

Sept. 8, 1959

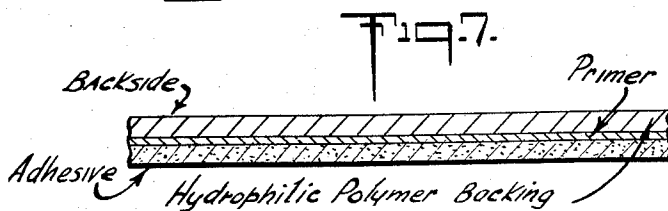
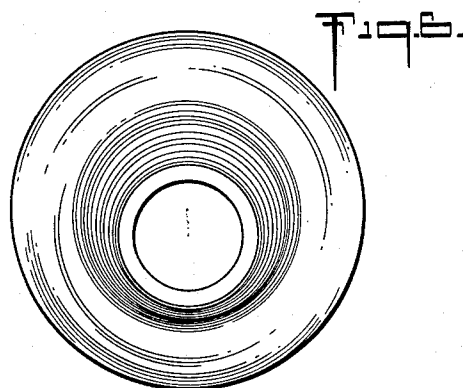
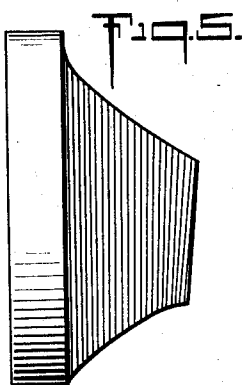
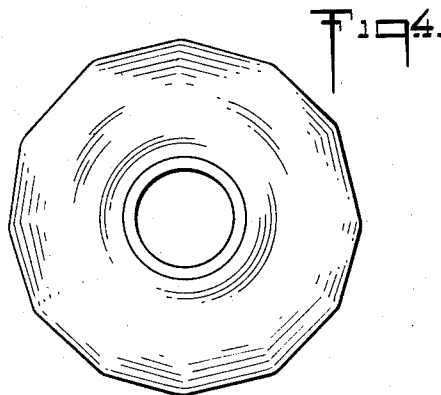
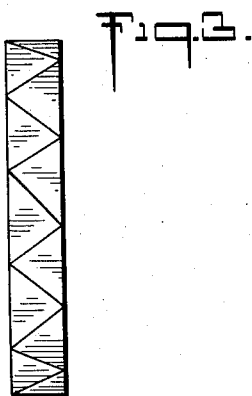
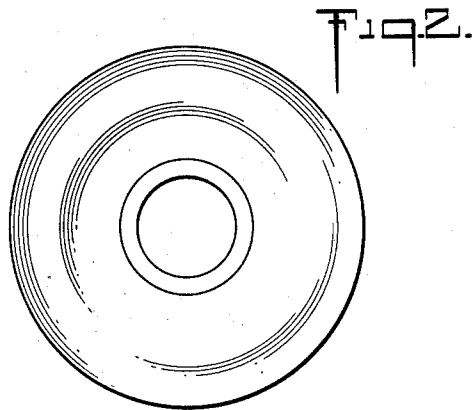
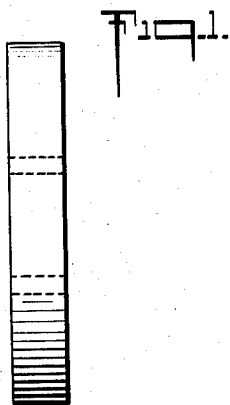
R. E. NORLAND ET AL

2,903,379

METHOD OF PREVENTING DISTORTION OR CHANGE OF
SHAPE IN PRESSURE-SENSITIVE ADHESIVE TAPES

Filed June 6, 1952

3 Sheets-Sheet 1



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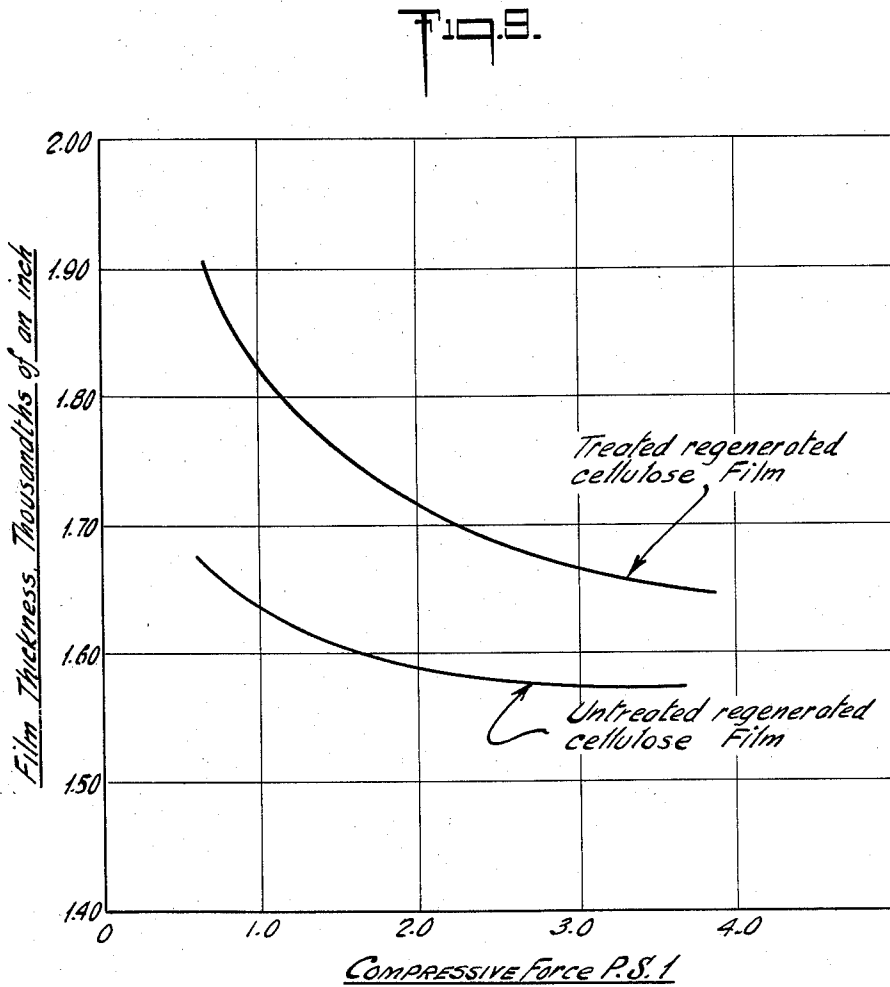
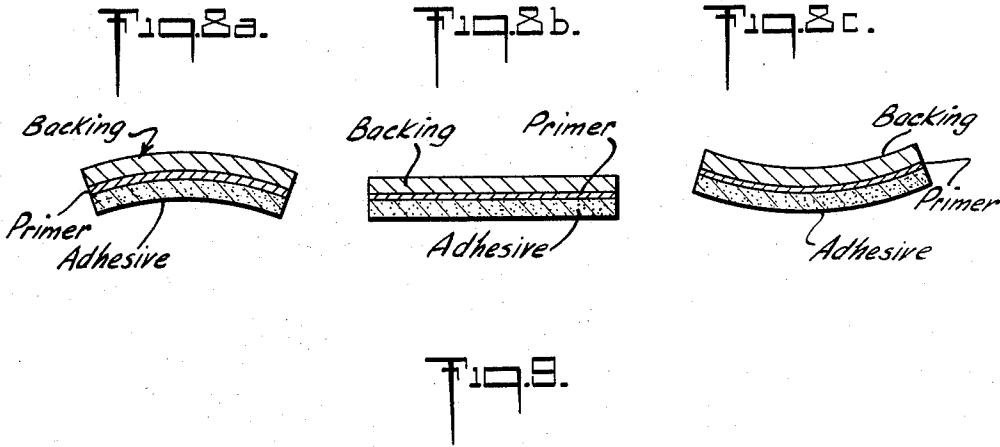
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 10.

*Typical depth of each cell: 0.0005-0.01 inches
Usual number of cells per sq. in.: 20,000-1000*

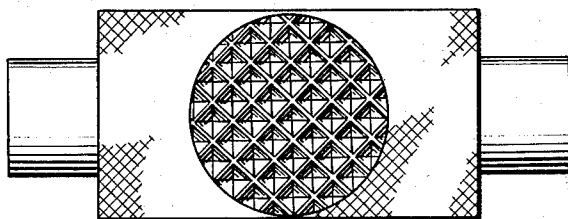
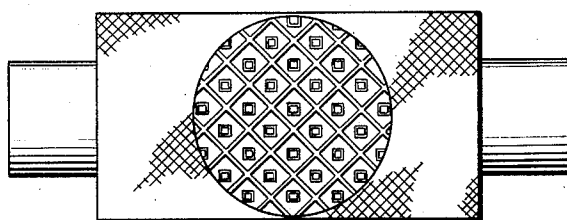


Fig. 11.

*Typical depth of each cell: 0.0005-0.01 INCHES
Usual number of cells per sq. in. 20,000-1000*



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METHOD OF PREVENTING DISTORTION OR CHANGE OF SHAPE IN PRESSURE-SENSITIVE ADHESIVE TAPES

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Application June 6, 1952, Serial No. 292,026

4 Claims. (Cl. 117—68.5)

This invention relates to a method of preventing deformation or change of shape in rolls of pressure-sensitive tapes. It is concerned particularly with normally tacky and pressure-sensitive tapes made from hydrophilic film backings such as regenerated cellulose film, polyvinyl alcohol, and films of glue, casein, methyl cellulose or of other moisture-sensitive polymer backings that undergo dimensional changes with changes in humidity.

Pressure-sensitive adhesive tape is usually prepared and sold in rolls and is applied to its ultimate use directly from the roll. For esthetic reasons, but more importantly to prevent permanent damage to the adhesive tape and to make it easy to apply, it is desirable that these rolls be perfectly well-rounded when made and that they remain in this round shape until they are used. Unfortunately, several types of deformation of such rolls are quite common.

The two main types of deformation are believed best illustrated in Figs. 1-6. As these types of deformation and other phenomenon related to this invention are best illustrated by the drawings, a brief description of these drawings follows immediately.

Fig. 1 is an end view of an undistorted roll of normally tacky and pressure-sensitive adhesive tape;

Fig. 2 is a side plan view of the film roll taken at right angles to Fig. 1 and illustrating particularly not only the circumference of the roll but also the center core upon which the roll is wound;

Fig. 3 is an end view similar to Fig. 1 but illustrating a roll that has aged and exhibits a phenomenon hereinafter referred to as "spoking";

Fig. 4 is a side plan view similar to Fig. 2 but illustrating the roll shown in Fig. 3;

Fig. 5 is an end view similar to Figs. 1 and 3 but illustrating a roll exhibiting the aging phenomenon referred to hereinafter as "telescoping";

Fig. 6 is a side plan view similar to Figs. 2 and 4 but illustrating the roll shown in Fig. 5;

Fig. 7 is a vertical section through a layer of normally tacky and pressure-sensitive adhesive tape showing the adhesive, the primer and the water-sensitive backings in their respective positions;

Figs. 8a, b and c are figures similar to Fig. 7 but illustrating downwardly curled, uncurled flat and upwardly curled adhesive tape, respectively;

Fig. 9 is a graph comparing compressibility of a typical backing treated in accordance with this invention with the compressibility of a similar backing prior to treatment;

Fig. 10 is a side view of a typical print roll used for application of a balancing coat in accordance with one feature of the invention and includes in the center an enlarged illustration of the roll surface;

Fig. 11 is a view similar to Fig. 10 showing a second type of print roll for use in the invention.

Perhaps the most common type of deformation occurs when a perfectly circular roll of tape, as illustrated in Figs. 1-2, changes shape to assume a ridged or polygon shape near its outer circumference. This condition,

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referred to as "starring" or "spoking," is illustrated best in Figs. 3-4 showing a roll of tape on a core.

The second type of deformation encountered in pressure-sensitive tapes can be described best as telescoping. In a normal undistorted roll of tape as shown in Figs. 1 and 2, the edges of the tape lie in two parallel planes. In a telescoped roll there is a displacement of adjoining layers of tape in a direction parallel to the axis of the roll and the roll assumes a partial cone or dish shape as shown in Figs. 5-6.

The occurrence of spoking and telescoping of tapes is dependent upon a number of variables, among which the most important are: stiffness of backing and its tendency to curl as a result of internal strains; tightness of wind of tape roll, diameter of tape roll and depth of tape on roll; and storage conditions of tape, particularly as regards changes in temperature and humidity.

Prevention of spoking in rolls of tape having moisture-sensitive film backings has been accomplished in some cases by winding the roll under high tension to prevent this type of distortion from forming. However, a roll of tape having a moisture-sensitive backing wound under high tension to prevent spoking is likely to telescope, especially if the humidity of the surrounding atmosphere increases, since moisture-sensitive film backings are susceptible to swelling which in turn causes telescoping.

Heretofore the elimination of roll distortions has been only partially successful. Packaging in moisture-proof metallic cans is sometimes used with some success, but the protection thus afforded is only temporary while the roll stays in the can. When a can is opened for use, tapes remaining in the can are subject to roll distortion, and the tape frequently undergoes distortion of such a serious nature during use that it cannot be unrolled from tape dispensers due to pressure on the sides of the holder.

A roll of pressure-sensitive tape may consist of three successive layers of material. Referring to Fig. 7, the tape consists of a backing layer, a primer layer used to anchor the adhesive or mass to one side of the backing, and the adhesive layer. In the following discussion, the backing layer shall be referred to as having two sides, a primed side to which primer and adhesive are applied and a backside opposite the primed side.

It has been established that the phenomenon of spoking can exist only in the presence of a curl or curvature in tape. The curl causing spoking occurs across the width of the roll of tape and not in the lengthwise direction. Spoking will only result when the curl is a downward curl, i.e., the edges of the tape are bent down in the direction of the primer or adhesive mass as shown in Fig. 8a.

The principle that tape spokes only in the presence of a downward curl is readily demonstrated using a common steel measuring tape with a curved surface and a three-inch cylinder. If the tape is wrapped around the cylinder first with the curl in one direction and then in the opposite direction, it may be noted that spoking will occur only in one case. If now a flat steel tape is wound around the same cylinder it will also be free of spoking.

In adhesive tape the downward curl which induces spoking seems due to the application of the usual water base primer to one side of the backing. The purpose of this primer is to anchor the adhesive securely to one side of the backing so that on unrolling the adhesive will not transfer in whole or in part to the opposite side of the film backing to which it has been applied, causing a spotty or unreliable insecure layer of adhesive. Wetting of the backing by applying a water base solution to one side induces surface strain in this backing causing it to curl in the direction of the wetted side. When the primer sheet is dried this condition of surface strain remains permanently set and results in what is known as spoking.

There are a number of such primers involving usually

a dispersion of a hydrophobic rubber and sometimes accompanied by a solution or a dispersion of a hydrophilic material. The term "rubber" as used in the specification and claims is intended to be used in its generic sense to define natural and synthetic rubbers. An aqueous dispersion primer that is particularly useful and has given a particularly satisfactory bond between adhesive and hydrophilic backing is shown in Billings Patent 2,340,298, patented Feb. 1, 1944. One of the primers shown therein comprises an aqueous dispersion of latex and polyvinyl alcohol in water at a solids content of approximately twenty percent by weight.

It is an object of this invention to provide a method for making an adhesive tape that is nonspoking. It is a further object of the invention to provide a method of making an adhesive tape that is nontelelescoping. Yet a further object of the invention is a method of making adhesive tapes from moisture-sensitive backings that form smooth round tape rolls that retain their even round features for an indefinite period of time.

Still further objects of the invention are the provision from moisture-sensitive backings of rolls of adhesive tape that are nonspoking, that are nontelelescoping, and of rolls that are both nonspoking and nontelelescoping. Still further objects of the invention will be apparent from the following description with particular reference to the several examples which, however, are shown merely by way of illustration rather than by limitation of the invention.

In accordance with one important feature of the invention, adhesive tape having a moisture-sensitive backing is coated on one side with an aqueous primer and balanced by imparting to it a curl opposed to the curl induced by the primer. This balancing curl is induced by applying on the side opposite the primer a second aqueous coating comprising a major proportion of water about equal to or exceeding the amount of water applied per unit area in the primer coat. Both coats are dried after application.

While this method of coating in itself produces an upward curl as shown in Fig. 8c, and accordingly a nonspoking tape, adhesive tape that is both nonspoking and nontelelescoping is desired and for this reason the last mentioned aqueous coat used to balance the adhesive sheet is preferably applied using a print roll having dispersions for minute quantities of water as illustrated in Figs. 10 and 11 of the drawing. This quantity of the water is applied from the print roll so as to create a visible, more or less permanent pattern of visible hills and valleys in the film and to increase the compressibility of a film backing having a thickness of from about one half of a mil to about three mils by from about one hundred to about one thousand percent. Compressibility is understood herein to be the reduction in thickness of a sheet when pressure of from about one to about three pounds per inch is applied to it. Application of the balancing coat in this manner avoids telescoping that is likely to occur if the balancing coat is not so applied.

To correct spoking alone the application of water or of a water solution can be achieved by any of the means well known in the coating art such as knife coating, roller coating, reverse roll coating, spray coating or kiss coating. The amount of water applied is not critical and may vary from about five hundredths of an ounce to about three tenths of an ounce per square yard. It is important that the water be applied to the surface opposite to that which has been coated with the water containing primer and that the water applied per unit area in the second coat is about equal or exceeds that applied in the first coat. Drying heats may range anywhere from 120° to 300° F. also any temperature that removes surface moisture achieves the desired result.

In order to reduce telescoping the print or engraved roll method of applying the water base balancing coat is preferable. Water applied with the print roll does not form a smooth, continuous film but separates into minute, uniform spots on the cellophane sheet. Upon dry-

ing, these small spots cause a pattern to form. The pattern is hard to detect without close observation. If the backing is now processed into finished rolls of adhesive coated tape, being wound at a normal tension, the effect of the pattern is to allow room for the backing to swell without distortion. The pattern consists of minute hills and valleys and when high humidities are encountered, the swelling backing film fills up the valley spaces without the necessity of telescoping to relieve the swelling strain. The clarity or transparency of the backing tape is in no way affected.

That the bulking effect on the backing is significant, can be demonstrated by experiments with various backings of which the following is typical. Samples of a flat sheet of regenerated cellulosic film were print roll coated, using a roller having 13,500 pyramid cells of one mil depth per square inch. The amount of water applied amounted to twelve-hundredths of an ounce per square yard. Samples of multilayers of this film and of corresponding untreated film were placed under compression at various loads and the following results were obtained, which are also shown in Fig. 9.

Load (Pounds per square inch).....	0.7	1.0	2.0	3.0
Thickness treated film, mils.....	1.89	1.82	1.72	1.66
Thickness untreated film, mils.....	1.66	1.64	1.59	1.58

Examination of the above table or of Fig. 9 shows that varying the compressive loading force from 0.7 to 3.0 per square inch gave thickness reductions of 0.23 mil for the treated cellophane versus only 0.08 mil for the untreated. Samples of adhesive coated tape rolls made from treated backing, wound at one pound per inch tension were compared with untreated film backing. The treated backing after exposure to 80% relative humidity for four days was undistorted, whereas untreated backing produced rolls resembling the telescoped roll shown in Fig. 6. Closely similar results are obtained with water-sensitive backings other than regenerated cellulose film.

In other words in accordance with one phase of this invention the normally tacky and pressure-sensitive adhesive tape is prepared in three steps:

The first two steps involve coating the moisture-sensitive backing on both sides. One coating applies the primer from aqueous dispersion or solution and the opposite coating applies from 0.05 to .3 of an ounce per square yard but in any case an amount equal to or exceeding the amount of water applied on the other side so as to induce a strain on the side of the backing opposed to the primer coating. After coating the sheet is dried and the adhesive applied to the primed side. It should be noted that the first two coatings may be applied in any sequence desired, i.e., the primer first or the balancing coat first or both simultaneously. The adhesive is, of course, applied after the earlier coatings have been completed.

In the usual case where it is desired to avoid not only spoking but also telescoping the balancing coat is applied from a print roll and the roll is regulated so as to provide minute pockets of water droplets on the surface of the water-sensitive backing increasing its outward pull and thereby increasing its compressibility from one hundred to a thousand percent of its original compressibility. Compressibility herein is understood to be the decrease in thickness of the film when a load of from one to three pounds per square inch is applied to it. The limitations as to compressibility are particularly important in connection with films having thicknesses of from about 0.5 to about three mils which are the films used as backings in normally tacky and pressure-sensitive adhesive tapes.

A number of examples illustrating the important process for producing pressure-sensitive tape having a moisture-sensitive backing yet free from distortion follows. In each of these examples that illustrates the decrease in telescoping by coating with print rolls the compressibility

was increased by from one hundred to one thousand percent after treatment.

Example I

(1) A plain, flat, transparent, regenerated cellulose film sheet is coated on the backside with 0.12 ounce per square yard of water with a print roll and dried by passing through an oven at 200° F.

(2) Approximately 0.10 ounce per square yard wet weight of a primer is applied to the opposite side; said primer consisting of one part polyvinyl alcohol, two parts latex and twelve parts water. The polyvinyl alcohol is a high viscosity type, having approximately twelve percent unhydrolyzed acetate groups and eighty-eight percent hydroxyl. The latex used is a styrene butadiene copolymer (six parts of the former for four parts of the latter) obtained as aqueous emulsion at forty-five percent solids. The primer is dried by passing through an oven at 200° F. This process will work equally well if steps 1 and 2 are performed simultaneously or in the reverse order.

(3) An adhesive mass consisting of six parts of crude rubber partially broken down on a rubber mill and 4 parts of resin in a fifteen percent solution of solvent such as toluene is prepared. The resin used is a polyterpene hydrocarbon resin having a softening point of 115° C. It is coated on the primed side of the sheet and dried through an oven to give an adhesive weight of 1.0 ounce per square yard.

(4) The large rolls of adhesive coated cellophane are now taken to slitting machines to be cut into smaller rolls. Most rolls of smooth untreated cellophane possess some degree of nonuniformity (such as bagginess or tight or loose sides) which cause some slit rolls to be wound too loosely or tightly. In the case of treated cellophane in which spoking cannot occur, the bulking effect of the pattern compensates for nonuniformity of the cellophane and it is now possible to wind the slit adhesive rolls with more uniform tension to obtain rolls of superior and more pleasing appearance.

Example II

(1) Cellophane is coated with 0.15 ounce per square yard of a three percent by weight aqueous solution of a thirty percent isopropanol solution of stearato chromic chloride prepared as described in Example I of United State Patent 2,273,040, issued February 17, 1942, in water with a print or engraved roll and dried by passing through an oven at 200° F.

(2) The process is completed as in steps 2, 3, and 4 of Example I. Slit rolls, in addition to having no spoking tendency, are found to be much improved in freedom from telescoping when subjected to high humidity, as compared with rolls from similar cellophane which has been untreated. This example illustrates the combination of treatment in accordance with the invention with treatment with repellent in one step.

Example III

(1) Cellophane is coated with a print roll with 0.15 ounce per square yard of ten percent solution of glycerin in water and dried by passing through an oven at 120° F.

(2) The process is completed as in steps 2, 3, and 4 of Example I. Again the slit tapes showed a remarkable improvement when treated versus non-treated cellophane is compared.

The above examples illustrate that either water or aqueous solutions, preferably comprising more than ninety percent by weight of water, are useful in:

(a) Reversing the direction, or eliminating the tendency of backing to curl and,

(b) In producing a pattern whose bulking effect on backing reduces the telescoping behavior.

Further illustrative examples are shown in the following:

Example IV

(1) A glossy smooth two-mil polyvinyl alcohol film is coated on the backside with fifteen hundredths of an ounce per square yard of water with a print roll and dried by passing through an oven at two hundred degrees Fahrenheit. The polyvinyl alcohol from which the smooth film was cast is the same as that described in Example I.

(2) The process is completed as in steps 2, 3, and 4 of Example I.

Example V

(1) A plain, transparent, regenerated cellulose film is processed as in steps 1 and 2 of Example I.

(2) An adhesive mass consisting of two parts pale crepe, two parts GRS, three parts zinc oxide, and three parts of the piccolyte polyterpene resin of Example I in a twenty-five percent by weight solution in toluene is coated on the primed side of the sheet and dried through an oven to give an adhesive weight of one and twenty-five hundredths of an ounce per square yard. GRS is a butadiene-styrene copolymer seventy-two parts by weight per twenty-eight parts by weight of Mooney viscosity sixty-five.

Example VI

(1) A plain, transparent, regenerated cellulose sheet is coated on the backside with five hundredths of an ounce per square yard of water with a print roll and dried by passing through an oven at 200° F.

(2) Approximately four hundredths of an ounce per square yard wet weight of a primer is applied to the opposite side; said primer consisting of one part casein and one part latex in thirteen parts of water. The primer is dried by passing through an oven at two hundred degrees Fahrenheit. This process works equally well if steps 1 and 2 are performed simultaneously or in the reverse order.

(3) The process is completed as in steps 3 and 4 of Example I.

In Examples 4, 5, and 6, it was found that the treated backings again eliminated curling induced by the primer coat, and consequently eliminated spoking in the tape rolls when subjected to low humidity (thirty to forty percent relative humidity). At the same time, the bulking effect produced by the treatment substantially reduced the tendency to telescope when tapes were held in an atmosphere of high humidity (greater than fifty percent relative humidity) as compared with untreated tapes.

Example VII

(1) Cellophane is coated with a primer consisting of:
Two parts light innertube reclaim rubber of sixty percent by weight hydrocarbon
Two parts glyceryl ester of hydrogenated rosin
Eighteen parts toluene
Two parts methyl ethyl ketone

This was applied to give a dried weight of 0.03 of an ounce per square yard.

(2) A filled adhesive mass is coated on the primed sheet as described in part 2 of Example V.

(3) Approximately twenty hundredths of an ounce per square yard of distilled water is printed on the cellophane backside and dried in an oven held at two hundred and fifty degrees Fahrenheit.

(4) The tape is wound into master rolls and then slit.

Example VIII

(1) Cellophane is primed with a polyvinyl alcohol-latex primer of composition shown in part 2 of Example I to give a wet weight of twelve hundredths of an ounce per square yard. The primer is oven dried.

(2) Approximately thirteen hundredths of an ounce per square yard of distilled water is printed on the backside and oven dried at two hundred and fifty degrees Fahrenheit.

- (3) An adhesive consisting of:

Ten parts polyvinyl isobutyl ether of intrinsic viscosity two and one half to three and one half

Two parts polyalpha-methyl styrene polymer of low molecular weight

One part mineral oil

Fifty-five parts toluene

is coated and dried to give a weight of one ounce per square yard.

- (4) The tape is slit as previously described.

Example IX

(1) Cellophane is primed with 0.10 ounce per square yard wet weight of polyvinyl alcohol-latex as in part 2 of Example I.

(2) Approximately ten hundredths of an ounce per square yard of water was printed on the primed side and dried at two hundred degrees Fahrenheit.

(3) The process was completed as in parts 3 and 4 of Example I.

Examples 7 and 8 were also found to possess non-deforming characteristics as compared with untreated tape at high and low humidities. Examples 1 through 8 illustrate that:

(a) The amount of water applied to the backside is not critical within limits to prevent spoking as long as it equals or exceeds that applied on the primed side. However, application of large amounts of water renders cellophane unmanageable for processing.

(b) Drying temperatures are not critical.

(c) Water may be applied to the cellophane anywhere in the tape making process, e.g. before priming, after priming, before adhesive coating, after adhesive coating, and before or after slitting.

Example IX though possessing resistance to telescoping at high humidity was found to spoke (at low humidities) due to the fact that the water pattern and primer were applied to the same side of the cellophane contrary to the preferred method of this patent.

Example X

(1) Approximately twelve hundredths of an ounce of water is coated on the backside of cellophane which has been primed as in part 2 of Example I. This water coating was applied with a sharp knife coater in place of the print roll of the preceding examples and the sheet dried.

(2) The tape was completed as in parts 3 and 4 of Example X.

At low humidities rolls of pressure-sensitive adhesive tape made as in Example X did not spoke while untreated ones did, and were found to telescope at high humidities along with untreated rolls. This example illustrates that spoking may be eliminated using any type of coating equipment, but that telescoping relief is only accomplished by obtaining a pattern effect on the film backing which increases its compressibility. It has been found that knife or roller coating which applies a continuous film of water does not crepe or bulk cellophane as compared with a print roll which applies a discontinuous film of water.

The type of pressure-sensitive adhesive coating applied appears not to be critical with regard to operation of the invention; the adhesive may be crude or synthetic rubber based, or contain other types of elastomers, e.g. a polyvinyl ether base; it may be with or without fillers; nor does the amount of adhesive coating affect the results within practical limits. Normally, an adhesive tape requires from one half of an ounce to one and one-half ounces per square yard of adhesive coating, and within such limits the balancing film treatment is operable.

The following modifications are of lesser utility than the ones described above:

a. Treatment with water soluble organic solvents such as lower alcohols and acetone unless such solvents con-

tain sufficient water (fifty percent or more) to produce a pattern as previously described;

b. Addition of glycerine or other humectant plasticizers up to fifty percent to the primer coating;

c. Recoating the primed side of the film with water can be used to obtain bulking of film but not to eliminate the objectionable curl.

The severity of the drying conditions during any stage of the processing may affect the relative degree of curling but not the direction of the curl. The latter is governed by the side upon which treatment occurs.

The exact reasons for the occurrence of curl may not be stated adequately but it is not controlled readily by applications of plasticizer to one side or the other of the water-sensitive film. This may be because of failure of plasticizer to counter strain alone or because of plasticizer migration after its application to the film. Experiments with water-soluble dyes show that the water coating apparently penetrates the film completely. Evidence from curling experiments indicate, however, that the effect of the coating is not uniformly distributed, or that the temporary surface hydration is in some manner permanently retained in the film structure on drying. The permanent transition of the film backing with respect to the direction of curl and average film thickness to mitigate spoking and telescoping, respectively, is found to correlate with side to which the coating is applied and pattern retained, rather than with the amount of water retained, state of overall hydration, or equivalent.

The advantage in appearance, and greater utility of tapes made according to the invention have been discussed. Less obvious but equally important is the fact that the process eliminates loose edges in the film during adhesive coating and substantially reduces waste, both in coating and in slitting tape. Tapes made by this process can be slit and wound in rolls under more uniform tension than has been possible heretofore. This has resulted in a sharp reduction in the amount of reject rolls which always represents a considerable burden on the cost of manufacturing pressure-sensitive tapes. Improved aging of tapes, due to less access of air to the adhesive coating, as shown in Fig. 2 compared to Fig. 6 is another important advantage. The improved tapes not only fit into conventional tape dispensers more readily, but show less jerky removal than tapes as shown in Fig. 3. This is especially important where automatic dispensers are used and tears are more apt to occur in unrolling.

Many other variations of the above-described invention will be apparent to those skilled in the art and are included in the inventive concept.

The claims are:

1. The process of preparing normally tacky and pressure-sensitive adhesive sheets comprising the steps of coating a hydrophilic backing film having a thickness of from about one-half to about three mils, on each side, one coating being a primer composed of an aqueous dispersion of a hydrophobic rubber, and the opposed coating comprising a balancing coat including a major proportion of water, said water being at least equal in amount to the amount of water applied by said primer coating, and amounting to from about five-hundredths of an ounce to about three-tenths of an ounce of water per square yard, drying said coating and applying a water-insoluble, normally tacky and pressure-sensitive adhesive to the surface of said primer coating after said primer coating has been applied, said adhesive comprising an elastomeric rubber base and a tackifying resin.

2. The process of preparing normally tacky and pressure-sensitive adhesive sheets comprising the steps of coating a regenerated cellulose backing film having a thickness of from about one-half to about three mils, on each side, one coating being a primer composed of an aqueous dispersion of a hydrophobic rubber and the opposed coating comprising a balancing coat including a major proportion of water, said water being at least equal in amount

to the amount of water applied by said primer coating, and amounting to from about five-hundredths of an ounce to about three-tenths of an ounce of water per square yard, drying said coating and applying a water-insoluble, normally tacky and pressure-sensitive adhesive to the surface of said primer coating after said primer coating has been applied, said adhesive comprising an elastomeric rubber base and a tackifying resin.

3. The process of preparing normally tacky and pressure-sensitive adhesive sheets comprising the steps of coating a hydrophilic backing film having a thickness of from about one-half to about three mils, on each side, one coating being a primer composed of an aqueous dispersion of a hydrophobic rubber, and the opposed coating comprising a balancing coat including a major proportion of water, said water being at least equal in amount to the amount of water applied by said primer coating, and amounting to from about five-hundredths of an ounce to about three-tenths of an ounce of water per square yard, drying said coating and applying a water-insoluble, normally tacky and pressure-sensitive adhesive comprising an elastomeric base and a tackifying resin to the surface of said primer coating after said primer coating has been applied, said balancing coating being applied in the form of minute droplets of water creating a visible pattern of hills and valleys longitudinally on the surface of the film so as to increase the compressibility of the treated film when dry from one hundred to one thousand percent beyond the compressibility of the untreated flat film.

4. In the process of preparing normally tacky and pressure-sensitive adhesive sheets that do not telescope when rolled into a conventional tape roll, the steps of coating a hydrophilic backing film having a thickness of from about one-half to about three mils, with a balancing coat in the form of minute droplets comprising major proportions of water creating a visible pattern of hills and valleys on the surface of the film so as to increase the compressibility of the treated film when dry from about one hundred to about one thousand percent beyond the compressibility of the untreated flat film, and drying the film when so treated to set the pattern, said hydrophilic backing film forming the base of said adhesive tape and applying a normally tacky and pressure-sensitive, water insoluble adhesive to the uncoated side of the backing, said adhesive comprising an elastomeric base and a tackifying resin.

References Cited in the file of this patent

UNITED STATES PATENTS

1,922,767	Humphner	Aug. 15, 1933
2,006,208	Bradner	June 25, 1935
2,153,374	Kantor	Apr. 4, 1939
2,340,298	Billings	Feb. 1, 1944
2,383,637	Yates et al.	Aug. 28, 1945
2,397,817	Staunton et al.	Apr. 2, 1946
2,515,423	Plasnik	July 18, 1950
2,574,152	Lewis	Nov. 6, 1951