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PROCESS FOR WRAPPING FOOD PRODUCTS

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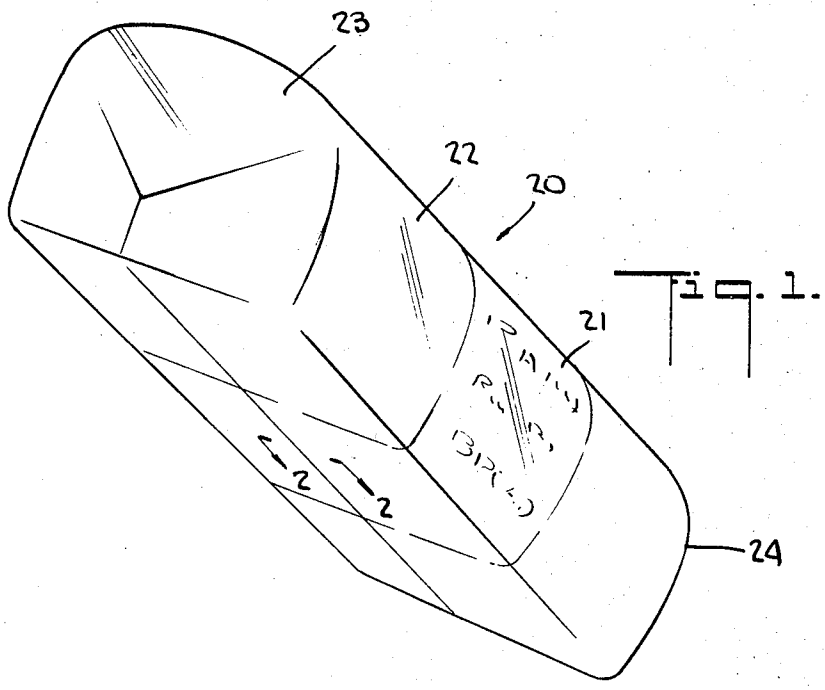
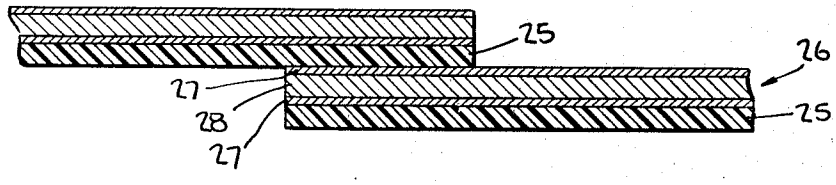


Fig. 1.

Fig. 2.



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PROCESS FOR WRAPPING FOOD PRODUCTS

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Continuation of application Ser. No. 26,638, May 3, 1960. This application July 6, 1965, Ser. No. 469,829

4 Claims. (Cl. 99—172)

This application is a continuation of our copending application Ser. No. 26,638, filed May 3, 1960, now abandoned.

This invention relates generally to a wax coating composition having improved adhesion to cellophane films into which the wax coating does not penetrate, and particularly to such a wax coating composition for use on waxed paper bread bands which are heat sealed to wrappers comprised of the above types of films.

Heretofore, loaves of bread and other baked goods have been wrapped with wrappers of cellophane and the like and waxed paper bands have been placed around a central portion of the loaf on the inside of the cellophane wrapper, but because of poor sealing strength of the waxed paper to the cellophane and since the method of wrapping the bread resulted in the bottom seal being between the wax paper and the cellophane, accidental opening of the wrapper frequently occurred during handling with consequent loss of the contents.

The sealing of a wax-coated paper, typically either sulfite or kraft paper, to itself or a similarly coated paper is relatively easy, because the wax penetrates the rather porous fibrous body of the paper, and high sealing strength test results are readily obtainable. However, when a wax is used to seal cellophane to paper, or to itself, it has been difficult to obtain high sealing strength because waxes do not penetrate the cellophane to any significant extent. It is more difficult to achieve a strong seal with food-wrapping grade cellophane than with ordinary cellophane because of the thin coating, typically saran or a nitro-cellulose derivative, applied to the former to decrease its permeability to moisture. Furthermore, the strength of the seal formed with wax between paper and cellophane is significantly influenced by relatively narrow variations of existing temperature at the time the seal is tested, and its age in hours since the seal was formed. Hence, paper to cellophane wax seals are tested at 40° F. and 75° F., and at ½ and 24 hour periods after forming the seal. The foregoing ranges of time and temperature obviously are encountered in the commercial distribution from manufacturer, for instance, a bakery, to consumer of foodstuffs. Nonetheless, the widespread commercial use of cellophane to wax paper seals in wrapping foods has provided for many years of substantial incentive to discover a wax composition which will provide acceptable sealing strengths under the conditions of commercial use.

An object of the present invention is to provide a wax coating composition providing improved adhesion of such composition to bread-wrapping grade cellophane films as well as to paper bands.

Another object is to provide a wax coating having improved low temperature adhesion to such films.

An additional object is to provide a wax coating having improved adhesion to such films after aging intervals of twenty-four hours or more.

A further object is to provide an improvement in the process of wrapping food by using such a wax composition when a waxed paper band is sealed to food-wrapping grade cellophane.

Broadly stated, an embodiment of the invention is an improvement in a process of wrapping foods, particularly baked goods such as bread loaves, wherein a waxed paper band is sealed by means of the wax thereon to a sheet of cellophane which envelops the food, such improvement comprising using as the wax for coating such paper a composition comprising in the range of from about one-quarter to about three-quarters of one percent of a polar wax, particularly carnauba wax; in the range of from about one-half percent to four percent of a polymethylenic material, such as polyethylene having a density greater than 0.92 or a high melting point synthetic paraffinic hydrocarbon wax, which is hard, non-tacky and at least partially crystalline, in the range of from about one percent to about three and one-half percent of a low molecular weight, amorphous, tacky, wax-compatible polymeric elastomer; and the remainder of the composition comprising a blend of hydrocarbon waxes comprising in the range of from about twenty-five to about forty-five percent hydrocarbon wax A, and in the range of from about seventy-five to about fifty-five percent hydrocarbon wax B, hydrocarbon waxes A and B being as defined hereinafter.

In another embodiment, the invention is a composition useful in sealing bread-wrapper grade cellophane to paper, which composition comprises in the range of from about one-quarter to about three-quarters of one percent of a polar wax, particularly carnauba wax; in the range of from about one-half percent to four percent of a polymethylenic material, such as polyethylene or a high melting point synthetic paraffinic hydrocarbon wax, which is hard, non-tacky and at least partially crystalline; in the range of from about one percent to about three and one-half percent of a low molecular weight, amorphous, tacky, wax-compatible polymeric elastomer; and the remainder of the composition comprising a blend of hydrocarbon waxes comprising in the range of from about twenty-five to about forty-five percent hydrocarbon wax A, and in the range of from about seventy-five percent to about fifty-five percent hydrocarbon wax B, hydrocarbon waxes A and B being as defined hereinafter.

Other features of the invention will become apparent in the following description and claims, and in the drawings in which:

FIG. 1 is a perspective view of a wrapped loaf of bread; and

FIG. 2 is an enlarged partial section taken along lines 2—2 of FIG. 1.

In the drawings, a typical wrapped loaf of bread designated generally by reference numeral **20** is shown in FIG. 1, this loaf having a wax-coated paper band **21** around the central portion of the loaf, the outer cellophane wrapper **22** covering the band and the entire loaf. The cellophane wrapper **22** is sealed upon itself at the ends **23–24** and along the bottom the central portion is joined as shown in FIG. 2. The cellophane **25** is sealed to the wax-coated paper bread band **26** so that the wax coating **27**

on the paper **28** must have good adhesion both to the paper **28** and the cellophane **25**. Since the bread bands are generally several inches wide, failure of the seal at this point constitutes a substantial rupture of the entire package.

Turning now to the various constituents of the wax composition, hydrocarbon wax A is a relatively high molecular weight (i.e. about 500–750 average), high melting point, soft and tacky, plastic-like hydrocarbon, usually derived from petroleum residuums, and consisting predominantly of a mixture of non-normal saturated paraffin hydrocarbons known as isoparaffins and/or naphthenes, having the following properties:

ASTM congealing point (ASTM D 938–49)	140–170° F.
Consistometer hardness at 77° F.	18–30 Abraham units.
ASTM needle penetration at 77° F. (ASTM D 1321–57T)	22–50 tenths of 1 mm.
ASTM oil content (ASTM D 721–56T)	3.0% (maximum).
Distillation assay at 10 mm. Hg	Not more than 10% distilling over at 600° F.

When used in the claims hereof, the phrase "hydrocarbon wax A" refers to a wax in accordance with the description of the foregoing paragraph.

Hydrocarbon wax B is a medium molecular weight (i.e. about 375–500 average) medium melting point, hard, tough, dry and only slightly tacky hydrocarbon, usually derived from high boiling petroleum distillates, and consisting predominantly of a mixture of saturated normal paraffins containing a substantial proportion of saturated branched chain isoparaffins.

ASTM melting point (ASTM D 87–57)	140–160° F.
Consistometer hardness at 100° F.	20 Abraham units (minimum).
ASTM oil content (ASTM D 721–56)	1.0% (maximum).

The method we have used in making determinations of consistometer hardness utilizes a standard consistometer supplied by John Chatillon & Sons, 85 Cliff Street, New York, N.Y. A 150 gram sample of the wax to be tested is conditioned at the test temperature for two hours. The consistometer plunger is then forced through the sample at a rate of one centimeter per minute by the controlled compression of a spring and the maximum force applied is recorded. Results are expressed as Abraham units.

The distillation assay method utilized herein is described in detail in commonly assigned patent application Ser. No. 842,166, filed Sept. 24, 1959, now U.S. Patent No. 2,985,538, which was copending with the above-mentioned patent application Ser. No. 26,638.

When used in the claims, the phrase "hydrocarbon wax B" refers to a wax in accordance with the description in the preceding three paragraphs.

The low molecular weight, amorphous, tacky, wax-compatible polymeric elastomer may be a monopolymer or a copolymer of propylene, butylene, isobutylene and isoprene, or a copolymer of any of the foregoing with ethylene, or mixtures thereof. The desired polymeric elastomers have a low order of crystallinity, and preferably exhibit substantially no crystallinity. As usual herein, the term "wax-compatible" denotes complete miscibility, as measured by visual observation, of the polymeric elastomer in blends of hydrocarbon waxes A and B in the amounts herein disclosed and claimed for each of the three components. A particularly suitable polymeric elastomer is polyisobutylene having a molecular weight in the range from about 5,000 to 30,000, preferably about 10,000 (sold under the name of Vistanex, a registered trademark of the Enjay Company). Other suitable elastomers include polybutylene having a molecular weight in the range of from about 800 to about 1500, and butyl rubber, which is a copolymer made from about 3% or less of isoprene and about 97% isobutylene. Another suitable amorphous tacky wax-compatible polymeric elastomer is amorphous polypropylene having a molecular weight in the range of from about 3,000 to about 7,000, and amorphous copolymers of ethylene and propylene of similar molecular weight. The molecular weights referred to herein are suitably determined by the method of Staudinger, except the molecular weight of amorphous polypropylene determined by boiling point elevation (ebullioscopic) method.

When used in the claims, the phrase "amorphous, tacky, wax-compatible polymeric elastomer" refers to a composition in accordance with the preceding paragraph.

The polymethylenic material which is characterized by being hard, non-tacky, and having substantial crystallinity may be polyethylene having a molecular weight in the range of from about 1500 to about 30,000, having a density greater than 0.92 preferably in the range of from about 10,000 to about 20,000. Advantageously, it may be a synthetic hydrocarbon wax, referred to herein as hydrocarbon wax C, and specifically such a wax sold commercially by Moore & Munger, New York, made by the Fischer-Tropsch process and marketed under the trademark "Paraflint" and having the following properties:

Needle penetration at 77° F.	Less than 2 mm.
Oil content	Less than 1.0%.
Average molecular weight	500–1000.
Acid, saponification, and bromine numbers	Nil.
Ash content	Less than .01%.
Color	White.
Viscosity at 250° F.	8–14 centipoises.
Specific gravity at 77° F.	0.93–0.95.
Congealing point range (ASTM D–938)	200–220° F.
Odor	Essentially none.

When used in the claims, the phrase "partially crystalline, hard, non-tacky, polymethylenic material" refers to a material in accordance with the description of the preceding paragraph.

The polar wax may be carnauba wax, candelilla wax, IGKP wax, etc. IGKP wax is an esterified montan wax and is described in detail in United States Patent Nos. 2,245,494 and 2,282,375.

It is to be understood that any of the individual materials illustratively mentioned above for the amorphous, tacky, wax-compatible polymeric elastomer, the at-least-partially crystalline polymethylenic material, and polar wax may be used, or combinations of each such materials may be used, to provide the desired amount for the particular additive constituent.

The wax coating composition of the present invention optionally may be used in conjunction with various anti-blocking agents and slip agents such as silicones and/or polyolefin glycol esters which are added to the water bath, and/or glycol or glycerol esters of aliphatic acids, and/or fatty amides which often are incorporated into the wax coating compositions for use in wrapping foods.

The limits of the various constituents were established by tests. The limits for the hydrocarbon blend of wax A and wax B were established by sealing strength tests at 40° F. and 73° F. of cellophane bread-wrapping grade, coated with a nitrocellulose derivative, designated in the industry as MS-grade, sealed to wax coated sulfite paper. (Unless otherwise noted, all sealing strength tests referred to herein were performed on cellophane to sulfite paper bands.) The temperature referred to in sealing strength tests are those at which the sample is both aged and tested for its sealing strength. The test employed for sealing strength followed the ASTM test described in "ASTM

Standards on Petroleum Products and Lubricants," American Society for Testing Materials, Philadelphia, 1948, pages 1074–1097, with the following modifications. The samples were sealed at 210° F. and quick chilled by chilling over a chill bar at 40° F. Samples were tested after both one-half hour aging and twenty-four hour aging and the specimens were peeled at a rate of 10 inches per minute. Sealing strength is expressed in grams per 3 inch wide strip. The test results were as follows:

TABLE I

	Formula 1	Formula 2	Formula 3	Formula 4
Hydrocarbon Wax A	18.95	34.11	37.90	41.69
Hydrocarbon Wax B	75.80	60.64	56.85	53.06
Vistanex	3.50	3.50	3.50	3.50
Polyethylene	0.50	0.50	0.50	0.50
Carnauba Wax	0.50	0.50	0.50	0.50
Glyceryl Monostearate	0.75	0.75	0.75	0.75
Sealing Strength, aged ½ hour at 40° F	28.6	36.6	50.0	37.4
Sealing Strength, aged 24 hours at 73° F	19.6	235.0	367.0	320.0

As used in the foregoing table and throughout the specification, all constituent amounts are percentages by weight of the total blended wax compositions.

The tacky, amorphous wax-compatible polymeric elastomer limits are defined by combinations of pressure blocking tests and sealing strength tests of cellophane to sulfite paper seals at 40° F.

The pressure blocking test is as follows:

Six 2 x 4 inch strips of the waxed paper to be tested, and twelve 2 x 4 inch strips of glassine paper are prepared. The six waxed paper strips, front side up and adjacent to each other, are sandwiched between the twelve glassine strips, six glassine strips on the bottom and six on the top. Desired pressure may be applied by any suitable instrument, which instrument, containing the waxed strips, is ovenized at elevated temperature (95–100° F.) for 17 hours. At the end of the ovenizing period, the instrument and the specimens are removed from the oven and are allowed to cool to room temperature. The test strips are pulled apart by hand with a quick pull, and the blocking evaluated on a 1–4 number basis which is defined as follows:

(1) No sticking
(2) Slight sticking
(3) Sticking
(4) Paper tear

The test results on the elastomer are shown below:

TABLE II

	Formula 5	Formula 6	Formula 7	Formula 8
Hydrocarbon Wax A*	34.8	34.0	33.5	32.9
Hydrocarbon Wax B*	61.7	60.5	59.5	58.6
Polyethylene	3.0	3.0	3.0	3.0
Carnauba Wax	0.5	0.5	0.5	0.5
Vistanex	0.0	2.0	3.5	5.0
Sealing Strength, aged ½ hour at 40° F		56.6	88.0	64.6
Sealing Strength, aged 24 hours at 73° F	42.0	132.5	190.0	280.0
Picking Point, ° F	115	109		109
Blocking Point, 0° F	121	112		111
Pressure Block Rating	2	1	2.5	4

*Ratio of Wax A/Wax B kept constant.

The limits for the hard, non-tacky, partially crystalline polymethylenic material are defined by a combination of sealing strength tests at both 40° F. and 73° F. as shown in the followlng table:

TABLE III

	Formula 9	Formula 10	Formula 6	Formula 11
Hydrocarbon A	35.1	34.7	34.0	33.3
Hydrocarbon B	62.4	61.8	60.5	59.2
Vistanex	2.0	2.0	2.0	2.0
Carnauba Wax	0.5	0.5	0.5	0.5
Polyethylene	0.0	1.0	3.0	5.0
Sealing Strength, aged ½ hour at 40° F	49.0	50.6	56.6	31.4
Sealing Strength, aged 24 hours at 73° F	126.2	237.5	132.5	29.0

The polar wax limits are determined primarily by the fact that adhesion to cellophane is reduced to an undesirable level at low temperatures, i.e., 40° F. when there is more than three quarters of one percent polar wax in the final composition. The following test shows the effect of varying the polar wax over the usable range:

TABLE IV

	Formula 12	Formula 13	Formula 6	Formula 14
Hydrocarbon Wax A	34.2	34.15	34.0	33.95
Hydrocarbon Wax B	60.8	60.6	60.5	60.3
Vistanex	2.0	2.0	2.0	2.0
Polyethylene	3.0	3.0	3.0	3.0
Carnauba Wax	0.0	0.25	0.5	0.75
Sealing Strength, aged ½ hour at 40° F	23.0	48.0	56.6	36.6
Sealing Strength, aged 24 hours at 73° F	27.0	65.0	132.5	235.0
Picking Point, ° F	113	113	109	111
Blocking Point, ° F	116	114	112	113

Comparative tests were made between bread wrappers coated with compositions according to the present invention and a typical bread wrapper formula; a startling difference in sealing strength was noted, as shown in Table V, wherein the sealing strength of the compositions according to the present invention is seen to be from 15 to 45 times greater than that of the prior art bread wrapper formula with no substantial increase in the blocking or picking points.

TABLE V

	Typical Bread Wrapper Formula	Formula 15	Formula 16
Composition:			
Hydrocarbon Wax A	34.92	37.20	33.50
Hydrocarbon Wax B	62.08	55.80	62.69
Polyethylene (DYLT)	3.0		
Polyethylene (DYNH)		0.46	1.40
Paraffint		2.31	
Vistanex		3.12	1.40
Butyl Rubber			0.52
Carnauba Wax		0.46	0.49
Glyceryl Monostearate		0.65	
Test:			
Sealing Strength, 73° F. (24 hour age)	10.5	151.6	453
Picking Point (° F.)	114	99	118
Blocking Point (° F.)	116	130	135

Additional tests were made using the following formulation:

Formula 17

Hydrocarbon A	31.00
Hydrocarbon B	63.61
Polyethylene	0.49
Paraffint	2.31
Vistanex	2.10
Carnauba wax	0.49

The water bath through which the wax-coated paper was passed during the chilling operation contained 0.25% Silicone EF 209 (made by Dow Corning Corporation) and 0.25% polyethylene glycol 400 monolaurate (made by Glyco Products).

Sealing strength tests at 73° F. (after 24 hours aging) gave the following results compared with a standard prior art commercial formulation using two different sulfite paper stocks.

TABLE VI

	Commercial Formula		Formula 17	
	Paper No. 1	Paper No. 2	Paper No. 1	Paper No. 2
Cellophane	3.7	9.7	94.5	55.5

The improved sealing strength characteristics of the wax compositions disclosed herein relative to those of previously known compositions has been demonstrated. In this demonstration, a twenty-five pound per ream sulfite paper stock was coated with fourteen pounds per ream of the wax composition being tested. Two tests were performed, one with such coated paper stock sealed to itself (i.e., sulfite to sulfite) and the other with such waxed paper sealed to cellophane (i.e., sulfite to cellophane), and the sealing strength of each determined. The process of sealing and testing was the same as described in the paragraph preceding Table I hereof.

The above described Formula 17 was used as illustrative of this invention. The prior art formulation which was taken from United States Patent No. 2,728,735 (see Table III thereof), consisted of 60% of a 139° F. melting point paraffin wax, 31.5% of a 145° F. melting point micro. wax, 3.5% of a 180° F. melting point paraffin wax (all of the foregoing three waxes are commercially available materials and were obtained from Shell Oil Company), and 5.0% of a polyethylene having a molecular weight of 7000. The sealing strength data obtained at 73° F. in the foregoing tests are set forth in Table VII.

TABLE VII

	Prior Art Formulation	Formula 17
Sealing Strength, sulfite to sulfite	138	[1] 473
Sealing Strength, sulfite to cellophane	3.5	500

[1] Pulling fibers.

The parenthetical notation in the foregoing table to pulling fibers indicates that the paper failed (by the tearing apart of the fibers of the paper) before the failure point of the wax seal was reached.

It is particularly noteworthy that the sealing strength of the prior art compound when sealing sulfite paper to cellophane is much less than when the same formulation is used to seal sulfite paper to itself, and less than 1% of the strength of Formula 17 when sealing bread-wrapper grade cellophane to sulfite paper.

From the above results it can be seen that the composition of the present invention amounts to a significant advance in the art and provides a coating composition which finds widespread use when wrapping food products such as bakery goods and cheeses and the like with cellophane and paper wrapper bands.

While certain embodiments of the invention have been described in detail herein, it is to be understood that certain changes and additions may occur to those skilled in the art without departing from the scope and spirit of the invention.

What is claimed is:

1. In a process of wrapping food wherein a waxed paper wrapper band is sealed by means of the wax thereon in overlapping relationship to a sheet of cellophane which envelops the food, the improvement of using as the wax for coating said paper a composition comprising in the range of from about one quarter to about three quarters percent of a polar wax, in the range of from about one half percent to about four percent of a partially crystalline, hard, non-tacky polymethylenic material having substantial crystallinity and an average molecular weight in the range of from about 1500 to about 30,000 and a density greater than about 0.92 gram per milliliter, in the range of from about one percent to about three and one half percent of a low molecular weight, amorphous, tacky, wax-compatible polymeric elastomer, and the remainder a blend of hydrocarbon waxes comprising in the range of from about twenty-five to about forty-five percent of a first hydrocarbon wax characterized by having a congealing point in the range of from about 140 to about 170° F., a consistometer hardness at 77° F. in the range of about 18 to about 30 units, a needle penetration at 77° F. in the range of from about 2.2 to about 5 millimeters and having not more than ten percent distillable at 600° F. and 10 millimeters of mercury, and in the range of from about seventy-five to about fifty-five percent of a second hydro-

carbon wax comprising predominantly a mixture of saturated normal paraffins and branched chain isoparaffins and characterized by having a melting point in the range of from about 140 to about 160° F., a consistometer hardness at 100° F. of at least 20 units and a maximum oil content of about 1 percent.

2. In a process of wrapping foods wherein a waxed paper wrapper band is sealed by means of the wax thereon in overlapping relationship to at least a portion of a sheet of cellophane which envelopes the food, the improvement of coating a paper wrapper band with a wax as characterized hereinafter and sealing said wax coated paper wrapper band to at least a portion of a sheet of cellophane which envelops the food product, said composition comprising in the range of from about one quarter to about three quarters percent of a polar wax, in the range of from about one half percent to about four percent of a hard, non-tacky, partially crystalline polymethylenic material having a substantial crystallinity and a molecular weight in the range of from about 1500 to about 30,000 and a density greater than 0.92, in the range of from about one percent to about three and one half perecnt of a low molecular weight, amorphous, tacky, polymeric elastomer, said elastomer being visually completely miscible in the blend of hydrocarbon wax A and hydrocarbon wax B hereinafter referred to in the relative amounts of said waxes and said elastomer required herein, and the remainder a blend of hydrocarbon waxes comprising in the range of from about twenty-five to about forty-five percent hydrocarbon wax A characterized by having a congealing point in the range of from about 140 to about 170° F., a consistometer hardness at 77° F. in the range of about 18 to about 30 units, and a needle penetration at 77° F. in the range of about 2.2 to about 5 millimeters and in the range of from about sevently-five to about fifty-five percent hydrocarbon wax B characterized by having a melting point in the range of from about 140 to about 160° F., a consistometer hardness at 100° F. of at least 20 units and a maximum oil content of about one percent.

3. In a process of wrapping foods wherein a waxed paper wrapper band is sealed by means of the wax thereon in overlapping relationship to a portion of a sheet of bread-wrapping grade cellophane which envelops the food, the improvement of using as the wax for coating said paper a composition comprising in the range of from about one quarter to about three quarters percent of a polar wax, in the range of from about one half percent to about four percent of a hard, non-tacky, partially crystalline polymethylenic, material, in the range of from about one percent to about three and one half percent of a low molecular weight, amorphous, tacky, wax-compatible polymeric elastomer selected from the class consisting essentially of homopolymers of propylene, butylene, isobutylene and isoprene, copolymers thereof, and copolymers thereof with ethylene, and mixtures thereof, and the remainder a blend of hydrocarbon waxes comprising in the range of from about twenty-five to about forty-five percent of a first hydrocarbon wax characterized by having a congealing point in the range of from about 140 to about 170° F., a consistometer hardness at 77° F. in the range of about 18 to about 30 units, a needle penetration at 77° F. in the range of from about 2.2 to about 5 millimeters and having not more than ten percent distillable at 600° F. and 10 millimeters of mercury, and in the range of from about seventy-five to about fifty-five percent of a second hydrocarbon wax comprising predominantly a mixture of saturated normal paraffins and branched chain isoparaffins and characterized by having a melting point in the range of from about 140 to about 160° F., a consistometer hardness at 100° F. of at least 20 units and a maximum oil content of about 1 percent.

4. In a process of wrapping bakery goods wherein a waxed paper wrapper band is sealed by means of the wax thereon in overlapping relationship to at least a portion of a sheet of cellophane which envelops the food, the improvement of coating a paper wrapper band with a wax as hereinafter characterized and sealing said wax coated paper to at least a portion of a sheet of cellophane which envelops said bakers goods, said composition comprising in the range of from about one quarter to about three quarters percent of carnauba wax, in the range of from about one half percent to about four percent of a partially crystalline polymethylenic synthetic wax characterized by a melting point of at least about 200° F., a needle penetration at 77° F. of less than about two millimeters, and a viscosity at 250° F. in the range of about 8 to about 14 centipoises, in the range of from about one percent to about three and one half percent of a low molecular weight, amorphous, tacky, wax-compatible polyisobutylene having an average molecular weight in the range of from about 5000 to about 20,000, and the remainder a blend of hydrocarbon waxes derived from petroleum comprising in the range of from about twenty-five to about forty-five percent of a first hydrocarbon wax characterized by having a congealing point in the range of about 140 to about 170° F., a consistometer hardness at 77° F. in the range of about 18 to about 30 units and a needle penetration at 77° F. in the range of about 2.2 to about 5 millimeters and in the range of from about seventy-five to about fifty-five percent of a second hydrocarbon wax characterized by having a melting point in the range of from about 140 to about 160° F., a consistometer hardness at 100° F. of at least 20 units and a maximum oil content of about one percent.

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RAYMOND N. JONES, *Primary Examiner.*