the film by a roller which dips into the bath and carries material from the bath to the film. The application temperature is the temperature to which the heat sealable material is heated in the bath, if necessary the roller itself may be heated to prevent the heat sealable material solidifying thereon.

We have found that the heat sealable materials of this invention are particularly effective when used on the wrapping machines described in the Complete Specification of our British Patent No. 1,220,754 and that when they are so used, satisfactory packages may be produced over extended runs of the machine. The machines of our British Patent No. 1,220,754 and the heat sealable materials of the present invention are particularly useful when wrapping articles in polypropylene film, especially biaxially oriented polypropylene film. In these machines the web of material passes over a printing roller, which dips into a bath of fluid heat sealable material and prints a pattern of the heat sealable material on the film. The film then passes through nip rollers to a knife where it is cut into the lengths which are to form one wrapper. It is therefore important that the heat sealable material on the film should not be sticky when the film passes through the nip rollers. Thus, we prefer that the "open time" of the heat sealable material should be as low as possible, preferably less than 1.5 seconds and certainly no more than two seconds. The "open time" is the time that the heat sealable material remains tacky after it has been applied to the film, during which the coated surface of the film is exposed at room temperature, and is the maximum time elapsing between the moment the adhesive is applied and the last moment at which a satisfactory seal may be formed without reheating the heat sealable material.

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2. The use of a heat sealable material according to claim 1 containing from 25% to 35% by weight of the copolymer of ethylene and vinyl acetate.

3. The use of a heat sealable material according to claim 1 or claim 2 in which the copolymer of ethylene and vinyl acetate contains from 24% to 35% by weight of vinyl acetate.

4. The use of a heat sealable material according to any of claims 1 to 3 containing



heat		from 25% to 35% by weight of the wax or mixture of waxes.	terpene resins, chlorinated paraffins, hydrocarbon resins and derivatives thereof; and polymers or copolymers of styrene.	15
g a		5. The use of a heat sealable material according to any of claims 1 to 4 containing 30% to 50% by weight of the tackifying resin.	8. The use of a heat sealable material according to any of the preceding claims having a melt viscosity of between 1 and 20 poise at application temperature.	20
ene 70	5	6. The use of a heat sealable material according to any of claims 1 to 5 in which the wax is paraffin wax having a melting point between 100 and 150°F optionally blended with other waxes.	9. The use of a heat sealable material substantially as hereinbefore described with particular reference to the accompanying Example.	25
ght		7. The use of a heat sealable material according to any of claims 1 to 6 in which the tackifying resin is selected from wood rosin,		
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